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MDCCLXXXIII.



Dictionary of Arts, Sciences, &c.

Sculpture.

SCULPTURE, the art of carving wood, or hewing stone, into images.

The antiquity of this art is past doubt; as the sacred writings, the most ancient and authentic monuments we have of the earliest ages, mention it in several places: witness Laban's idols stolen away by Rachel, and the golden calf which the Israelites set up in the desert, &c. But it is very difficult to fix the original of the art, and the first artists, from profane authors; what we read thereof being intermixed with fables, after the manner and taste of those ages.

The first works in sculpture were with clay, not only in making statues, but in forming models; and to this day a sculptor never undertakes any thing considerable, without forming a model either in clay or wax. In making figures of these materials, they begin and finish their work with their hands, using only three or four pieces of wood, which are roundish at one end, and at the other flat, with a sort of claws and teeth, which are to smooth and scratch the work. For waxen models, to every pound of wax add half a pound colophony; some add turpentine, and melt it together with oil of olives, more or less of the latter being used as they would have the matter harder or softer; some also add a little vermilion to give it a colour: this is wrought and moulded with the fingers like clay.

For sculpture in wood, which we properly call CARVING., the first thing required is to choose wood proper for the work the sculptor is to perform. If it be any thing large, and that requires a great deal of strength and solidity, the hardest and most durable wood is to be chosen; and for smaller works and ornaments, the softer wood is used; but it must be such, however, as is firm and close: for a large work, though it be only a single figure, it is better to make use of several pieces of wood, or bits of board, glued together, than of one whole piece, which is more liable to crack; for a thick piece of wood may not be dried to the heart, however it may appear on the outside. See CARVING.

In sculpture in marble and other stone, the first thing to be done is to saw out a block of marble, of the bigness of the work to be performed; and this being done, the superfluities are to be taken off by a stubbed point and a heavy mallet: thus bringing it near the measures required, the sculptor reduces it still nearer with a finer tool, called a dog's tooth, it having two points, but one not so sharp as the other. After this he makes use of his gradine, which is a flat cutting tool

with three teeth; he then takes off, with a smooth chisel, the scratches the gradine left on the marble, and uses it with dexterity and delicacy to give softness and tenderness to his figure; till at length, taking rasps of different degrees of fineness, the work is gradually rendered fit for polishing. To polish the work, the sculptor uses pumice-stone and smalt; then he goes over it with tripoli; and when he would give it more lustre, rubs it with leather and straw-ashes. There are several other tools used by sculptors, adapted to the different parts of the work and the nature of the stone they make use of. As the models of clay shrink as they grow dry, whenever sculptors undertake a considerable piece of work, they only use the model for making a mould of plaster or stucco, in which is formed a figure of the same matter, which serves them thenceforth for a model, and by which they adjust all their measures and proportions. To proceed the more regularly, on the head of the model they place an immoveable circle divided into degrees, with a moveable rule or index, fixed in the centre of the circle, and divided also into equal parts: from the end of the rule hangs a line with a plummet, which serves to take all the points, to be transferred thence to the block of marble, from whose top hangs another plummet like that of the model. But there are some excellent sculptors who disapprove of this method; urging, that the smallest motion of the model changes their measures; for which reason they choose rather to take all their measures with the compasses.

For the casting of statues or figures of metal, and the moulding of statues, &c. of stucco, plaster, &c. see the articles CASTING, FOUNDRY of Statues, &c.

SCUM, properly denotes the impurities which a liquor, by boiling, casts up to the surface. The term *scum* is also used for what is more properly called the scoria of metals.

SCURVY, in medicine. See that article, n° 97, 448.

SCURVY-GRASS, in botany. See COCHLEAREA. The officinalis, or common official scurvy-grass, grows upon rocks on the sea coast, and on the Highland mountains, abundantly. It has an acrid, bitter, and acid taste, and is highly recommended for the scurvy. There are instances of a whole ship's crew having been cured of that distemper by it; and as it abounds with acid salts, there can be no doubt but that it is a great refresher of putrefaction. The best way of taking

Sculpture
|
Scurvy-
grass.

Scutage
Scytala.

it is raw in a salad. It is also diuretic, and useful in dropsies. The Highlanders esteem it as a good stomachic.

The coronopus, another species, was some years ago rendered famous, the ashes of it being an ingredient in Mrs Joanna Stephens's celebrated medicine for the stone and gravel; but, unfortunately for those afflicted with that excruciating complaint, it has not been able to support its credit. It is acrid, and tastes like garden cress.

SCUTAGE (*scutagium*, Sax. *scildpening*), was a tax or contribution raised by those that held lands by knights-service, towards furnishing the king's army, at one, two, or three merks for every knight's fee. Henry III. for his voyage to the Holy Land, had a tenth granted by the clergy, and *scutage* three merks of every knight's fee by the *laity*. This was also levied by Henry II. Richard I. and king John. See KNIGHT-SERVICE.

SCUTE, (*scutum*) a French gold coin of 3s. 4d. in the reign of king Henry V. And Catharine queen of England had an assurance made her of sundry castles, manors, lands, &c. valued at the sum of 40,000 *scutes*, every two whereof were worth a noble. *Ret. Parl.* i. Hen. VI.

SCUTTLES, in a ship, square holes cut in the deck, big enough to let down the body of a man, and which serve upon some occasions to let the people down into any room below, or from one deck to another.

SCYLAX, a celebrated mathematician and geographer in the isle of Caryanda, in Caria, flourished under the reign of Darius Hytaspes, about 522 B. C. Some have attributed to him the invention of geographical tables. We have under his name a geographical work published by Hoeschelius; but it is written by a much latter author, and is perhaps only an abridgement of Scylax's Ancient Geography.

SCYLLA, (anc. geog.) a rock in the Fretum Siculum, near the coast of Italy, dangerous to shipping, opposite to Charybdis, a whirlpool on the coast of Sicily: both of them famous in mythology.

SCYROS, (anc. geog.) an island in the Egean sea, opposite to the middle of Eubœa to the east, with a cognominal town, (Ptolemy). The country of king Lycomedes; where Achilles, in the habit of a girl, was educated and lay concealed, to prevent going to the siege of Troy; who debauched Didamia, the king's daughter, and by her had Pyrrhus, (Ovid.) famous also for the death and place of exile of Theseus, king of Athens, (Valerius Maximus). Anciently inhabited by the Dolopes, a race of intolerable robbers, expelled by Timon the Athenian, (Thucydides, Plutarch). Now *Sciro*. E. Long. 25. o. N. Lat. 38. 15.

SCYTALA LACONICA, in antiquity, a stratagem or device of the Lacedæmonians, for the secret writing of letters to their correspondents, so that if they should chance to be intercepted, nobody might be able to read them.—To this end they had two wooden rollers, or cylinders, perfectly alike and equal; one whereof was kept in the city, the other by the person to whom the letter was directed. For the letter, a skin of very thin parchment was wrapped round the roller, and thereon was the matter written; which done, it was

taken off, and sent away to the party, who, upon putting it in the same manner upon his roller, found the lines and words in the very same disposition as when they were first wrote. This expedient they set a very high value on; though, in truth, artless, and gross enough: the moderns have improved vastly on this method of writing. See CIPHER.

SCYTHIA, an ancient name for the northern parts of Asia, now known by the name of *Tartary*; also for some of the north-eastern parts of Europe.

This vast territory, which extends itself from the Ilter or Danube, the boundary of the Celtes, that is from about the 25th to almost the 110th degree of east longitude, was divided into Scythia in Europe, and Scythia in Asia, including, however, the two Sarmatias; or, as they are called by the Greeks, *Sauromatias*, now the Circassian Tartary, which lay between and severed the two Scythias from each other. Sauromatia was also distinguished into European and Asiatic; and was divided from the European Scythia by the river Don or Tanis, which falls into the Paulus Meotis; and from the Asiatic by the Rha, now Volga, which empties itself into the Caspian sea.

1. The Asiatic Scythia comprehended, in general, great Tartary, and Russia in Asia; and, in particular, the Scythia beyond or without Imaus contained the regions of Bogdoi or Ostiacoi, and Tanguti. That within, or on this side Imaus, had Turkestan and Mongal, the Ubecke or Zagatai, Kal-muc and Nagaian Tartars; besides Siberia, the land of the Samoiodes, and Nova Zembla. These three last not being so soon inhabited as the former, as may be reasonably supposed, were wholly unknown to the ancients; and the former were peopled by the Bactrians, Sogdians, Gandari, Sacks, and Massagetes. As for Sarmatia, it contained Albania, Iberia, and Colchis; which makes now the Circassian Tartary, and the province of Georgia.

2. Scythia in Europe, reached (towards the south-west) to the Po and the Alps, by which it was divided from the Celtes, or Celto-Gallia, and by the Rhine northward. It was bounded on the south by the Ilter or Danube, and the Euxine sea. Its northern limits have been supposed to stretch to the spring-heads of the Boristhenes or Nieper, and the Rha or Volga, and so to that of the Tanais.—The ancients divided this country into Scythia Arimaspa, which lay eastward, joining to Scythia in Asia; and Sarmatia Europæana on the west. In Scythia, properly so called, were the Arimaspei on the north; the Getæ or Dacians along the Danube, on the south; and the Neuri between these two. So that it contained the European Russia, or Muscovy, and the lesser Crim Tartary eastward; and, on the west, Lithuania, Poland, part of Hungary, Transilvania, Walachia, Bulgaria, and Moldavia. Sarmatia is supposed to have reached northward, to that part of Swedeland called *Fennigia*, now *Finland*; in which they placed the Oœnes, Panoti, and Hippopodes. This part they divided from northern Germany, now the west part of Sweden and Norway, by the *Mare Sarmaticum* or *Scythicum*, which they supposed ran up into the northern ocean, and, dividing Lapland into two parts, formed the western part of Sweden, with Norway, into one island, and Finland into another; supposing this also

Scythia.

Although the ancient Scythians were celebrated as a warlike people, yet their history is too uncertain and obscure to enable us to give any detail which would not prove equally tiresome and uninteresting to the reader.

SEA, is frequently used for that vast tract of water encompassing the whole earth, more properly called *ocean*. See OCEAN.

With regard to the depth or profundity of the sea Varenus affirms, that it is in some places unfathomable, and in others very various, being in certain places $\frac{1}{2}$, $\frac{1}{3}$, $\frac{4}{5}$, $1\frac{1}{2}$, $2\frac{1}{2}$, $4\frac{1}{2}$ English miles, in other places deeper, and much less in bays than in oceans. In general, the depths of the sea bear a great analogy to the height of mountains on the land, so far as is hitherto discovered.

There are two principal reasons why the sea does not increase by means of rivers, &c. falling every where into it. The first is, because waters return from the sea by subterranean cavities and aqueducts, thro' various parts of the earth. Secondly, because the quantity of vapours raised from the sea, and falling on the land, only cause a circulation, but no increase, of water. It hath been found by calculation, that in a summer's day there may be raised in vapours, from the Mediterranean Sea, 528000000 tons of water; and yet this sea receiveth not, from all its nine great rivers above 182700000 tons per day, which is but a third part of what is exhausted in vapours.

SEA, is more properly used for a particular part or

division of the ocean; denominated from the countries it washes, or from other circumstances.—Thus we say, the *Irish sea*, the *Mediterranean sea*, the *Baltic sea*, the *Red sea*, &c.

Till the time of the emperor Justinian, the sea was common and open to all men: whence it is that the Roman laws grant an action against a person who shall prevent another in the free navigation or fishing therein.—The emperor Leo, in his 56th novel, first allowed such as were in possession of the land the sole privilege of fishing before their respective territories, exclusive of all others: he even gave a particular commission to certain persons, to divide the Thracian Bosphorus among them. From that time, the sovereign princes have been endeavouring to appropriate the sea, and to withdraw it from the public use. The republic of Venice pretends to be so far mistress in her gulf, that there is a formal marriage every year, between that seignory and the Adriatic.

In these last ages, the British have particularly claimed the empire of the sea in the channel; and even that of all the seas encompassing the three kingdoms of England, Scotland, and Ireland; and that as far as the shores of the neighbouring states. In consequence of which pretension it is, that children born on these seas are declared natural Britons, as much as if born on British ground.—The justice of this pretension is strenuously argued between Grotius and Selden, in the *Mare Liberum*, and *Mare Clausum*.

Encroachments by the Sea on the Dry Land. It has been matter of dispute whether the land or the water are gaining upon each in this terraqueous globe, and it is a dispute which seems not to be capable of an easy solution. In many places, it is certain that the sea has gained very considerably, and very recently too. In Britain several remarkable encroachments have been remarked. In the reign of Augustus, the isle of Wight made part of the island of Britain, so that at low water the Britons crossed over towards it with cart-loads of tin; but now the connection is totally cut off, and the isle of Wight is constantly separated from Britain by a channel half a mile wide. And in other places the same encroachments are perceptible. In general, on the eastern coast, the sea has gained ground; while on the southern and western, it has gained in some places, and lost in others. It has gained considerably on the coast of Yorkshire, Norfolk, Suffolk, Essex, and the eastern shore of Kent; as also that of Sussex, Hampshire, Dorsetshire, and Cornwall. Within this last half century also the sea has made large encroachments upon the islands of Scilly, and from May 1766 to May 1767 was observed to encroach 40 inches. It has also encroached upon the coasts of North Devonshire, Penbrokehire, and Cardiganhire. But, on the other hand, in the southern parts of Kent, in Lincolnshire and Lancashire, the land has gained upon the sea. In Kent, it has retreated from the beach of Sandwich, sunk the small ætuary of Solinus into an insignificant current, and converted a fine harbour, called by the Romans *Rutupæ*, where their fleet were regularly laid up, into a valley watered by a river. In Lincolnshire it has added a considerable quantity of ground to the coast, and left many thousand acres betwixt the old bank of

its waters and the present margin of its shore. And in Lancashire, the sands which originally formed the beach of the sea, and were covered every tide with its waters, are now regularly inhabited. They still retain the name given them by the Britons, viz. *Meales*, or *loose quaggy lands*; tho', loose and quaggy as they once were, they are now cultivated, and a parochial church and village erected upon them.

From considering these facts, we may doubt whether the sea in fact has gained on the land, or the land on the sea; as what is gained by either on one side may perhaps be lost on the other. Buffon imagines, that the sea is perpetually gaining upon the land, and will at last cover the tops of the highest mountains, leaving its present bed quite dry; but his notions concerning the gradual motion of the waters from one place to another have been so fully refuted under the article EARTH, that it is needless to mention any thing further concerning them in this place. Others there are who argue strenuously for the continual increase of dry land, and decrease of the sea. Their principal argument is drawn from a supposition of the vegetation of stone, and a petrifying quality inherent in sea water.

A Scotch gentleman, who was at Boulogne in the summer 1750, has favoured us with a remarkable instance of this petrifying quality in sea-water. He observed, that the British channel, which washes the bottom of a hill near that place, (commonly called *Cæsar's Fort*, from a Roman encampment still visible on it, said to have been constructed by Julius Cæsar when he invaded Britain), had worn in thro' a great part of the hill, which consists mostly of mixed land, with about three or four feet of a strong bluish clay soil above. As the sandy part is washed away, the clay falls down in large masses, and, as the inhabitants there affirm, is petrified by the salt water. In fact, one sees, about 40 or 50 yards within the present high-water mark, a large stratum of rocks, much resembling the black-rocks at Leith; and between these and the hill many huge masses of rock, though there appears nothing rocky on the bare side of the hill next the channel. And the inhabitants of Boulogne are every day seen blowing up these rocky masses with gun-powder, burning the stones into lime, and using them also as stones for their buildings. This gentleman, walking one day on the sands, saw a large lump of clay fallen from the hill, and so lying to be washed by the tide. He impressed a mark on it with his stick, which, being soft, it then easily received. But passing the same way about three weeks afterwards, he could not force his stick into the same lump.

From some limestone quarries also in the neighbourhood of Kirkcaldy in Fife, and which are taken notice of under the article QUARRY, it is inferred that stones vegetate, and that the waters of the sea have retreated ever since the deluge. These two causes, say the abettors of this doctrine, in a long series of ages, alter the face of our globe entirely, or rather have reduced the earth into its present form, by creating rocks at the bottom of the sea, and then leaving them in dry land, where they turn into inland mountains. This seems to be the method which nature observes: for all along our coasts there are limestone rocks, and some of them within low-water mark, which have the very same inclination, and the same mixture of petri-

fied sea-bodies, as in the quarry we have described; but since we see rocks of this kind arising out of the sea, we must of necessity ascribe the same origin to such as are more remote from the shore, and left up in the country.

All rocks, therefore, where such extraneous bodies are found, seem to be formed from the common sediment of the sea, as sands of several kinds, with the bones of fishes, stalks of sea-weed, and empty shells, which are all rolled into beds by the agitation of the waters. These different bodies, thus blended together, are, by the violence of the flux and reflux, banked up towards the shore: which is the cause of the inclination or dipping of the rock. No sooner is one stratum laid, than, by a continual accession of the same matter, a second is superinduced; and so on successively, till the mass has reached a certain height in water. These loose materials, as soon as the vegetation commences, are fastened by a very strong cement, and, as at the sight of Medusa's head, begin to assume the consistency of stone. For the petrific matter fills up all the interstices, pervades the pores of the most solid bodies, and lodges every where the particles that enter into its own composition; which seems to be a fixed salt, or very powerful astringent, together with a mixture of mineral juices or metallic ores, which run in small veins, like wire, in several places of the rock.

The shells, being of a close and compact texture, and therefore refusing admission to the grosser parts, seem to have received only the finer parts of the mixture, which has converted them into a transparent substance, somewhat resembling crystal. The seaweeds, of a more porous and spongy nature, have imbibed the whole lapidific matter; which has changed them into a fine white marble, capable of a very high polish. The like may be said of all the other bodies, as they are more rare or dense in their texture, and fitted to receive more or less of the petrific matter.

The only difficulty in this hypothesis, and what we must endeavour to surmount, is, that we must conceive the sea to be so high as to cover all the hills where such sea-bodies are to be found. So, in the present case, we must suppose it to have been above 200 feet higher than it is at present. Now, though neither history nor tradition could assist us in the inquiry, yet still the fact may be ascertained from indelible monuments, and more to be depended on than any human testimony whatever. For since our inland hills have the very same inclination, and the same mixture of shells, &c. as the rocks have which stand within low-water mark; what can we think, but that the former once stood where the latter stand now? why may we not conclude for certain, that, according to their distances, they have all successively arisen from the sea, as the only proper matrix for such productions, and the only place, too, where the materials that enter into their composition can be found? In short, by means of these petrified sea-bodies, we trace the waters which drowned the old world, like an enemy who leaves his spoils behind him in his retreat, from the tops of our highest inland hills down to the shore; and there see them all confined within the limits of our present sea, which seems still to be making the proper dispositions for leaving

Sea.

leaving us. Historians, when all our helps fail, produce medals and gold coins, as an authentic evidence of certain facts; in like manner, we may look upon sea-rocks, turned into inland hills, to be an undeniable proof that our earth hath arisen, inch by inch, from the sea.

The age of man bears so small a proportion to the age of the world, that the insensible changes made on the face of nature pass unobserved. We see so few alterations in our own times, that we conclude, too hastily, that there are none at all; or, when the land makes any encroachments in one place, the sea, we imagine, takes her revenge by inundations in another, and that in this manner their limits are pretty well secured. But this is undoubtedly a very lame account of the matter. For inundations seldom happen, and are but partial; whereas the recesses of the waters is universal, and, like the other great laws of nature, acts incessantly at all times. An earthquake in one place, the washing of loose sands and earths in another, may lay some particular spots under water; but these will by no means balance the encroachments of the land, remarkable more or less over all the globe. We will but give two or three instances out of many which with equal facility might be produced.

The island Pharos, according to Homer, who, perhaps spoke from experience, stood a day's sailing with a fair wind from the continent. That island, however, was joined to the land, in very ancient times, by a causeway of 900 paces, and makes now a part of the city of Alexandria. The city of Tyre, before the time of Alexander the Great, and for some ages after, was surrounded with a very deep sea of four fathoms over; and yet we know for certain, it has been joined to the continent upwards of 1000 years.—Æneas landed at Lavinium, if we can believe Virgil; but Lavinium stands now above 12 miles from the sea, and as rich vineyards and corn-fields as are in Italy must for ever go by the name of the *Lavinian shores*.—Ostia too has undergone the same fate, and become an inland town. Nothing but the express authority of historians, and its own stately ruins, could convince us that it was the celebrated Ostia built at the mouth of the Tiber.—The same observations may be extended to all the maritime towns famous in ancient history: their old harbours are now all choked up, buried under ground, or deserted by the sea, and left far up in the country.

Nor is there much weight in an objection that may be started in this place, namely, That there are several sea-port towns, famous in the ancient world, which have the same character in our own times. So London, under the emperor Nero, was, as it still is, a rendezvous of merchants, and a place of great foreign trade. But are we sure that these towns, though they have the same names, occupy also the same spots of ground with the old ones? Is it not more probable, that the inhabitants, not out of choice, but absolute necessity, and for the convenience of shipping, draw gradually down towards the sea as the rivers choke up towards their sources? This, we know, has happened to some, and we have great reason to believe the same of all.

"We may produce several very strong circumstances, which, taken all together, will amount to the force

Sea.

of a direct proof that the land has gained very considerably on our coasts. Whoever views the Carle of Falkirk from Stirling castle in Scotland, will think it extremely probable, that all that champaign country, as the ancients believe of the Lower Egypt, has been gained from the sea, by the vast quantity of sand and mud brought down the river. To confirm this conjecture, whenever the ground is digged in several places thereabouts, they meet with vast collections of shells and other spoils of the sea. A ship's anchor was found, some time since, in the same country, buried under ground, at two miles distance from the Forth. These two circumstances put it out of all doubt, nor need we any further proof of the matter. We have nothing but the name to inform us, that ever Burntisland was surrounded with the sea; but whoever views the situation of that place, will be convinced, that, not many centuries ago, it has been joined to Kye by a narrow and flat neck of land to the north. The inhabitants of Kirkcaldy, even those of a middle age, remember to have seen the tides flow a great deal higher than they do at present. The truth of it is, our shores are insensibly rising, not only from the huge sand-banks, but from a vigorous vegetation of stone, which prevails, among all our coasts, at the bottom of the sea. For nature is as hard at work now as ever; and it is improbable, that these rocks, where there is such a mixture of sea-bodies, which but just show their heads above water, will occasion as much speculation to future ages as their elder brothers in the inland places of the country do to us.

The encroachments of the land in the frith of Tay are more remarkable, and seem to be of a more recent date. The whole Carle of Gowrie has been, we may say, but a late acquisition from the sea; as the flat face of the country, and names of the towns, sufficiently evince. Most of their towns begin or end with *isle*, that is, *island*; as Meg-*isle*, Inse-*tower*, &c. probably the very names they went by when they were sand-banks, or islands surrounded by the sea.—Some old written instruments mention Errol as a place standing to the south of Tay, though it stands a long mile to the north of the river at present. The inhabitants of the country have a tradition, that the course of Tay, in former ages, was by the foot of the hills to the north of Errol, and to this day they show the very holes in rocks to which the ships cables were fastened. But if the Tay ran so far to the north, as there is great reason to believe, all the lower grounds to the south of Errol would be drowned, and that frith would be twice, if not thrice, as broad as it is in our time.—The inhabitants of Perth remember to have heard their fathers say, that, in the high hill of Kinnoil, they have seen the remains of staples and rings, with other conveniences for shipping, as in a harbour. At a village two miles above Perth, and far from the Tay, some workmen draining a peat-marsh, found the ring, stock, and shaft, of an anchor, with a great log of wood standing erect in the earth, to which it was conjectured the ships cables were fixed. The children of the workmen were lately alive to attest this fact.

These circumstances make it probable, that the land is continually usurping upon the sea, and also may reconcile us to what follows; for if the limestone quarry in the neighbourhood of Kirkcaldy was a
sea-

sea-rock, as it undoubtedly was, our frith must have covered twice the extent of ground that it does at present. All the lower part of Fife, for some miles up the country, except some islands here and there, and which are now hills or high lands, would be laid under water. The Lothians must have shared the same fate with Fife: for the very spot on which Edinburgh stands, would be covered with water; the Castle-rock, Calton-hill, and Salisbury Craig, would be sea-rocks; Arthur's seat would be diminished almost to its head; and, with respect to the coast then, might appear what Inse Keith does to us. Northumberland and the Merse must have been in the same situation with the counties bordering on the Forth. The lower part of these two counties would be deluged with a great sea, whose shores would be five or six miles westward from Berwick. The Tweed must have been so great a frith, that the largest ship in the present navy of England might have gone up the river, as far as Kello, if not farther. We call places by their names which then had none. In this manner we might make the tour of Great Britain, and, by imagining the sea to be 200 or 300 feet higher than it is at present, demonstrate, that our island is larger, by a third at least, than it was at that time.

Such has been the state of our island; in a very remote period of time, no doubt; though perhaps not in the ages immediately succeeding the deluge: on the contrary, it may be presumed, that as many ages must have passed from the deluge to the period we are speaking of as from thence to our own times. For we have all the reason in the world to believe, that, ever since the old world was drowned, the waters have fallen equally in equal times, and not faster at one time than at another as is commonly imagined. The bare rocks on our highest hills show sufficiently both the place where they have vegetated, and that for many ages they have borne the violence of that dreadful element: for it is impossible to conceive, that they could have come out of nature's hands in the miserable and ruinous condition in which they appear. Their ragged tops, tattered surfaces, and rifted sides, are the wounds they have received from an obdurate foe; who, though vanquished at last, has made many furious attacks, and disputed every inch of ground, before he has retreated.

It is very probable, that, in the earlier ages after the flood, the country between the Tweed and the Tay might appear in the following manner. The Cheviot hills to the south, and Lamermoor hills to the north, would be the limits of the frith of Tweed; the same Lamermoor hills to the south, and the Lomond hills to the north, would be the boundaries of the frith of Forth; the Lomond hills to the south, and a like ridge of hills to the north of the Tay, would be the confines of the frith; so that in all the space betwixt the Tweed and the Tay there would be three very great friths, with no inland intervening but the backs of these bare hills, which would show like long tongues of land running out a great way in the sea.

In reality, when one views the country around, from any of the high hills we have mentioned, and observes it sloping gradually from the inland parts down to the sea, and on each hand towards the beds of the rivers, one can hardly forbear thinking it was once in

such a situation, and that it still looks like the shore of a great sea, which has now, after a long succession of ages, almost disappeared. For, not only the earth slopes, as we have said before, towards the sea, or towards the rivers; but the very rocks, contrary to their natures, conform themselves to this inclination. The flat rocks, where the growth or vegetation runs horizontally, dip all at one extremity; whereas we might expect to find them all lying in the plane of the horizon. Again, in some kind of flint rock, where the vegetation shoots directly upwards, the flakes of the stone are all reflected from the perpendicular, and make a very obtuse angle with the horizon, not under 120 degrees, as nearly as can be guessed. Now, it is absolutely impossible to account for such an inclination, unless we suppose that the sand-banks, of which these rocks were originally formed, having been shored up towards the land, by the flux and reflux of the waters, before they were fixed by vegetation."

There are some of the strongest arguments which have been advanced for the continual increase of the dry-land, and decrease of the sea. How far they appear conclusive, we leave to the judgment of the reader.

Luminousness of the Sea. See LIGHT, n° 26.

SEA-Anemony, the same with *ANIMAL-flower*, a species of marine animals of the nature of polypi, very much resembling vegetables in their method of generation. In these creatures the young grow out from their sides, and when they are arrived at a certain size fall off from the parent. They are multiplied likewise by cutting them in pieces. In some the young ones are produced from the inside, and after a certain season are ejected by the mouth, which will also be the case at any time if the old one is put to great pain. The Abbé Diquemarre has published three essays on these animals, in the 64th and 67th vol. of the Philosophical Transactions, in which a great number of experiments are related concerning them. In his last essay he mentions a species of sea-anemonies which propagate by tearing off small shreds from their own bodies, each of which thro' time becomes a perfect animal. See *ANIMAL-flower*.

SEA-Bear. } See PHOCA.

SEA-Calf. } See PHOCA.

SEA-Crow. See TRICHECUS.

SEA-Crow, *MIRE-Crow*, or *Pewit*. See LARUS.

SEA-Horse. } See PHOCA.

SEA-Lion. } See PHOCA.

SEA-Mall, or *SEA-Mew*. See LARUS.

SEA-Marks. The erection of beacons, light-houses, and sea-marks, is a branch of the royal prerogative. By 8 Eliz. 13. the corporation of the Trinity-house are empowered to set up any beacons or sea-marks wherever they shall think them necessary; and if the owner of the land or any other person shall destroy them, or take down any steeple, tree, or other known sea-mark, he shall be forfeit 100 l. Sterling; or, in case of inability to pay it, he shall be *ipso facto* outlawed.

SEA-Water, that briny bitterish fluid which constitutes the sea.

The saltness of this water is very rationally judged to arise from great multitudes both of mines and mountains of salt, dispersed here and there

in the depths of the sea. Dr Halley supposes that it is probable the greatest part of the sea-falt and of all falt lakes, as the Caspian Sea, the Dead Sea, the Lake of Mexico, and the Titicaca in Peru, is derived from the water of the rivers which they receive : and since this sort of lakes has no exit or discharge but by the exhalation of vapours ; and also since these vapours are entirely fresh, or devoid of such particles ; it is certain the saltness of the sea and such lakes must from time to time increase, and therefore the saltness at this time is greater than at any time heretofore. He further adds, that if, by experiments made in different ages, we could find the different quantity of salt which the same quantity of water (taken up in the same place, and in all other the same circumstances) would afford, it would be easy from thence, by rules of proportion, to find the age of the world very nearly, or the time wherein it has been acquiring its present saltness.

With regard to the use of this falt property of sea-water, it is observed, that the saltness of the sea preserves its waters pure and sweet, which otherwise would corrupt and stink like a filthy lake, and consequently that none of the myriads of creatures which now live therein could then have a being. From thence also the sea-water becomes much heavier, and therefore ships of greater size and quantity may be used thereon. Salt water also doth not freeze so soon as fresh water, whence the seas are more free for navigation. We have a dissertation, by Dr Russel, concerning the medical uses of sea-water in diseases of the glands, &c. wherein the author premises some observations upon the nature of sea-water, considered as impregnated with particles of all the bodies it passes over, such as submarine plants, fish, salts, minerals, &c. and saturated with their several effluvia, to enrich it, and keep it from putrefaction : whence this fluid is supposed to contract a soapiness ; and the whole collection, being pervaded by the sulphureous steams passing through it, to constitute what we call *sea-water*, the confessed distinguishing characteristics of which are saltness, bitterness, nitrocity, and unctuousity : whence the author concludes, that it may be justly expected to contribute signally to the improvement of physic. The cases in which our author informs us we are to expect advantage from sea-water, are, 1. In all recent obstructions of the glands of the intestines and mesentery. 2. All recent obstructions of the pulmonary glands, and those of the viscera, which frequently produce consumptions. 3. All recent glandular swellings of the neck, or other parts. 4. Recent tumours of the joints, if they are not suppurated, or become scirrhous or cancerous, and have not carious bones for their cause. 5. Recent desquations upon the glands of the eye-lids. 6. All desquations of the skin, from an erysipelas to a lepra. 7. Diseases of the glands of the nose, with their usual companion a thickness of the lip. 8. Obstructions of the kidneys, where there is no inflammation, and the stone not large. 9. In recent obstructions of the liver, this method will be proper, where it prevents constipations of the belly, and assists other medicines directed in icteric cases. The same remedy is said to be of signal service in the bronchocele ; and is likewise recommended for the

prevention of those bilious colics that so frequently afflict our mariners.

Freshening SEA-Water. The method of making sea-water fresh, an advantage long wanted for the benefit of navigation, is now found to be easily performed by the simple process of distillation in a common still. This method was published by Dr Lind some time ago, and cannot by any means be improved, as the process is already reduced to its utmost simplicity. A pretended improvement was afterwards proposed by Dr Irvine ; for which he had the dexterity not only to get the merit of Dr Lind's discovery, but a premium of L. 5000. The improvement, if such it may be called, consists only in having a very large tube instead of the worm of the common still, and a person to wet the tube constantly with a mop, instead of using a worm-tub.

SEA-Needle, *Horn-fish*, *Gar-fish*. See *ESOX*.

SEA-Nettle. See *URTICA Marina*.

SEA-Pie or *Oyster-Catcher*. See *HÆMATOPUS*.

SEA-Serpent, a monstrous creature, said to inhabit the northern seas about Greenland and on the coasts of Norway. Pontoppidan, in his natural history of Norway, brings several testimonies of mariners who pretend to have seen it ; but no distinct account of its form and properties has been obtained. According to the relations there given, the sea-serpent is thicker than a large hoghead, and upwards of 600 feet in length ; with large blue eyes, resembling two polished pewter-plates, when seen at a distance. Sometimes it raises part of its body out of the water, so that its head will reach above the highest masts : and it is thought to be able to sink the largest man of war by throwing itself across it : yet it is said to be a timid animal ; and not only has never been known to do hurt, but flies from the slightest appearance of injury, &c. See Plate CCLXV.

SEA-Plants. Count Marfigli, who was at indefatigable pains to collect the various sea-plants of several places, divides all those productions into three classes.

The first class contains the soft or herbaceous ones ; the second the ligneous ones, or such as are of a woody hardness ; and the third, those which are of the hardness of stone. Of the first class are the algæ, called *sea-wrack* ; the fucuses, or sea-oaks ; the sea-mosses, or conservas ; and the different species of sponges.

Of the second kind are those called *lythophyta* by the ancients, as if their hardness approached to that of stones. All these consist of two substances, a cortical and an internal. The cortical part, while in the sea, is soft ; but in drying, it becomes as hard as chalk, or thereabouts, easily crumbling to pieces between the fingers : this is what deceived the ancients into an opinion of its being of a stony nature. The internal substance, properly speaking, seems to have more the nature of horn than of wood : if it is burnt, it throws out a smoke or froth, like that which horns or feathers of animals yield in the fire, and their smell in burning is of the same kind. The branches of these plants are very pliable, bending in the manner of whalebone ; and they give the same resistance to a knife in the cutting.

The stony plants, which should properly be called the *lythophyta*, but which never are called so, are the

several species of coral, madrepora, and the like. The madrepora differs from the coral, in having its surface pierced with almost innumerable holes. The corals, however, are now discovered to belong to the animal, not the vegetable kingdom. See CORAL.

The algae are the only sea-plants which have any roots, properly so called; these therefore grow out of the soft bottom of the sea as other plants out of the earth: but all the other sea-plants, without exception, appear fixed upon hard and solid bodies, incapable of affording them any nourishment; such as stones, shells, pieces of iron, of wood, &c. and sometimes on other plants; and they are not fastened to these substances by fibres passing into or surrounding them, but merely by a foot or pediment, capable of only fixing them down, not of drawing nourishment from the substances, were there any there. From this observation, the author concludes, that all the plants which have no roots, may be properly said to be all root, or to perform the office of roots in their whole substance, or that they take in nourishment in every part by certain pores, which in many are visible, and cover the whole surface.

This manner of receiving nourishment, he also observes, very well suits their condition, since they are always surrounded on all sides with that water by which they are to be nourished; whereas the plants which grow on land have only a part of them buried in the earth, from whence they are to be supplied with the proper juices. The roots of land-plants, therefore, have only the necessary organs for receiving supplies; whereas the sea-plants, he finds to be all over covered with small glands, whose office it is to receive and to convey into the internal parts of the plant the proper juices for its nourishment; and these, he observes, are in general of a glutinous and milky nature. The great difference between the land and sea plants is seen in this familiar instance: A land-plant will remain fresh for a long time in all its parts, on one end of the stalk only being plunged in water; but a sea-plant, if part of it be out of water and part in, will always be fresh and vigorous in that part which is under water, while the part that is dry will wither and decay. It is easy hence to see, that the several parts of the land-plants have connections with and dependences on one another; whereas, in the sea-plant, every part takes in its own nourishment, and lives and flourishes wholly independent of the rest.

After having gone through this general system, the author descends to several remarkable particulars. He mentions an instance of a fucus, whose stalk, when in its growing state, is a quarter of an inch in diameter; yet in drying shrinks up so much, as to be not thicker than a single thread. Another species, called by the fishermen the *sea-orange*, from its resemblance to an orange in shape, he observes, is properly a fucus; it has neither stalk nor branches, but consists wholly of this globular body; it is not a solid substance, but a membrane of about one ninth of an inch in thickness, regularly distended into this shape by being filled with sea-water. All over the sides of this cavity there are fixed slender filaments, which traverse the whole, and probably receive nourishment from the water contained in the cavity, and distribute it to the several parts of the sides where they are inserted. Another sea-plant

this author mentions, only appears in the shape of a bark; it affixes itself to the branches of the lythophyta, when they have lost their natural bark, and sometimes in the same manner coats and crufts over the surface of stones. When it is fresh, it is of a lively red, of the consistence of a mushroom, and about the thickness of the back of a common knife; and its external surface is full of small prominences, which contain a glutinous juice; round about these also there stand several yellow tubercles, which, with the red of the ground of the plant, make upon the whole a very beautiful appearance. Its under-surface is perfectly smooth and glossy. This seems a much more remarkable plant, as to the manner of its vegetation, than those which grow on other plants at land.

SEA-Weed, or *Alga Marina*, is commonly used as a manure in those places where it can be had in plenty. The best is that cut from the rocks, and of which kelp is made. The second best is that called the *peasy fort*, and the worst is that with a long stalk. This kind of manure is used chiefly for the barley-crop; in which case, or for fallow, it is ploughed in directly. The people of the country have such an high opinion of its fertilizing qualities, that they sometimes lay it out after the barley is in the ground; but that is a slovenly and injudicious method. In the neighbourhood of Berwick, it is used in their compound dunghills, with fold-yard, stable-dung, and earth; and in that manner an immense quantity of dung is produced by such farmers as are situated near the sea. It is remarkable, that such farmers as use the sea-weed properly, have their lands in such heart as seldom to have occasion for a fallow to restore their freshness. This species of manure is experimentally found to be excellent for gardens, as it not only enriches the ground, but destroys all the kinds of vermin.

SEA-Wolf. See ANARRHICAS.

South-Sea. See PACIFIC OCEAN, and SOUTH-SEA.

SEAL, a punchon, piece of metal, or other matter, usually either round or oval; whereon are engraven the arms, device, &c. of some prince, state, community, magistrate, or private person, often with a legend or inscription; the impression whereof in wax serves to make acts, instruments, &c. authentic.

The use of seals, as a mark of authenticity to letters and other instruments in writing, is extremely ancient. We read of it among the Jews and Persians in the earliest and most sacred records of history. And in the book of Jeremiah there is a very remarkable instance, not only of an attestation by seal, but also of the other usual formalities attending a Jewish purchase. In the civil law also, seals were the evidence of truth, and were required, on the part of the witnesses at least, at the attestation of every testament. But in the times of our Saxon ancestors, they were not much in use in England. For though Sir Edward Coke relies on an instance of king Edwin's making use of a seal about 100 years before the conquest, yet it does not follow that this was the usage among the whole nation: and perhaps the charter he mentions may be of doubtful authority, from this very circumstance of being sealed; since we are assured by all our ancient historians, that sealing was not then in common use. The method of the Saxons was, for such as could write to subscribe their names, and, whether they

they could write or not, to affix the sign of the cross: which custom our illiterate vulgar do for the most part to this day keep up, by signing a cross for their mark when unable to write their names. And indeed this inability to write, and therefore making a cross in its stead, is honestly avowed by Cædwalla, a Saxon king, at the end of one of his charters. In like manner, and for the same unformountable reason, the Normans, a brave but illiterate nation, at their first settlement in France, used the practice of sealing only, without writing their names: which custom continued when learning made its way among them, though the reason for doing it had ceased; and hence the charter of Edward the Confessor to Welmminster-abbey, himself being brought up in Normandy, was witnessed only by his seal, and is generally thought to be the oldest sealed charter of any authenticity in England. At the conquest, the Norman lords brought over into this kingdom their own fashions; and introduced waxen seals only, instead of the English method of writing their names, and signing with the sign of the cross. The impressions of these seals were sometimes a knight on horseback, sometimes other devices; but coats of arms were not introduced into seals, nor indeed into any other use, till about the reign of Richard I. who brought them from the croifade in the Holy Land, where they were first invented and painted on the shields of the knights, to distinguish the variety of persons of every Christian nation who resorted thither, and who could not, when clad in complete steel, be otherwise known or ascertained.

This neglect of signing, and resting only upon the authenticity of seals, remained very long among us; for it was held in all our books, that sealing alone was sufficient to authenticate a deed: and so the common form of attesting deeds, "sealed and delivered," continues to this day; notwithstanding the statute 29th Car. II. c. 3. revives the Saxon custom, and expressly directs the signing in all grants of lands and many other species of deeds: in which, therefore, signing seems to be now as necessary as sealing, though it hath been sometimes held that the one includes the other.

The king's *great seal* is that whereby all patents, commissions, warrants, &c. coming down from the king are sealed; the keeping whereof is in the hands of the lord chancellor. The king's *privy seal* is a seal that is usually first set to grants that are to pass the great seal.

SEAL is also used for the wax or lead, and the impression thereon, affixed to the thing sealed.

An amalgam of mercury with gold, reduced to a butyraceous consistence by straining off part of the mercury through leather, has been recommended as a proper material for taking off the impression of seals in wax. In this state, the compound scarce contains one part of mercury to two of gold; yet is of a silver whiteness, as if there was none of the precious metal in it. In this state it grows soft on being warmed or worked between the fingers; and is therefore proper for the purpose above-mentioned, but is not superior to some amalgams made with the inferior metals, as is well known to some impostors, who have sold for this use amalgams of the base metals as curious preparations of gold.

SEALER, an officer in chancery appointed by the lord chancellor or keeper of the great seal to seal the

writes and instruments there made, in his presence.

SEALING, in architecture, the fixing a piece of wood or iron in a wall with plaster, mortar, cement, lead, or other solid binding. For flaps, hinges, and joints, plaster is very proper.

SEALING-Wax. See WAX.

SEAM or SEME of corn, is a measure of eight bushels.

SEAM of Glass, the quantity of 120 pound, or 24 stones, each five pounds weight. The seam of wood is an horse-load.

SEAM, in mines, the fame with a vein or stratum of metal.

SEAMEN, such persons as are reserved to serve the king or others, at sea; who may not depart without licence, &c. See MARITIME State.

Seamen fighting, quarrelling, or making any disturbance, may be punished by the commissioners of the navy with fine and imprisonment. Registered seamen are exempted from serving in any parish, office, &c. and are allowed bounty-money beside their pay. By the law of merchants, the seamen of a vessel are accountable to the master or commander, the master to the owners, and the owners to the merchants, for damage sustained either by negligence or otherwise. Where a seaman is hired for a voyage, and he deserts before it is ended, he shall lose his wages; and in case a ship be lost in a storm, the seamen lose their wages, as well as the owners their freight.

Means of preserving the Health of SEAMEN. There is scarce any article of more importance to a commercial nation than this, as by means of its seamen every such nation is not only enriched, but defended from its enemies. Seamen are subject to putrid disorders from many causes, the principal of which are the want of cleanliness, the bad air in ships, and the putrid provisions which they are often obliged in long voyages to feed upon. So exceedingly fatal were the diseases produced from these causes formerly, that when the first East-India vessels failed, three of them suffered so much from the scurvy by the time they had got only three degrees beyond the line, that the merchants who had embarked on this adventure were obliged to do duty as common sailors; and out of their complement of 480 men there died in all 105. Sir Richard Hawkins also, an intelligent and experienced officer who lived about that time, relates, that "in 20 years, during which he had used the sea, he could give an account of 10,000 mariners who had perished by the scurvy alone." We have also a striking instance of the fatal effects of the scurvy in lord Anson's celebrated voyage round the world. Soon after he had passed the straits of Le Maire, this disease began to appear among his men; and by the time that the Centurion had advanced a little way on her voyage, 47 had died of it in his ship; and there were but few on board who had not in some degree been affected, though they had scarce been eight months from England. In the ninth month, when standing for the island of Juan Fernandez, the Centurion lost double that number; and the mortality went on at so great a rate, that, before they arrived there, she had lost upwards of 200, and at last could muster no more than six men in a watch capable of doing duty. The other ships suffered in the same proportion.

* See Mr.
Ainslie,
No 277.

tion. After having reached the island, the crews quickly recovered their health: but they had continued only a short time at sea when the same fatal distemper broke out again; and before the Centurion, which now contained the survivors of all the three crews, had got the length of the island of Tinian, more than four-fifths of the original complement were destroyed. However, it is probable that this extreme mortality was not occasioned by the scurvy alone; but that it was conjoined with that putrid and pestilential distemper called the *jail or hospital fever* *. But whether this was the cause or not, it is certain that both these distempers originate from putrefaction, and the same causes which prevent the scurvy will also prevent the jail fever.

How great is the contrast between this fatal voyage of Lord Anson, and that of captain Cook, who, "with a company of 118 men, performed a voyage of three years and 18 days, throughout all the climates, from 52° north to 71° south, with the loss of only one man by a distemper;" and even this one, of a phthisis pulmonalis, or consumption of the lungs, of which he would in all probability have died though he had remained at land! As this far exceeds any thing of the kind ever known before, it is evident, that the means used by captain Cook for the preservation of his mariners must be looked upon as the best for preserving the health of seamen that ever have been found out; for which reason we shall in this article give a summary account of these means.

The ships, besides being fitted up in the completest manner for resisting the dangers of the sea, were supplied with several kinds of provisions different from those usually furnished. They had wheat instead of oatmeal; sugar instead of oil: they had also malt; four kront, salted cabbage; portable broth; salep; marmalade of carrots; and inspissated juice of wort and beer. Some of these had before been found highly antiscorbutic; and others were sent out by way of experiment, particularly the two last. From the malt was made sweet wort, which by Dr Macbride was recommended as a powerful antiscorbutic; and was given from five to six pints a-day, as the surgeon thought necessary. Sour kront is cabbage cut small; to which is put a little salt, some juniper-berries, and anniseeds. It is then fermented, and afterwards packed close in casks; in which state it will keep good for a long time. The allowance for each man was two pounds a-week; but was increased or diminished according to circumstances. Salted cabbage is the vegetable cut to pieces and salted down in casks, by which means it may be preserved for a long time. Portable broth is made from the ligamentous and mucilaginous parts of beef boiled down into a kind of glue, and afterwards diluted with boiling water. Salep and rob of lemons and oranges were used only for the sick and scorbutic who were under the care of the surgeon. Marmalade of carrots is the juice of yellow carrots inspissated till it becomes of the consistence of honey or treacle, which last it resembles both in taste and colour. It was recommended by baron Storch of Berlin as a very great antiscorbutic. The inspissated juice of wort and beer were invented some years ago by Mr Pelham secretary to the commissioners of the victualling-office. This gentleman considered, that if the juice of malt, either as beer or wort, was inspissated by evaporation,

it was probable that it would keep good at sea; and if so, that a supply of beer might be had at any time, by mixing it with water. Mr Pelham's experiments succeeded so well, that the commissioners caused 31 half-barrels of this juice to be prepared, and sent out along with captain Cook's ships for a trial; 19 on board the *Resolution*, and 12 on board the *Adventure*. They were also provided with fishing-nets, lines, and hooks of every kind, for catching fish, wherever that was practicable.

The general success of these articles and precautions has already been mentioned. With regard to particulars, captain Cook tells us, that to such of the men as showed the least symptom of the scurvy, and even to such as seemed inclined to it, sweet wort was given from one to two or three pints a-day each man; or in such proportion as the surgeon thought necessary, which sometimes amounted to three quarts. "This," says he, "is without doubt one of the best antiscorbutic medicines hitherto discovered; and with, with proper attention to other things, I am persuaded, prevent the scurvy from making any great progress for a considerable while. But I am not altogether of opinion that it will cure it at sea. Sour kront is not only a wholesome vegetable food, but in my opinion highly antiscorbutic, and it spoils not by keeping. A pound of this was served to each man, when at sea, twice a-week, or oftener, as was thought necessary. —An ounce of portable broth for each man, or such other proportion as circumstances pointed out, was boiled in their peak, three days in the week; and when we were in places where vegetables were to be got, it was boiled with them and wheat or oatmeal every morning for breakfast, and also with pease and fresh vegetables for dinner. It enabled us to make several nourishing and wholesome messes, and was the means of making the people eat a greater quantity of vegetables than otherwise they would have done. The surgeon made use of rob of lemons and oranges in many cases with great success. We were certainly gainers by the exchange of wheat instead of oatmeal, and sugar instead of oil. Sugar, I apprehend, is a very good antiscorbutic; whereas oil, such as the navy is usually supplied with, I am of opinion, has a contrary effect.

"But the introduction of the most salutary articles, either as provisions or medicines, will generally prove unsuccessful, unless supported by certain regulations. On this principle, many years experience, together with some hints I had from Sir Hugh Palliser, captains Campbell, Wallis, and other intelligent officers, enabled me to lay a plan whereby all was to be governed.

"The crew were at three watches, except upon some extraordinary occasions. By this means they were not so much exposed to the weather as if they had been at watch and watch; and had generally dry clothes to shift themselves when they happened to get wet. Care was also taken to expose them as little as possible to wet weather. Proper methods were used to keep their persons, hammocks, bedding, cloaths, &c. constantly clean and dry. Equal care was taken to keep the ship clean and aired between decks. Once or twice a-week she was dried with fires; and when this could not be done, she was smoked with gunpowder, mixed with vinegar or water. I had also fire-

frequently a fire made in an iron pot at the bottom of the well, which was of great use in purifying the air in the lower parts of the ship. To this and to cleanliness, as well in the ship as among the people, too great attention cannot be paid; the least neglect occasions a putrid and disagreeable smell below, which nothing but fires will remove. Proper attention was paid to the ship's coppers, so that they were kept constantly clean. The fat which boiled out of the salt-beef and pork I never suffered to be given to the people, being of opinion that it promotes the scurvy.

"I was careful to take in water wherever it was to be got, even when we did not want it; because I look upon fresh water from the shore to be more wholesome than that which has been kept for some time on board a ship. Of this essential article we were never at an allowance, but had always plenty for every necessary purpose. Navigators, indeed, cannot in general expect, nor would they wish to meet, with such advantages in this respect as fell to my lot. The nature of our voyage carried us into very high latitudes: but the hardships and dangers inseparable from that situation were in some degree compensated by the singular felicity we enjoyed of extracting inexhaustible supplies of fresh water from an ocean strewed with ice.

"We came to few places where either the art of man, or the bounty of nature, had not provided some sort of refreshment or other, either in the animal or vegetable way. It was my first care to procure whatever of any kind could be met with, by every means in my power, and to oblige our people to make use thereof both by my example and authority; but the benefits arising from refreshments of any kind soon became so obvious, that I had little occasion to recommend the one or to exert the other."

In lord Anson's voyage, those who were ill of the scurvy found themselves so much refreshed with the oranges and lemons they met with on the island of Tinian, that these fruits have since been reckoned the best antiscorbutics in the world, and vast advantages were imagined to arise from the rob or extract of the juices of these fruits, if ships could be supplied with them in sufficient quantity. Captain Cook was supplied with some quantity; but his opinion is very different. In a letter to Sir John Pringle, dated July 7th 1776, he has the following paragraph: "I entirely agree with you, that the dearth of the rob of lemons and of oranges will hinder them from being furnished in large quantities: but I do not think this so necessary; for though they may assist other things, I have no great opinion of them alone. Nor have I a higher opinion of vinegar: my people had it very sparingly during the last voyage; and towards the latter part of it, none at all; and yet we experienced no ill effects from the want of it. The custom of washing the inside of the ship with vinegar I seldom observed, thinking that fire and smoke answered the purpose much better."—For further particulars relating to the means of prevention and cure of the scurvy, see the article *MEDICINE*, n° 448.

On the whole, it is easy to observe, that the same means which are necessary for the preservation of health at land, will also preserve it at sea; and without these the best medicines are ineffectual. The whole indeed may be comprehended under the following articles,

1. Plenty of wholesome food and drink. 2. Pure air. 3. Dry and warm lodging. 4. Moderate exercise, without excessive fatigue or want of sleep. If the provisions which ships carry out along with them would keep sound throughout the whole time of the voyage, there would be no more occasion for an exact regimen at sea than at land; but as the provisions necessarily spoil and become putrid in long sea-voyages, we are thence obliged to use large quantities of antiseptics, in order to correct that putrid tendency.—On land there is commonly a free circulation of air; and therefore the maladies which partly ensue from confined and putrid air in ships, have been thought to arise from some malignant quality in the sea-air itself: but if a proper circulation of air is produced throughout all the parts of the ship, either by ventilation or otherwise, the sea-air is found to be equally wholesome with that of land; nay, where the land-air is confined, as in jails and hospitals, it is found to produce diseases worse than even the scurvy. Lastly, if a person at land indulges himself in sloth and uncleanness, if his habitation is damp and dirty, he will very probably lose his health; and it is not to be wondered at if he should do the same in similar circumstances at sea. The means, then, of preserving the health of seamen are, besides an attention to the purity of the air, the cleanliness of the ship and crew, the laying in a sufficient stock of wholesome provisions, which will keep as long as possible, and renewing them as frequently as an opportunity can be found. And as drink is an article as essential to the preservation of health as food, a method of procuring a constant supply of pure uncorrupted water at sea must certainly be an object of the utmost importance; for which see the articles (*Freshening*) *SEA-WATER*, and *WATER* (*preserving it from putrefaction at sea*).

SEAPOYS, a name given to Indian soldiers who serve after the European manner. It is applied only to the natives of the East Indies.

SEARCLOTH, or *CERECLOTH*, in surgery, a form of external remedy somewhat harder than an unguent, yet softer than an plaster, though it is frequently used both for the one and the other. The cerecloth is always supposed to have wax in its composition, which distinguishes and even denominates it. In effect, when a liniment or unguent has wax enough in it, it does not differ from a cerecloth.

SEASIN, in a ship, the name of a rope by which the boat rides by the ship's side when in harbour, &c.

SEASONS, in cosmography, certain portions or quarters of the year distinguished by the signs which the sun then enters, or by the meridian altitudes of the sun; consequent on which are different temperatures of the air, different works in tillage, &c. The year is divided into four seasons; spring, summer, autumn, and winter.

SEBASTIAN, Sr. a handsome, populous, and strong town of Spain, in the province of Guipuscoa, with a good and well-frequented harbour. It is situated at the foot of a mountain; and the harbour secured by two moles, and a narrow entrance for the ships. The town is surrounded with a double wall, and to the sea-side is fortified with bastions and half-moons. The streets are long, broad, and straight, and paved with white flag-stones. At the top of the mountain is a citadel, with a garrison well-furnished with cannon.

The

Seamen

Sebastian.

Sebastiano,
Secale.

The town carries on a considerable trade, the greatest part of which consists of iron and steel, which some reckon to be the best in Europe. They also deal in wool, which comes from old Castile. W. Long. 1. 59. N. Lat. 43. 23. The capital of Brazil in South America is likewise called Sebastian.

SEBASTIANO, called *Del Pionbo*, from an office in the lead mines given him by Pope Clement VII. was an eminent Venetian painter, born in 1485. He was first a disciple of old Giovanni Bellino; continued his studies under Giorgione; and having attained an excellent manner of colouring, went to Rome, where he insinuated himself into the favour of Michael Angelo. He has the name of being the first who invented the art of preparing plaster-walls for oil-painting; but was so slow and lazy in his work, that other hands were often employed to finish what he began. He died in 1547.

SECALE, RYE; a genus of the d'ignia order, belonging to the triandria class of plants. There are four species, the most remarkable of which is the cerealis, or common rye cultivated in our fields. See AGRICULTURE, n° 112.—114.

Rye is next in price to wheat, which, though inferior to it in many respects, in some others it very much resembles. It rises higher than wheat; the ear is smaller, with shorter, sharper, and rougher awns; the grain is less in size, thinner and darker; the root not so bushy as that of wheat, and therefore does not so much exhaust the soil; it is earlier in the ear by a month. It is next in weight to wheat, the bushel being from 56 to 59 pounds; where they allow nine pecks to a bushel, it sometimes reaches to 67 pounds. In several places this grain with an early kind of wheat are sown and reaped together. This mixed corn is commonly called *maslin* (*swissellane*) and also *munck-corn* or *monk-corn*, corruptly for *monk-corn*, because bread made of it was commonly eat in monasteries. Professor Bradley assures us, that this was the sweetest and moistest bread he ever tasted. Many others are of the same opinion in this respect. But in the article of bread, we are at present rather governed by the sight than the taste. The general use of rye is for bread, of which there was much more formerly eaten than at present, and yet there is still more of it consumed in this way than of barley. Mr King estimates the produce of rye in his time at 10,000,000 of bushels. We grow at present 8,509,216 bushels, of which 7,992,000 are spent in bread, 284,000 are consumed in other uses, and 269,216 bushels are annually exported. This amounts to 283,7981; whereas in the last century, though we grew more, we imported considerable quantities, and consequently the nation gains very considerably by this grain. Rye-bread, in the opinion of good judges, is rather unwholesome than unpleasant. It is conceived to be of very difficult digestion, and therefore only fit for hard-working and laborious people. Besides this, it is black, heavy, and by no means pleasing to those who are not used to it; but, as appears from their continuing in the use of it, very acceptable, and agrees with such as have been accustomed to it from their youth. But this grain, being mixed with wheat, is thought from its clamminess, to contribute to keep the bread

made of it long moist, to give it an agreeable flavour, and to make it go farther, and to save the trouble of frequent baking. It yields a great deal of fine and strong spirit, and some use is made of it by the tanners.

Upon the whole, as the chief consumption of rye was in bread, and as for more than half a century past this has been continually diminishing, so we at present grow less of it than in times past, though we export more of it than we formerly did. It may, however, deserve some consideration, whether for several weighty reasons the culture of this grain should not be more attended to and encouraged; and, amongst others, for these that follow: Because it will grow almost every where, and on any soil, not only with little trouble, but, which is a circumstance not unworthy of notice, with less danger of failing than any other crop: Because, though less eaten than in former times, yet it is still in great esteem abroad, and especially in the northern parts of Europe, where the consumption of it is large, and it sells at a considerable price: and, lastly, Because our rye is thought wholesome, and much less, if indeed at all, exposed to that dreadful and deplorable malady the French call *ergot* (A), which frequently renders the eating it very dangerous and destructive, not to man only, but to all animals; and of course our rye from this fortunate circumstance will preserve a preference in foreign markets.

SECANT, in geometry, is a line that cuts another, or divides it into two parts.

SECEDEES, a sect of Presbyterians, who dissent from the established church of Scotland in the year 1733. The following circumstance gave rise to this sect. Messrs Erskine, Wilton, Moncrieff, and Fisher, ministers of the church of Scotland, obliquely refused, for several years, to obey the decisions of the General Assembly with regard to the settlement of ministers agreeably to the law of patronage: For this open contempt of authority, the assembly, after many and repeated admonitions, were at last obliged to eject them from their respective charges. These four clergymen, when they saw matters carried this length, immediately complained of persecution; professed uncommon sanctity and austerity of manners; and cried out that the church was over-run with various errors, such as, a compliance with the law of patronage; the tenderness of the assembly to professors Simpson and Campbell, who were accused of Arian and Arminian heresies; and a number of practical deviations from the covenanted reformation of Scotland: They even inveighed against the conduct of the government for their ready admission of malignant and wicked men into places of trust in the army and state; for the loose and unlimited restoration of Charles II. to the throne; for the restoration of Prelacy in England, which had been solemnly abjured; for restoring the superstitious Christmas vacation; for the repeal of the penal laws against witches, &c. &c. These things, joined to the popular talents of some of the above ministers, alarmed the minds of many well-meaning people, and in a few years procured a numerous train of followers. Elated with this unexpected success, they soon split into two parties. The chief point of contest among the leaders of this sect was concerning the lawfulness of what is called the *burgess-oath*; and hence the one party have

Secant,
Seceders.

(A) See Phil. Transf. N° 130. p. 758. It is a most horrid distemper, ending frequently in an incurable gangrene.

Seckendorf have ever since been called *Burghers*, and the other *Antiburghers*.

Second.

SECKENDORF (Guy Lewis de), a very learned German, descended from ancient and noble families, was born at Aurache in Franconia in 1626. He was a good linguist, learned in law, history, and divinity; and is said to have been a tolerable painter and engraver. He was honourably employed by several of the German princes; and died councillor of state to Frederick III. elector of Brandenburg, and chancellor of the university of Halle, in 1692. He wrote many books, particularly, "A history and defence of the Lutheran religion," 2 vols folio, Frankfurt, 1602, in Latin.

SECOMIÆ, in natural history, the name of a genus of fossils, of the class of septerizæ; the characters of which are, That they are bodies of a dusky hue; divided, by septa or partitions of a sparry matter, into several more or less regular portions; of a moderately firm texture; not giving fire with steel; but fermenting with acid menstrua, and easily calcining. The septerizæ of this genus are of all others the most common, and are what have been known by the little expressive or mistaken names of the waxen vein, or ludus Helmontii. We have many species of these bodies known among us. Of the whitish or brownish, we have 13; of the yellowish, five; and of the ferruginous ones, four.

SECOND, in geometry, chronology, &c. the 60th part of a prime or minute, whether of a degree or of an hour.

SECOND, in music, one of the musical intervals; being only the difference between any found and the next nearest found, whether above or below it.

SECOND Major, in music. See **INTERVAL**.

SECOND Minor, in music. See **INTERVAL**.

SECOND-SIGHT, a peculiar faculty, ascribed to some of the inhabitants of the Highlands of Scotland, by which they are said to foretel certain events before they come to pass. Some have denied, and others affirmed, the existence of this gift; instead of troubling our readers with the various accounts which they give of it, we shall present them with the following observations upon this subject by Dr Beattie of Aberdeen, whose account of the second-sight appears to us rational and well founded.

The Highlands of Scotland are a picturesque, but a melancholy country. Long tracts of mountainous desert, covered with dark heath, and often obscured by misty weather; narrow valleys, thinly inhabited, and bounded by precipices resounding with the fall of torrents; a soil so rugged, and a climate so dreary, as in many parts to admit neither the amusements of pasturage, nor the labours of agriculture; the mournful dashing of waves along the friths and lakes that intersect the country; the portentous noises which every change of the wind and every increased diminution of the waters is apt to raise in a lonely region full of echoes and rocks and caverns; the grotesque and ghastly appearance of such a landscape by the light of the moon: objects like these diffuse a gloom over the fancy, which may be compatible enough with occasional and social merriment, but cannot fail to tincture the thoughts of a native in the hour of silence and so-

litude. If these people, notwithstanding their reformation in religion, and more frequent intercourse with strangers, do still retain many of their old superstitions, we need not doubt but in former times they must have been much more enslaved to the horrors of imagination, when beset with the bugbears of Popery and Paganism. Most of their superstitions are of a melancholy cast. That of *second-sight*, by which some are still supposed to be haunted, is considered by themselves as a misfortune, on account of the many dreadful images it is said to obtrude upon the fancy. It is said that some of the Alpine regions do likewise lay claim to a sort of second-sight. Nor is it wonderful, that persons of a lively imagination, immersed in deep solitude, and surrounded with the stupendous scenery of clouds, precipices, and torrents, should dream (even when they think themselves awake) of those few striking ideas with which their lonely lives are diversified; of corpses, funeral processions, and other subjects of terror; or of marriages, and the arrival of strangers, and such like matters of more agreeable curiosity.

Let it be observed also, that the ancient Highlanders of Scotland had hardly any other way of supporting themselves than by hunting, fishing, or war, professions that are continually exposed to fatal accidents. And hence, no doubt, additional horrors would often haunt their solitude, and a deeper gloom overshadow the imagination even of the hardiest native.

A sufficient evidence can hardly be found for the reality of the *second-sight*, or at least of what is commonly understood by that term. A treatise on the subject was published in the year 1762, in which many tales were told of persons whom the author believed to have been favoured, or haunted, with these illuminations; but most of the tales were trifling and ridiculous: and the whole work betrayed, on the part of the compiler, such extreme credulity, as could not fail to prejudice many readers against his system.

That any of these visionaries are apt to be swayed in their declarations by sinister views, we will not say; but this may be said with confidence, that none but ignorant people pretend to be gifted in this way. And in them it may be nothing more, perhaps, than short fits of sudden sleep or drowsiness, attended with lively dreams, and arising from some bodily disorder, the effect of idleness, low spirits, or a gloomy imagination. For it is admitted, even by the most credulous Highlanders, that as knowledge and industry are propagated in their country, the second-sight disappears in proportion; and nobody ever laid claim to the faculty who was much employed in the intercourse of social life. Nor is it at all extraordinary, that one should have the appearance of being awake, and should even think one's self so, during those fits of dozing; that they should come on suddenly, and while one is engaged in some business. The same thing happens to persons much fatigued, or long kept awake, who frequently fall asleep for a moment, or for a long space, while they are standing, or walking, or riding on horseback. Add but a lively dream to this slumber, and (which is the frequent effect of disease) take away the consciousness of having been asleep, and a superstitious man may easily mistake his dream for a waking vision; which, how-

Second
Secretary.

however, is soon forgotten when no subsequent occurrence recalls it to his memory; but which, if it shall be thought to resemble any future event, exalts the poor dreamer into a Highland prophet. This conceit makes him more recluse and more melancholy than ever; and so feeds his disease, and multiplies his visions: which, if they are not dissipated by business or society, may continue to haunt him as long as he lives; and which, in their progress through the neighbourhood, receive some new tinctures of the marvellous from every mouth that promotes their circulation. As to the prophetic nature of this second-sight, it cannot be admitted at all. That the Deity should work a miracle in order to give intimation of the frivolous things that these tales are made up of, the arrival of a stranger, the nailing of a coffin, or the colour of a suit of cloaths; and that these intimations should be given for no end, and to those persons only who are idle and solitary, who speak Galic, or who live among mountains and deserts, is like nothing in nature or providence that we are acquainted with; and must therefore, unless it were confirmed by satisfactory proof (which is not the case), be rejected as absurd and incredible.

These visions, such as they are, may reasonably enough be ascribed to a disordered fancy. And that in them, as well as in our ordinary dreams, certain appearances show, on some rare occasions, resemble certain events, is to be expected from the laws of chance; and seems to have in it nothing more marvellous or supernatural, than that the parrot, who deals out his fooleries at random, should sometimes happen to salute the passenger by his right appellation.

SECONDARY, in general, something that acts as second or in subordination to another.

SECONDARY *Qualities of Bodies*. See METAPHYSICS, n° 32, 35.

SECONDAT. See MONTESQUIEU.

SECRETARY, an officer who, by his master's orders, writes letters, dispatches, and other instruments, which he renders authentic by his signet. Of these there are several kinds; as, 1. Secretaries of state, who are officers that have under their management and direction the most important affairs of the kingdom, and are obliged constantly to attend on the king: they receive and dispatch whatever comes to their hands, either from the crown, the church, the army, private grants, pardons, dispensations, &c. as likewise petitions to the sovereign, which, when read, are returned to them; all which they dispatch according to the king's direction. They have authority to commit persons for treason, and other offences against the state, as conservators of the peace at common law, or as justices of the peace throughout the kingdom. They are members of the privy-council, which is seldom or never held without one of them being present. As to the business and correspondence in all parts of this kingdom, it is managed by either of the secretaries without any distinction; but with respect to foreign affairs, the business is divided into two provinces or departments, the southern and the northern, comprehending all the kingdoms and states that have any intercourse with Great Britain; each secretary receiving all letters and addresses from, and making all dispatches to, the several princes and states comprehended in his province. Ireland and the Plantations are un-

der the direction of the elder secretary, who has the southern province, which also comprehends France, Italy, Switzerland, Spain, Portugal, and Turkey: the northern province includes the Low Countries, Germany, Denmark, Sweden, Poland, and Muscovy. Each of the secretaries has an apartment in all the royal houses, both for their own accommodation and their officers; they have also a table at the king's charge, or else board-wages. The two secretaries for Britain have each two under secretaries, and one chief clerk; with an uncertain number of other clerks and translators, all wholly depending on them. To the secretaries of state belong the custody of that seal properly called the *signet*, and the direction of two other offices, one called the *paper-office*, and the other the *signet-office*. 2. Secretary of an embassy, a person attending an ambassador, for writing dispatches relating to the negotiation. There is a great difference between the secretary of an embassy, and the ambassador's secretary; the last being a domestic or menial of the ambassador, and the first a servant or minister of the prince. 3. The secretary of war, an officer of the war-office, who has two chief clerks under him, the last of which is the secretary's messenger. There are also secretaries in most of the other offices.

SECRETION, in the animal economy, the separation of some fluid mixed with the blood by means of the glands. See the article GLAND.—In the bodies of animals we observe a great number of juices of different natures, viz. the blood, lymph, saliva, stomach-liquor, intestinal juices, pancreatic juice, bile, urine, &c. and the blood is the general source of all. See the articles BLOOD, LYMPH, SALIVA, &c.

SECT, a collective term, comprehending all such as follow the doctrines and opinions of some famous divine, philosopher, &c.

SECTION, in general, denotes a part of a divided thing, or the division itself. Such, particularly, are the subdivisions of a chapter; called also *paragraphs*, and *articles*: the mark of a section is §.

SECTION, in geometry, denotes a side or surface appearing of a body or figure cut by another; or the place where lines, planes, &c. cut each other.

SECTOR, in geometry, is a part of a circle, comprehended between two radii and the arch; or it is a mixed triangle, formed by two radii and the arch of a circle.

SECTOR, is also a mathematical instrument of great use in finding the proportion between quantities of the same kind, as between lines and lines, surfaces and surfaces, &c. for which reason the French call it the *compas of proportion*.

The great advantage of the sector above common scales, &c. is, that it is adapted to all radii, and all scales. For, by the line of chords, fines, tangents, &c. adapted to any radius betwixt the length and breadth of the sector, when opened.

The sector is founded on the fourth proposition of the sixth book of Euclid, where it is demonstrated, that similar triangles have their homologous sides proportional; an idea of its foundation or theory may be conceived from what follows. Let the lines AB, AC, ^{Plate} CCLXVII. represent the two legs of the sector, and AD, AE, ^{fig. 6.} two equal sections from the centre. If now the points BC and DE be connected, the lines BC and DE will be

Secretion
Sector.

Sector.

be parallel: therefore the triangles ADE, and ABC, will be similar, and consequently the sides AD, DE, AB, BC, proportional; that is, as AD:DE::AB:BC; whence, if AD be the half, third, or fourth part of AB, DE will be a half, third, or fourth part BC. Whence it follows, that if AD be the chord, sine, tangent, &c. of any number of degrees to the radius AB, DE will be the same to the radius BC.

Sector.

Plate CCLXXVII.
fig. 7, 8.

Description of the SECTOR. This instrument consists of two equal legs or rules of brass, &c. riveted together, but so as to move easily on the rivet: on the faces of the instrument are placed several lines; the principal of which are the line of equal parts, line of chords, line of sines, line of tangents, line of secants, and line of polygons.

The line of equal parts, called also the *line of lines*, marked L, is a line divided into 100 equal parts, and where the length of the leg will allow it, each of these is subdivided into halves and quarters. It is found on each leg, on the same side, and the divisions numbered 1, 2, 3, 4, 5, &c. to 10, which is near the extremity of each leg. Note, in practice, 1 represents either 1, 10, 100, 1000, 10000, &c. as occasion requires; in which case, 2 represents 2, 20, 200, 2000, 20000, &c. and so of the rest. The line of chords, marked C on each leg, is divided after the usual manner, and numbered 10, 20, 30, &c. to 60. The line of sines, denoted on each leg by the letter S, is a line of natural sines, numbered 10, 20, 30, &c. to 90. The line of tangents, denoted on each leg by the letter T, is a line of natural tangents, numbered 10, 20, 30, &c. to 45. Besides which, there is another little line of tangents on each leg, commencing at 45°, and extending to 75°, denoted by the letter t. Line of secants, denoted on each leg by the letter f, is a line of natural secants, numbered 10, 20, 30, &c. to 75, not commencing at the centre of the instrument, but at some distance therefrom. The line of polygons, denoted by the letter P on each leg, is numbered 4, 6, 5, &c. to 12, which falls considerably short of the centre of the instrument.

Besides these lines, which are essential to the sector, there are others placed near the outward edges on both sides, and parallel thereto; which are in all respects the same as those on Gunter's scale, and used after the same manner. Such are the lines of artificial sines marked S, of artificial tangents marked T, and Gunter's line of numbers marked N; these lines do not extend to the end of the instrument. There are sometimes other lines placed, to fill the vacant spaces, as the lines of hours, latitudes, and inclination of meridians, which are used the same as on the common scales.

The lines found by the sector are of two kinds, lateral and parallel; the first are such as are found by the sides of the sector, as AB, AC, (fig. 6.) the latter such as go across from one leg to the other, as DE, BC. Note, the lines are not placed in the same order on all sectors, but they may be easily found by the above directions.

Use of the Line of Equal Parts on the SECTOR. 1. To divide a given line into any number of equal parts, suppose seven. Take the given line in your compass; and setting one foot in a division of equal parts, that may be divided by seven, for example, 70,

whose seventh part is 10, open the sector till the other point fall exactly on 70, in the same line on the other leg. In this disposition, applying one point of the compasses to 10, in the same line, shut them till the other fall in 10, in the same line, on the other leg, and this opening will be the seventh part of the given line. Note, if the line to be divided be too long to be applied to the legs of the sector, divide only one half or one fourth by 7, and the double or quadruple thereof will be the seventh part of the whole.

2. To measure the lines of the perimeter of a polygon, one of which contains a given number of equal parts. Take the given line in your compasses, and set it parallel, upon the line of equal parts, to the number on each leg expressing its length. The sector remaining thus, set off the length of each of the other lines parallel to the former, and the numbers each of them falls on will express their lengths.

3. A right line being given, and the number of parts it contains, suppose 120, to take from it a shorter line, containing any number of the same parts, suppose 25. Take the given line in your compasses, open the sector till the two feet fall on 120 on each leg; then will the distance between 25 on one leg, and the same number on the other, give the line required.

4. To multiply by the line of equal parts on the sector. Take the lateral distance from the centre of the line to the given multiplicator; open the sector till you fit that lateral distance to the parallel of 1 and 1, or 10 and 10, and keep the sector in that disposition; then take in the compasses the parallel distance of the multiplicand, which distance, measured laterally on the same line, will give the product required. Thus, suppose it were required to find the product of 8, multiplied by 4: take the lateral distance from the centre of the line to 4 in your compasses, i. e. place one foot of the compasses in the beginning of the divisions, and extend the other along the line to 4. Open the sector till you fit this lateral distance to the parallel of 1 and 1, or 10 and 10. Then take the parallel distance of 8, the multiplicand; i. e. extend the compasses from 8, in this line, on one leg, to 8 in the same line on the other; and that extent, measured laterally, will give the product required.

5. To divide by the line of equal parts on the sector. Extend the compasses laterally from the beginning of the line to 1, and open the sector till you fit that extent to the parallel of the divisor; then take the parallel distance of the dividend, which extent, measured in a lateral direction, will give the quotient required. Thus, suppose it was required to divide 36 by 4; extend the compasses laterally, the beginning of the line to 1, and fit to that extent the parallel of 4, the divisor; then extend the compasses parallel, from 36 on one leg to 36 on the other, and that extent, measured laterally, will give 9, the quotient required.

Use of the Sine of Chords on the SECTOR. 1. To open the sector so as the two lines of chords may make an angle or number of degrees, suppose 40. Take the distance from the joint to 40, the number of the degrees proposed, on the line of chords; open the sector till the distance from 60 to 60, on each leg, be equal to the given distance of 40; then will the two

Sector.

lines on the sector form an angle of 40 degrees, as was required.

2. The sector being opened, to find the degrees of its aperture. Take the extent from 60 to 60, and lay it off on the line of chords from the centre; the number whereon it terminates will show the degrees, &c. required.

3. To lay off any number of degrees upon the circumference of a circle. Open the sector till the distance between 60 and 60 be equal to the radius of the given circle; then take the parallel extent of the chord of the number of degrees on each leg of the sector, and lay it off on the circumference of the given circle. Hence any regular polygon may be easily inscribed in a given circle.

Use of the Line of Polygons on the Sector. 1. To inscribe a regular polygon in a given circle. Take the semidiameter of the given circle in the compasses, and adjust it to the number 6, on the line of polygons, on each leg of the sector: then, the sector remaining thus opened, take the distance of the two equal numbers, expressing the number of sides the polygon is to have; *e. gr.* the distance from 5 to 5 for a pentagon, from 7 to 7 for a heptagon, &c. These distances carried about the circumference of the circle, will divide it into so many equal parts.

2. To describe a regular polygon, *e. gr.* a pentagon, on a given right line. Take the length of the line in the compasses, and apply it to the extent of the number 5, 5, on the lines of polygons. The sector thus opened, upon the same lines take the extent from 6 to 6; this will be the semi-diameter of the circle the polygon is to be inscribed in. If then, with this distance, from the ends of the given line, you describe two arches of a circle, their intersection will be the centre of the circle.

3. On a right line, to describe an isosceles triangle, having the angles at the base double that at the vertex. Open the sector, till the ends of the given line fall on 10 and 10 on each leg; then take the distance from 6 to 6. This will be the length of the two equal sides of the triangle.

Use of the Lines of Sines, Tangents, and Secants, on the Sector. By the several lines disposed on the sector, we have scales to several radiuses; so that having a length or radius given, not exceeding the length of the sector when opened, we find the chord, sine, &c. thereto. *e. gr.* Suppose the chord, sine, or tangent, of 10 degrees, to a radius of 3 inches required; make 3 inches the aperture, between 60 and 60, on the lines of chords of the two legs; then will the same extent reach from 45 to 45 on the line of tangents, and from 90 to 90 on the line of the sines on the other side; so that to whatever radius the line of chords is set, to the same are all the others set. In this disposition, therefore, if the aperture between 10 and 10, on the lines of chords, be taken with the compasses, it will give the chord of 10 degrees. If the aperture of 10 and 10 be in like manner taken on the lines of sines, it will be the sine of 10 degrees. Lastly, if the aperture of 10 and 10 be in like manner taken on the lines of tangents, it gives the tangent of 10 degrees.

If the chord, or tangent, of 70 degrees were required; for the chord, the aperture of half the arch, viz. 35, must be taken, as before; which distance,

repeated twice, gives the chord of 70 degrees. To find the tangent of 70 degrees to the same radius, the small line of tangents must be used, the other only reaching to 45: making, therefore, 3 inches the aperture between 45 and 45 on the small line; the extent between 70 and 70 degrees on the same, will be the tangent of 70 degrees to 3 inches radius.

To find the secant of an arch, make the given radius the aperture between 0 and 0 on the line of secants: then will the aperture of 10 and 10, or 70 and 70, on the said lines, give the tangent of 10°, or 70°.

If the converse of any of these things were required, that is, if the radius be required, to which a given line is the sine, tangent, or secant, it is but making the given line, if a chord, the aperture on the line of chords, between 10 and 10, and then the sector will stand at the radius required; that is, the aperture between 60 and 60 on the said line is the radius. If the given line were a sine, tangent, or secant, it is but making it the aperture of the given number of degrees; then will the distance of 90 and 90 on the sines, of 45 and 45 on the tangents, of 0 and 0 on the secants, be the radius.

Astronomical Sector. See *ASTRONOMICAL Sector*. SECULAR, something which is temporal; in which sense the word stands opposed to ecclesiastical: thus we say, secular power, secular jurisdiction, &c.

Secular is more peculiarly used for a person who lives at liberty in the world, not shut up in a monastery, nor bound by vows, or subjected to the particular rules of any religious community; in which sense it stands opposed to *regular*. The Romish clergy are divided into secular and regular.

SECULAR Games, in antiquity, solemn games held among the Romans once in an age. These games lasted three days and as many nights; during which time sacrifices were performed, theatrical shows exhibited, with combats, sports, &c. in the circus. The occasion of these games, according to Valerius Maximus, was to stop the progress of a plague. The first who had them celebrated at Rome was Valerius Publicola, the first consul created after the expulsion of the kings. The ceremonies to be observed therein were found prescribed in one of the books of the Sibyls. At the time of the celebration of the secular games, heralds were sent throughout all the empire, to intimate that every one might come and see those solemnities which he never yet had seen, nor was ever to see again. Authors are not agreed as to the number of years wherein these games returned, partly because the quantity of an age or *seculum* among the ancients is not known, and partly on other accounts: some will have it that they were held every hundred years, and that the *seculum* or age was our century.

SECULAR Poem, a poem sung or rehearsed at the secular games; of which kind we have a very fine piece among the works of Horace, being a sapphic ode at the end of his epodes.

SECULARIZATION, the act of converting a regular person, place, or benefice, into a secular one. Almost all the cathedral churches were anciently regular, that is, the canons were to be religious; but they have been since secularized. For the secularization of a regular church, there is required the authority of the pope, that of the prince, the bishop of the place,

Secular,
Seculariza-
tion.

Secundines

Sedley.

place, the patron, and even the consent of the people. Religious that want to be released from their vow, obtain briefs of secularization from the pope.

SECUNDINES, in anatomy, the several coats or membranes wherein the fœtus is wrapped up in the mother's womb; as the chorion and amnios, with the placenta, &c.

SECUTORES, in antiquity, a kind of gladiators among the Romans, who fought against the rittarii. The secutores were armed with a sword and a buckler, to keep off the net or noose of their antagonists, and they wore a cask on their head.

This was also a name given to such gladiators as took the place of those killed in the combat, or who fought the conqueror.

SEDAN, a strong town of France in the province of Champagne, on the confines of Luxemburg. It is one of the keys to the kingdom; and there is a well-furnished arsenal, and a fine manufactory of woollen clothes and stuffs. It is seated on the river Marne, in E. Long. 5. 2. N. Lat. 49. 12.

SEDATIVES, in medicine, a general name for such medicines as weaken the powers of nature, such as venesection, cooling salts, purgatives, &c.

SE DEFENDO, in law, a plea used for him that is charged with the death of another, by alleging that he was under a necessity of doing what he did in his own defence: as that the other assaulted him in such a manner, that if he had not done what he did, he must have been in hazard of his own life. See **HOMICIDE**, and **MURDER**.

SEDIMENT, the settlement or dregs of any thing; or that gross, heavy part of a fluid body, which, upon resting, sinks to the bottom of the vessel.

SEDLEY (Sir Charles), an English poet and wit, the son of Sir John Sedley of Aylesford in Kent, was born about the year 1639. At the restoration he came to London to join the general jubilee; and commended wit, courtier, poet, and gallant. He was so much admired, that he became a kind of oracle among the poets; which made King Charles tell him, that Nature had given him a patent to be Apollo's viceroy. The productions of his pen were some plays, and several delicately tender amorous poems, in which the softness of the verses was so exquisite, as to be called by the duke of Buckingham *Sedley's witchcraft*. "There were no marks of genius or true poetry to be discerned, (say the authors of the *Biographia Britannica*;) the art wholly consisted in raising loose thoughts and lewd desires, without giving any alarm; and so the poison worked gently and irresistibly. Our author, we may be sure, did not escape the infection of his own art, or rather was first tainted himself before he spread the infection to others."—A very ingenious writer of the present day, however, speaks much more favourably of Sir Charles Sedley's writings. "He studied human nature; and was distinguished for the art of making himself agreeable, particularly to the ladies: for the verses of Lord Rochester, beginning with, *Sedley has that prevailing gentle art*, &c. so often quoted, allude not to his writings, but to his personal address." [*Langborne's Essay*, &c.]—But while he thus grew in reputation for wit and in favour with the king, he grew poor and debauched; his estate

was impaired, and his morals were corrupted. One of his frolics, however, issuing in an indictment and a heavy fine, Sir Charles took a more serious turn, applied himself to business, and became a member of parliament, in which he was a frequent speaker. We find him also in the House of Commons in the reign of James II. whose attempts upon the constitution he vigorously withstood; and he was very active in bringing on the revolution. This was thought more extraordinary, as he had received favours from James. But that prince had taken a fancy to Sir Charles's daughter, (though it seems he was not very handsome), and, in consequence of his intrigues with her, he created Miss Sedley countess of Dorchester. This honour, so far from pleasing, greatly shocked Sir Charles. However libertine he himself had been, yet he could not bear the thoughts of his daughter's dishonour; and with regard to her exaltation, he only considered it as rendering her more conspicuously infamous. He therefore conceived a hatred for the king; and from this, as well as other motives, readily joined to dispossess him of the throne. A witty saying of Sedley's, on this occasion, is recorded. "I hate ingratitude, (said Sir Charles); and therefore, as the king has made my daughter a countess, I will endeavour to make his daughter a queen;" meaning the princess Mary, married to the prince of Orange, who dispossessed James of the throne at the revolution. He lived to the beginning of queen Anne's reign; and his works were printed in 2 vols 8vo, 1710.

SEDR, or **SEDRÉ**, the high-priest of the sect of Ali among the Persians. The sedre is appointed by the emperor of Persia, who usually confers the dignity on his nearest relation. The jurisdiction of the sedre extends over all effects destined for pious purposes, over all mosques, hospitals, colleges, sepulchres, and monasteries. He disposes of all ecclesiastical employments, and nominates all the superiors of religious houses. His decisions in matters of religion are received as so many infallible oracles; he judges of all criminal matters in his own house without appeal. His authority is balanced by that of the muditehid, or first theologue of the empire.

SEDUCTION, the act of seducing, corrupting, or drawing aside.

SEDUCTION of Women-children. By 4. and 5 of *Ph. and Mary*, c. 8. if any person, above the age of fourteen, unlawfully shall convey or take away any woman-child unmarried (which is held to extend to bastards as well as to legitimate children) within the age of 16 years, from the possession and against the will of her father, &c. he shall be imprisoned two years, or fined at the discretion of the justices. See the statute, and *Blackst. Comment.* vol. iv. p. 108, 209.

SEDUM, **ORPINE**; a genus of the pentagynia order, belonging to the decandria class of plants. There are 19 species; of which the most remarkable are,

1. The telephium, common orpine, or live-long, hath a perennial root, composed of many knobbed tubercles, sending up erect, round, succulent stalks, branching half a yard or two feet high, garnished with oblong, plane, serrated, succulent leaves, and the stalks terminated by a leafy corymbus of flowers, of

Sedley

Sedum.

Sedum.

different colours in the varieties. This species is an inhabitant of woods and dry places in England, &c. but has been long a resident of gardens for variety and medical use.

2. The *anacampseros*, or decumbent ever-green Italian orpine, hath a fibrous perennial root, decumbent or trailing stalks, wedge-shaped entire leaves, and the stalks terminated by a corymbus of purple flowers. 3. The *rupestre*, rock sedum, or stone-crop of St Vincent's rock, hath slender, trailing, purple stalks; short, thick, awl-shaped, succulent, glaucous leaves in clusters, quinquefoliously imbricated round the stalks, and the stalks terminated by roundish cymose bunches of bright yellow flowers. It grows naturally on St Vincent's rock near Bristol, and other rocky places in Europe. 4. The *aiizon*, or Siberian yellow orpine, hath a tuberculate, fibrous perennial root; many upright, round, succulent stalks, a foot high; lanceolated, plane, serrated, thickish leaves; and the stalks terminated by a close-fitting cymose cluster of bright yellow flowers. 5. The *reflexum*, reflexed small yellow sedum, or prick-madam, hath a slender fibrous perennial root; small trailing succulent stalks, garnished with thick, awl-shaped, succulent leaves sparsely, the lower ones recurved, and the stalks terminated by reflexed spikes of bright yellow flowers. It grows naturally on old walls and buildings in England, &c. 6. The *acre*, acid sedum, common stone-crop of the wall, or wall-pepper, hath small fibry roots, very slender succulent stalks four or five inches high, very small, sub-oval, gibbous, erect, alternate leaves, close together, and the stalks terminated by trifid-cymose bunches of small yellow flowers. This sort grows abundantly on rocks, old walls, and tops of buildings, almost every where, which often appear covered with the flowers in summer. 7. The *sexangularis*, or hexangular stone-crop, hath a fibry perennial root; thick, short, succulent stalks; small, sub-oval, gibbous, erect leaves close together, arranged six ways imbrication, and the stalks terminated by bunches of yellow flowers. It grows on rocky and other dry places in England, &c. 8. The *album*, or white stone-crop, hath fibry perennial roots; trailing slender stalks, six or eight inches long; oblong, obtuse, sessile, spreading leaves; and the stalks terminated by branchy cymose bunches of white flowers. This grows on old walls, rocks, and buildings in England, &c. 9. The *hispanicum*, or Spanish sedum, hath fibrous perennial roots, crowned with clusters of taper, acute, succulent leaves; slender succulent stalks, four or five inches high, garnished also with taper leaves, and terminated by downy cymose clusters of white flowers.

All these species of sedum are hardy herbaceous succulent perennials, durable in root, but mostly annual in stalk, &c. which, rising in spring, flower in June, July, and August, in different sorts; the flowers consisting universally of five spreading petals, generally crowning the stalks numerous in corymbos and cymose bunches and spikes, appearing tolerably conspicuous, and are succeeded by plenty of seeds in autumn, by which they may be propagated, also abundantly by parting the roots, and by slips or cuttings of the stalks in summer; in all of which methods they readily grow and spread very fast into tufted bunches:

being all of succulent growth, they consequently delight most in dry soils, or in any dry rubbishy earth.

Uses. As flowering plants, they are mostly employed to embellish rock-work, ruins, and the like places, planting either the roots, or cuttings of the shoots, in a little mud or any moist soil at first, placing it in the crevices, where they will soon root and fix themselves, and spread about very agreeably. For economical purposes, the *reflexum* and *rupestre* are cultivated in Holland and Germany, to mix with lettuce in salads. The wall-pepper is so acrid, that it blisters the skin when applied externally. Taken inwardly, it excites vomiting. In scorbutic cases and quartan agues, it is said to be an excellent medicine under proper management. Goats eat it; cows, horses, sheep, and swine, refuse it.

SEED, in physiology, a substance prepared by nature for the reproduction and conservation of the species both in animals and plants. See GENERATION, PLANTS, SEMEN, and BOTANY, sect. v.

SEEDLINGS, among gardeners, denote such roots of gilliflowers, &c. as come from seed sown. Also the younger tender shoots of any plants that are newly sown.

SEEDY, in the brandy trade, a term used by the dealers to denote a fault that is found in several parcels of French brandy, which renders them unsaleable. The French suppose that these brandies obtain the flavour which they express by this name, from weeds that grow among the vines from whence the wine of which this brandy is pressed was made.

SEEING, the art of perceiving objects by the organ of sight; or it is the sense we have of external objects by means of the eye. See ANATOMY, n° 406 *et seq.* and OPTICS, n° 115 *et seq.*

SEGEBERG, a town of Germany, in the duchy of Holstein, and in Wagria; with a castle standing on a high mountain, consisting of limestone, large quantities of which are carried to Hamburg and Lubeck. It belongs to Denmark, and is seated on the river Treve; in E. Long. 10. 23. N. Lat. 54. 5.

SEGEDIN, a strong town of Lower Hungary, in the county of Czongrad, with a castle. The Imperialists took it from the Turks in 1686. It is seated at the confluence of the rivers Teisse and Masroch, in E. Long. 20. 25. N. Lat. 46. 15.

SEGMENT of a CIRCLE, in geometry, is that part of the circle contained between a chord and an arch of the same circle.

SEGNA, or SEGNI, a strong town of Croatia, with a strong fort, a good harbour, and a bishop's see. It belongs to the house of Austria, and is seated on the coast of the Gulph of Venice. E. Long. 15. 2. N. Lat. 45. 4.

SEGNÍ, an ancient town of Italy, in the Campagna of Rome, with a bishop's see, and the title of duchy. It is said that organs were first invented here. It is seated on a mountain. E. Long. 13. 5. N. Lat. 41. 40.

SEGORBE, a town of Spain, in the kingdom of Valencia, with the title of a duchy, and a bishop's see. It is seated on the side of a hill, between the mountains, in a soil very fertile in corn and wine, and where there

Sedum
I
Segorbe

Segovia. there are quarries of fine marble. It was taken from the Moors in 1245; and the Romans thought it worth their while to carry some of the marble to Rome. W. Long. o. 22. N. Lat. 32. 54.

SEGOVIA, an ancient, large, rich, populous, and handsome city of Spain, in Old Castile, with a bishop's see, and a strong castle called *Alcazar*. It is adorned with handsome structures; and there are about 7000 houses, comprehending the suburbs. It is surrounded with a strong wall, flanked with towers and ramparts. Here the best cloth in Spain is made from the fine Spanish wool so much esteemed in other countries. This is one part of their trade, and another is very fine paper. The cathedral church stands on one side of the great square, and contains the statue of the Virgin Mary in massy silver. The alcazar is seated in the highest part of the town, is covered with lead, and has 16 rooms very richly adorned with tapestry, a great deal of gilding, and very fine ornaments of marble and porphyry. The royal chapel is magnificently gilded, and embellished with very fine paintings. The next most remarkable structure is the Casa de la Moneda, or the mint, whose towers are all covered with lead. It is seated in a valley, surrounded with a river, on which are mills, employed in coining, and by which every thing is done in an instant; for they can coin as much money here in a day as at other places in a month. The aqueduct is a work of the Romans, and serves to bring water into the town, being 3000 paces in length, and supported by 177 arches of a prodigious height. They consist of two rows, one placed above the other. It is seated on a mountain between two hills, near the river Arayada. W. Long. 3. 21. N. Lat. 40. 56.

SEGOVIA (New), a town of North America, in New Spain, and in the audience of Guatemala; seated on the river Yare, on the confines of the province of Honduras. W. Long. 84. 35. N. Lat. 13. 25.

SEGOVIA, a town of America in Terra Firma, and in the province of Venezuela, seated on a river, near a very high mountain, where there are mines of gold. W. Long. 65. 45. N. Lat. 7. 55.

SEGOVIA, a town of Asia, in the island of Manila, and one of the largest of the Philippines, seated at the north end of the island, 240 miles north of Manila, and subject to Spain. E. Long. 109. o. N. Lat. 18. 30.

SEGRAIS (John Renaud de), a French poet, born at Caen in 1624. Poetry was far from proving unprofitable to him; for it enabled him to rescue himself, four brothers, and two sisters, from the unhappy circumstances in which the extravagance of a father had left them. His prose writings, as novels and romances, though for the most part frivolous enough, have great merit as to their style, which may be considered as a standard. Of this kind are his *Nouvelles Françaises*, and the romances called *La Princesse de Cleves*, and *Zayde*; the latter of which has been often printed, with Mr Huet's *Origine des Romans* prefixed. This piece was written on purpose for it; and is, says Voltaire, a work of great use. But it is principally for his poetical works that Segrais is distinguished. These consist of, 1. *Diverses Poësies*, 4to, Paris 1658;

2. *Athis*, a pastoral; and, 3. A translation of Virgil's *Georgics* and *Eneid*.

SEGREANT, is the herald's word for a griffin when drawn in a leaping posture and displaying his wings as if ready to fly.

SEGUE, in the Italian music, is often found before *aria*, *alleluja*, *amen*, &c. to shew that those portions or parts are to be sung immediately after the last note of that part over which it is writ; but if these words *si place*, or *ad libitum*, are joined therewith, it signifies, that these portions may be sung or not, at pleasure.

SEJANT, a term used in heraldry, when a lion, or other beast, is drawn in an escutcheon fitting like a cat with his fore-feet straight.

SEJANUS, the son of a Roman knight, by his political talents became prime minister to the emperor Tiberius, over whom he gained for some time such an ascendancy that he governed the empire, till his cruelties and ambitious designs opened the eyes of Tiberius, and he was condemned and executed in the same day, A. D. 51.

SEIGNIOR, is, in its general signification, as much or *lord*; but is particularly used for the lord of the fee as of a manor, as *seigneur* among the feudists is he who grants a fee or benefit out of the land to another; and the reason is, because having granted away the use and profit of the land, the property or dominion he still retains in himself.

SEIGNIORAGE, is a royalty or prerogative of the king, whereby he claims an allowance of gold and silver bought in the masts to be exchanged for coin. As seigniorage, out of every pound weight of gold, the king had for his coin 5 s. of which he paid to the master of the mint sometimes 1 s. and sometimes 1 s. 6 d. Upon every pound weight of silver, the seigniorage answered to the king in the time of Edward III. was 18 penny-weight, which then amounted to about 1 s. out of which he sometimes paid 8 d. at others 9 d. to the master. In the reign of king Henry V. the king's seigniorage of every pound of silver was 15 d. &c.

SEIGNIORY, is borrowed from the French *seigneurie*, i. e. *dominatus*, *imperium*, *principatus*; and signifies with us a manor or lordship, *seignory de fokesmans*. *Seignory in gross* seems to be the title of him who is not lord by means of any manor, but immediately in his own person; as *tenure in capite*, whereby one holds of the king as of his crown, is *seignory in gross*.

SEISIN, in law, signifies possession. See the next article.—In this sense we say, *premier seisin*, for the first possession, &c.

Seisin is divided into that *in deed* or *in fact*, and that *in law*. A seisin *in deed* is where a possession is actually taken: but a seisin *in law* is, where lands descend, and the party has not entered thereon; or in other words, it is where a person has a right to lands, &c. and is by wrong disseised of them. A seisin *in law* is held to be sufficient to avow on; tho' to the bringing of an assise, actual seisin is required; and where seisin is alleged, the person pleading it must shew of what estate he is seised, &c.

Seisin of a superior service is deemed to be a seisin.

Segreant
Seisin.

fin of all superior and casual services that are incident thereto; and seisin of a lessee for years, is sufficient for him in reversion.

Livery of Seisin, in law, an essential ceremony in the conveyance of landed property; being no other than the pure feudal investiture, or delivery of corporal possession of the land or tenement. This was held absolutely necessary to complete the donation; *Nam feudum sine investitura nullo modo constitui potuit*: and an estate was then only perfect when, as Fleta expresses it in our law, *sit juris et seisinæ conjunctio*. See **FEOFFMENT**, in **APPENDIX**.

Investitures, in their original rise, were probably intended to demonstrate in conquered countries the actual possession of the lord; and that he did not grant a bare litigious right, which the soldier was ill qualified to prosecute, but a peaceable and firm possession. And, at a time when writing was seldom practised, a mere oral gift, at a distance from the spot that was given, was not likely to be either long or accurately retained in the memory of bystanders, who were very little interested in the grant. Afterwards they were retained as a public and notorious act, that the country might take notice of and testify the transfer of the estate; and that such as claimed title by other means might know against whom to bring their actions.

Blackst.
Comment.

In all well-governed nations, some notoriety of this kind has been ever held requisite, in order to acquire and ascertain the property of lands. In the Roman law, *plenum dominium* was not said to subsist, unless where a man had both the *right* and the *corporal possession*; which possession could not be acquired without both an actual intention to possess, and an actual seisin, or entry into the premises, or part of them in the name of the whole. And even in ecclesiastical promotions, where the freehold passes to the person promoted, corporal possession is required at this day, to vest the property completely in the new proprietor; who, according to the distinction of the canonists, acquires the *jus ad rem*, or inchoate and imperfect right, by nomination and institution; but not the *jus in re*, or complete and full right, unless by corporal possession. Therefore in dignities possession is given by installation; in rectories and vicarages by induction, without which no temporal rights accrue to the minister, though every ecclesiastical power is vested in him by institution. So also even in descents of lands, by our law, which are cast on the heir by act of the law itself, the heir has not *plenum dominium*, or full and complete ownership, till he has made an actual corporal entry into the lands: for if he dies before entry made, *his* heir shall not be entitled to take the possession, but the heir of the person who was last actually seised. It is not therefore only a mere right to enter, but the actual entry, that makes a man complete owner; so as to transmit the inheritance to his own heirs: *non jus, sed seisinam, facit stipitem*.

Yet, the corporal tradition of lands being sometimes inconvenient, a symbolical delivery of possession was in many cases anciently allowed; by transferring something near at hand, in the presence of credible witnesses, which by agreement should serve to represent the very thing designed to be conveyed; and an occupancy of this sign or symbol was permitted as equivalent to occupancy of the land itself. Among the

Jews we find the evidence of a purchase thus defined in the book of Ruth: "Now this was the manner in former time in Israel, concerning redeeming and concerning changing, for to confirm all things: a man plucked off his shoe, and gave it to his neighbour; and this was a testimony in Israel." Among the ancient Goths and Swedes, contracts for the sale of lands were made in the presence of witnesses, who extended the cloak of the buyer, while the seller cast a clod of the land into it, in order to give possession; and a staff or wand was also delivered from the vendor to the vendee, which passed through the hands of the witnesses. With our Saxon ancestors the delivery of a turf was a necessary solemnity to establish the conveyance of lands. And, to this day, the conveyance of our copyhold estates is usually made from the seller to the lord or his steward by delivery of a rod or verge, and then from the lord to the purchaser by re-delivery of the same in the presence of a jury of tenants.

Conveyances in writing were the last and most refined improvement. The mere delivery of possession, either actual or symbolical, depending on the ocular testimony and remembrance of the witnesses, was liable to be forgotten or misrepresented, and became frequently incapable of proof. Besides, the new occasions and necessities, introduced by the advancement of commerce, required means to be devised of charging and incumbering estates, and of making them liable to a multitude of conditions and minute designations, for the purposes of raising money, without an absolute sale of the land; and sometimes the like proceedings were found useful in order to make a decent and competent provision for the numerous branches of a family, and for other domestic views. None of which could be effected by a mere, simple, corporal transfer of the soil from one man to another, which was principally calculated for conveying an absolute unlimited dominion. Written deeds were therefore introduced, in order to specify and perpetuate the peculiar purposes of the party who conveyed: yet still, for a very long series of years, they were never made use of, but in company with the more ancient and notorious method of transfer by delivery of corporal possession.

Livery of seisin, by the common law, is necessary to be made upon every grant of an estate of freehold in hereditaments corporeal, whether of inheritance or for life only. In hereditaments incorporeal it is impossible to be made; for they are not the object of the senses; and in leases for years, or other chattel interests, it is not necessary. In leases for years indeed an actual entry is necessary, to vest the estate in the lessee: for a bare lease gives him only a right to enter, which is called his interest in the term, or *interesse termini*; and when he enters in pursuance of that right, he is then, and not before, in possession of his term, and complete tenant for years. This entry by the tenant himself serves the purpose of notoriety, as well as livery of seisin from the grantor could have done; which it would have been improper to have given in this case, because that solemnity is appropriated to the conveyance of a freehold. And this is one reason why freeholds cannot be made to commence *in futuro*, because they cannot (at the common law) be made but by livery of seisin; which livery, being an actual manual tradition

tradition of the land, must take effect *in presenti*, or not at all.

Livery of seisin is either in *deed* or in *law*.

Livery in *deed* is thus performed. The feoffor, lessor, or his attorney, together with the feoffee, lessee, or his attorney, (for this may as effectually be done by deputy or attorney, as by the principals themselves in person), come to the land or to the house; and there, in the presence of witnesses, declare the contents of the feoffment or lease on which livery is to be made. And then the feoffor, if it be of land, doth deliver to the feoffee, all other persons being out of the ground, a clod or turf, or a twig or bough there growing, with words to this effect: "I deliver these to you in the name of seisin of all the lands and tenements contained in this deed." But, if it be of a house, the feoffor must take the ring or latch of the door, the house being quite empty, and deliver it to the feoffee in the same form; and then the feoffee must enter alone, and shut the door, and then open it, and let in the others. If the conveyance or feoffment be of divers lands, lying scattered in one and the same county, then in the feoffor's possession, livery of seisin of any parcel, in the name of the rest, sufficeth for all; but if they be in several counties, there must be as many liveries as there are counties. For, if the title to these lands comes to be disputed, there must be as many trials as there are counties, and the jury of one county are no judges of the notoriety of a fact in another. Besides, anciently, this seisin was obliged to be delivered *coram paribus de vicineto*, before the peers or freeholders of the neighbourhood, who attested such delivery in the body or on the back of the deed; according to the rule of the feudal law, *Pares debent interesse investiture feudi, et non alii*: for which this reason is expressly given; because the peers or vassals of the lord, being bound by their oath of fealty, will take care that no fraud be committed to his prejudice, which strangers might be apt to connive at. And though, afterwards, the ocular attestation of the *pares* was held unnecessary, and livery might be made before any credible witnesses, yet the trial, in case it was disputed, (like that of all other attestations), was still reserved to the *pares* or jury of the county. Also, if the lands be out on lease, though all lie in the same county, there must be as many liveries as there are tenants: because no livery can be made in this case, but by the consent of the particular tenant; and the consent of one will not bind the rest. And in all these cases it is prudent, and usual, to endorse the livery of seisin on the back of the deed, specifying the manner, place, and time, of making it; together with the names of the witnesses. And thus much for livery in deed.

Livery in *law* is where the same is not made on the land, but in *sight* of it only; the feoffor saying to the feoffee, "I give you yonder land, enter and take possession." Here, if the feoffee enters during the life of the feoffor, it is a good livery, but not otherwise; unless he dares not enter, thro' fear of his life or bodily harm: and then his continual claim, made yearly in due form of law, as near as possible to the lands, will suffice without an entry. This livery in law cannot, however, be given or received by attorney, but only by the parties themselves.

SEIZE, in the sea-language, is to make fast or bind, particularly to fasten two ropes together with rope-yarn. The seizing of a boat is a rope tied to a ring or little chain in the fore-ship of the boat, by which means it is fastened to the side of the ship.

SEIZURE, in commerce, an arrest of some merchandise, moveable, or other matter, either in consequence of some law or of some express order of the sovereign. Contraband goods, those fraudulently entered, or landed without entering at all, or at wrong places, are subject to seizure. In seizures, among us, one half goes to the informer, and the other half to the king.

SELDEN (John), called by Grotius *the glory of England*, was born at Salvington in Suffex in 1584. He was educated at the free-school at Chichester; whence he was sent to Hart-Hall in the university of Oxford, where he staid four years. In 1612, he entered himself in Clifford's Inn, in order to study the law; and about two years after removed to the Inner Temple, where he soon acquired great reputation by his learning. He had already published several of his works; and this year wrote verses in Latin, Greek, and English, upon Mr William Browne's Britannia's Pastorals. In 1614, he published his *Titles of Honour*; and in 1616, his *Notes on Sir John Fortescue's book De Laudibus Legum Anglie*. In 1618, he published his *History of Tythes*; which gave great offence to the clergy, and was animadverted upon by several writers; and for that book he was called before the high-commission court, and obliged to make a public acknowledgment of his sorrow for having published it. In 1621, being sent for by the parliament, though he was not then a member of that house, and giving his opinion very strongly in favour of their privileges in opposition to the court, he was committed to the custody of the sheriff of London; but was set at liberty after five weeks confinement. In 1623, he was chosen burgess for Lancaster; but, amidst all the divisions of the nation, kept himself neuter, prosecuting his studies with such application, that though he was the next year chosen reader of Lyon's Inn, he refused to perform that office. In 1625, he was chosen burgess for Great Bedwin in Wiltshire, to serve in the first parliament of king Charles I. in which he declared himself warmly against the duke of Buckingham; and on his Grace's being impeached by the House of Commons, was appointed one of the managers of the articles against him. In 1627 and 1628, he opposed the court-party with great vigour. The parliament being prorogued to January 20. 1629, Mr Selden retired to the earl of Kent's house at Wreth, in Bedfordshire, where he finished his *Marmoræ Arundeliana*. The parliament being met, he, among others, again distinguished himself by his zeal against the court; when the king dissolving the parliament, ordered several of the members to be brought before the King's Bench bar, and committed to the Tower. Among these was Mr Selden, who insisting on the benefit of the laws, and refusing to make his submission, was removed to the King's Bench prison. Being here in danger of his life on account of the plague then raging in Southwark, he petitioned the lord high treasurer, at the end of Trinity-term, to intercede with his Majesty that he might be removed to the Gate-House, Westminster,

Selden,
Selenitz.

minster; which was granted: In Michaelmas term following, the judges objecting to the lord treasurer's warrant, by which he had been removed to the Gate-House, an order was made for conveying him back to the King's Bench, whence he was released in the latter end of the same year; but fifteen years after, the parliament ordered him 5000*l.* for the losses he had sustained on this occasion. He was afterwards comitted with several other gentlemen for dispersing a libel; but the author, who was abroad, being discovered, they were at length set at liberty. In 1634, a dispute arising between the English and Dutch concerning the herring-fishery on the British coast, he was prevailed upon by archbishop Laud to draw up his *Mare Clausum*, in answer to Grotius's *Mare Liberum*; which greatly recommended him to the favour of the court. In 1640, he was chosen member for the university of Oxford; when he again opposed the court, though he might, by complying, have raised himself to very considerable posts. In 1643, he was appointed one of the lay-members to sit in the assembly of divines at Westminster, and was the same year appointed keeper of the records in the Tower. In 1645, he was made one of the commissioners of the admiralty. The same year he was unanimously elected master of Trinity-college, Cambridge; but declined accepting. He died in 1654; and was interred in the Temple-church, where a monument is erected to his memory.—Dr Wilkes observes, that he was a man of uncommon gravity and greatness of soul, averse to flattery, liberal to scholars, charitable to the poor; and though he had great latitude in his principles with regard to ecclesiastical power, yet he had a sincere regard for the church of England. He wrote many learned works besides those already mentioned; the principal of which are, 1. *De Jure Naturali & Gentium juxta Disciplinam Hebræorum.* 2. *De Nuptiis & Divorciis.* 3. *De Anno Civili veterum Hebræorum.* 4. *De Nummis.* 5. *De Diis Syris.* 6. *Uxor Hebraica.* 7. *Jani Anglorum Facies altera,* &c. All his works were printed together in 1726, in 3 vols folio.

SELENITE, MOON-STONE, in natural history, a class of fossils, naturally and essentially simple; not inflammable, nor soluble in water; composed of slender filaments, ranged into fine and even thin flakes, and those disposed into regular figures, in the different genera, approaching to a rhomboide, a hexangular column, or a reſtangled inequilateral parallelogram; fissile like the talcs, but that not only horizontally, but perpendicularly also; flexile in a small degree, but not at all elastic; not fermenting with acid menstrua, and readily calcining in the fire.

Of this class Dr Hill makes seven orders, and under these orders ten genera. The first order is the selenite, with horizontal plates, approaching to a rhomboidal form; the second order is the selenite with horizontal plates, of a columnar and angular form; the third order comprehends those selenite whose filaments are visibly arranged into plates, but in the whole masses appear striated, not tabulated; of the fourth order, are the flat selenite, of no determinately angular figure; of the fifth order are the selenite formed of plates perpendicularly arranged; of the sixth order are those selenite formed of a congeries of plates, ranged in form

of a star; and of the seventh order are those selenite of a complex and indeterminate figure.

This fossil is found in strata of clay, usually of the blue tough kind; we have it in many parts in England, particularly about Shotover hills in Oxfordshire; in several places of Northamptonshire, Leicestershire, and about Epsom in Surry. In medicine, it is a very powerful astringent; and is of effect in diarrhoeas, dysenteries, and hæmorrhagies. It stands also recommended as a cosmetic. The people of Northamptonshire call it *staunch*, and use it in hæmorrhagies of all kinds with success.

SELENOGRAPHY, a branch of cosmography, which describes the moon and all the parts and appearances thereof, as geography does those of the earth. See the references at MOON, and Plate XLII.

SELEUCIDÆ, in chronology. *Æra* of the Seleucidæ, or the Syro-Macedonian æra, is a computation of time, commencing from the establishment of the Seleucidæ, a race of Greek kings, who reigned as successors of Alexander the Great, in Syria, as the Ptolemies did in Egypt. This æra we find expressed in the book of the Maccabees, and on a great number of Greek medals struck by the cities of Syria, &c. The Rabbins call it the *æra of contracts*; and the Arabs, *therik dîkarnain*, that is, the “æra of the two horns.” According to the best accounts, the first year of this æra falls in the year 311 B. C. being 12 years after Alexander's death.

SELEUCUS (Nicanor), one of the chief generals under Alexander the Great, and, after his death, founder of the race of princes called *Seleucidæ*. He is equally celebrated as a renowned warrior, and as the father of his people; yet his virtues could not protect him from the fatal ambition of Ceraunus, one of his courtiers, by whom he was assassinated 280 B. C.

SELF-MURDER, the pretended heroism, but real cowardice, of the Stoic philosophers, who destroyed themselves to avoid those ills which they had not the fortitude to endure, though the attempting it seems to be countenanced by the civil law, yet was punished by the Athenian law with cutting off the hand which committed the desperate deed. And also the law of England wisely and religiously considers, that no man hath a power to destroy life but by commission from God the author of it: and as the suicide is guilty of a double offence; one spiritual, in invading the prerogative of the Almighty, and rushing into his immediate presence uncalled for; the other temporal, against the king, who hath an interest in the preservation of all his subjects; the law has therefore ranked this among the highest crimes, making it a peculiar species of felony, a felony committed on one's self. And this admits of accessories before the fact, as well as other felonies; for if one persuades another to kill himself, and he does so, the adviser is guilty of murder. *A felo de se*, therefore, is he that deliberately puts an end to his own existence, or commits any unlawful malicious act, the consequence of which is his own death: as if, attempting to kill another, he runs upon his antagonist's sword; or, shooting at another, the gun bursts and kills himself. The party must be of years of discretion, and in his senses, else it is no crime.

Seleno-
graphy
Self.

Seleucia,
Selkirkshire

Seleucia, crime. But this excuse ought not to be refrained to that length to which our coroners juries are apt to carry it, viz. that the very act of suicide is an evidence of insanity; as if every man, who acts contrary to reason, had no reason at all: for the same argument would prove every other criminal *non compos*, as well as the self-murderer. The law very rationally judges, that every melancholy or hypochondriac fit does not deprive a man of the capacity of discerning right from wrong; which is necessary to form a legal excuse. And therefore, if a real lunatic kills himself in a lucid interval, he is a *felo de se* as much as another man.

But now the question follows, What punishment can human laws inflict on one who has withdrawn himself from their reach? They can only act upon what he has left behind him, his reputation and fortune: on the former, by an ignominious burial in the highway, with a stake driven through his body; on the latter, by a forfeiture of all his goods and chattels to the king: hoping, that his care for either his own reputation, or the welfare of his family, would be some motive to refrain him from so desperate and wicked an act. And it is observable, that this forfeiture has relation to the time of the act, done in the felon's lifetime, which was the cause of his death. As if husband and wife be possessed jointly of a term of years in land, and the husband drowns himself; the land shall be forfeited to the king, and the wife shall not have it by survivorship. For by the act of casting himself into the water he forfeits the term; which gives a title to the king, prior to the wife's title by survivorship, which could not accrue till the instant of her husband's death. And tho' it must be owned that the letter of the law herein borders a little upon severity; yet it is some alleviation, that the power of mitigation is left in the breast of the sovereign, who upon this (as on all other occasions) is reminded by the oath of his office, to execute judgment in mercy.

SELEUCIA, (anc. geogr.) furnamed *Babylonia*, because situate on its confines, at the confluence of the Euphrates and Tigris. Ptolemy places it in Mesopotamia. It is called also *Seleucia ad Tigrim*, (Polybius, Strabo, Ildorus, Characenus); washed on the south by the Euphrates, on the east by the Tigris, (Theophrastus); generally agreed to have been built or enlarged by Seleucus Nicanor, master of the east after Alexander; by means of which Babylon came to be deserted. It is said to have been originally called *Cochæ*, (Ammian, Eutropius); though others, as Arrian, distinguish it, as a village, from *Seleucia*; and, according to Zosimus, the ancient name of *Seleucia* was *Zebasfa*. Now called *Bagdad*. E. Long. 44. 21. N. Lat. 33. 10. There were many other cities of the same name, all built by Seleucus Nicanor.

SELKIRKSHIRE, called also the *Sheriffdom of Ettrick Forest*, a county of Scotland, extending about 20 miles in length from east to west, and about 12 in breadth from south to north. It borders on the north with part of Tweeddale and Mid-Lothian; on the south and east with Teviotdale; and on the west with Anandale. This county was formerly reserved by the Scottish princes for the pleasure of the chase, and where they had houses for the reception of their train.

VOL. X.

Sella
Semen.

At that time the face of the country was covered with woods, in which there were great numbers of red and fallow deer, whence it had the name of *Ettrick Forest*. The woods, however, are now almost entirely cut down, and the county is chiefly supported by the breed of sheep. They are generally fold into the south, but sometimes into the Highlands, about the mouth of March, where they are kept during summer; and after being improved by the mountain-grass, are returned into the Lowlands in the beginning of winter.

SELLA TURCICA, is a deep depression between the elinoid apophyses of the sphenoid bone. See *ANATOMY*, n° 15, d.

SELTZER WATER, is a mineral water which springs up at Lower Seltzer, a village in the electorate of Triers, about 10 miles from Frankfort on the Mayne. It is a very useful medicinal water. It contains a very small portion of a calcareous earth, of a native mineral alkali, and an acid; but of these the quantity is too small to attribute any medicinal virtues to; but it it contains also near 1-7th of its bulk of fixed air, which is more than is found in any other mineral water, and to this it owes its principal virtues.

SEM, or **SEM**, the son of Noah, memorable for his filial piety in concealing the folly and disgrace of his father; for which he received a remarkable benediction; about 2476 B. C. He lived to the age of 600 years.

SEMEN, in botany, the **SEED**; the essence of the fruit of every vegetable; defined by Linnæus to be a deciduous part of the plant, containing the rudiments of a new vegetable, and fertilized by the asperion or sprinkling of the male-dust. The parts of a seed, properly so called, enumerated by Linnæus, are as follows: 1. **CORCULUM**, the *punctum vite*, or essence of the feed. 2. **COTYLEDONES**, the lobes. 3. **HILUM**, a mark or scar in the feed. 4. **ARILLUS**, Lin. the proper covering: *calyptra* of Tournefort. 5. **CORONULA**, PAPPUS, the crown of the feed. 6. **ALA**, the wing of the feed.

Besides the seed properly so called, two other terms are referred by Linnæus to the general article of **SEMEN**, viz. 7. **NUX**, a nut, or feed covered with a hard bony skin. 8. **PROPAG**, the feed of the moises.

With respect to number, plants are either furnished with one feed, as pea-pink and bistort; two, as wood-roof and the umbelliferous plants; three, as spurge; four, as the lip-flowers of Tournefort and rough-leaved plants of Ray; or many, as ranunculus, anemone, and poppy.

The form of seeds is likewise extremely various, being either large or small, round, oval, heart-shaped, kidney-shaped, angular, prickly, rough, hairy, wrinkled, sleek, or shining, black, white, or brown. Most seeds have only one cell, or internal cavity; those of lesser burdock, valerian, lamb's lettuce, cornelian cherry, and seabean, have two.

With respect to substance, seeds are either soft, membranaceous, or of a hard bony substance; as in gromwell, tamarind, and all the nuciferous plants.

In point of magnitude, seeds are either very large,

Semen.

as in cocoa-nut; or very small, as in campanula, *anemone*, rampions, and throat-wort.

With respect to situation, they are either dispersed promiscuously through the pulp, (*semina nidulantia*), as in water-lily; affixed to a future or joining of the valves of the seed-vessel, as in the cross-shaped and pea-bloom flowers; or placed upon a *placenta*, or receptacle within the seed-vessel, as in tobacco, and thorn-apple.

Seeds are said to be naked (*semina nuda*) which are not contained in a cover, or vessel: such are those of the lip and compound flowers, the umbelliferous and rough-leaved plants; covered seeds (*semina secta*) are contained in some vessel, whether of the capsule, pod, berry, apple, or cherry kind.

A simple seed is such as bears neither crown, wing, nor downy *pappus*; the varieties in seeds, arising from these circumstances, are particularly enumerated under their respective heads.

In assimilating the animal and vegetable kingdoms, Linnæus denominates seeds the eggs of plants. The fecundity of plants is frequently marvellous; from a single plant or stalk of Indian Turkey wheat, are produced, in one summer, 2000 seeds; of elecampane, 3000; of sun-flower, 4000; of poppy, 32,000; of a spike of cat's-tail, 10,000 and upwards: a single fruit, or seed-vessel, of tobacco, contains 1000 seeds; that of white poppy, 8000. Mr Ray relates, from experiments made by himself, that 1012 tobacco-seeds are equal in weight to one grain; and that the weight of the whole quantum of seeds in a single tobacco-plant, is such as must, according to the above proportion, determine their number to be 360,000. The same author estimates the annual produce of a single stalk of spleen-wort to be upwards of one million of seeds.

The dissemination of plants respects the different methods or vehicles by which nature has contrived to disperse their seeds for the purpose of increase. These by naturalists are generally reckoned four.

1. Rivers and running waters. 2. The wind. 3. Animals. 4. An elastic spring, peculiar to the seeds themselves.

1. The seeds which are carried along by rivers and torrents are frequently conveyed many hundreds of leagues from their native soil, and cast upon a very different climate, to which, however, by degrees, they render themselves familiar.

2. Those which are carried by the wind, are either winged, as in fir-tree, trumpet-flower, tulip-tree, birch, arbor-vitæ, meadow-rue, and jessamine, and some umbelliferous plants; furnished with a *pappus*, or downy crown, as in valerian, poplar, reed, fucculent swallow-wort, cotton-tree, and many of the compound flowers; placed within a winged *calix*, or seed-vessel, as in scabious, sea-pink, dock, *diocorea*, ash, maple, and elm-trees, logwood and woad; or lastly, contained within a swelled *calix* or seed-vessel, as in winter-cherry, cucubalus, mellilot, bladder-nut, fumatory, bladder-sena, heart-feed, and chick-pease.

3. Many birds swallow the seeds of vanelloe, juniper, mistletoe, oats, millet, and other grasses, and void them entire. Squirrels, rats, parrots, and other animals, fuffer many of the seeds which they devour to escape, and thus in effect disseminate them. Moles,

ants, earth-worms, and other insects, by ploughing up the earth, admit a free passage to those seeds which have been scattered upon its surface. Again, some feeds attach themselves to animals, by means of hooks, crochets, or hairs, which are either affixed to the seeds themselves, as in hound's tongue, mouse-ear, vervain, carrot, balsam-parley, fanigie, water hemp-agrimony, *arctopus* and *terrebinth*; to their calix, as in burdock, agrimony, *rhesia*, small wild bugloss, dock, nettle, pellitory, and lead-wort; or to their fruit or seed-vessel, as in liquorice, enchanter's night-shade, cross-wort, clivers, French honeysuckle, and arrow-headed grafs.

4. The seeds which disperse themselves by an elastic force, have that force resident either in their *calix*, as in oats and the greater number of ferns; in their *pappus*, as in centaurea crupina; or in their *capsule*, as in geranium, herb-bennet, African spiræa, fraxinella, horse-tail, balsam, Malabar nut, cucumber, elaterium, and male balsam apple.

SEMEN *Masculinum*, in the animal economy, is a white, liquid matter or humour, the thickest of any in the body, separated from the blood in the testicles, and reserved in proper vessels, to be the means of generation. By chemical analysis it is found to consist almost entirely of oil and volatile salts blended together by the mediation of a little phlegm. See ANIMALCULE. n° 48 et seq.

SEMEDRIAHA, a town of Turkey in Europe, is the province of Servia, with a good citadel. It is the capital of a sangiacate, was taken by the Turks in 1690, and is seated on the Danube in E. Long. 21. 25. N. Lat. 45. 4.

SEMENTINÆ FERTÆ, in antiquity, feasts held annually among the Romans, to obtain of the gods a plentiful harvest. They were celebrated in the temple of Tellus, where solemn sacrifices were offered to Tellus and Ceres. These feasts were held about seed-time, usually in the month of January; for, as Macrobius observes, they were moveable feasts.

SEMI, a word borrowed from the Latin, signifying half; but only used in composition with other words, as in the following articles.

SEMICIRCLE, in geometry, half a circle, or that figure comprehended between the diameter of the circle and half its circumference.

SEMICOLON, in grammar, one of the points or stops used to distinguish the several members of a sentence from each other.

The mark or character of the semicolon is (;), and has its name as being of somewhat less effect than a colon; or as demanding a shorter pause.

The proper use of the semi-colon is to distinguish the conjunct members of a sentence. Now, by a conjunct member of a sentence is meant, such a one as contains at least two simple members.—Whenever, then, a sentence can be divided into several members of the same degree, which are again divisible into other simple members, the former are to be separated by a semi-colon. For instance: "If fortune bear a great sway over him, who has nicely stated and concerted every circumstance of an affair; we must not commit every thing, without reserve, to fortune, lest she have too great a hold of us." Again: *Si quantum in agro locisque desertis audacia potest, tantum in foro aique judi-*

Semen
Semicolon

Semicolon
Semiramis.

Semperi
vum.

cis impudentia valerit; non minus in causa cederet Aulus Cincinnatus Sextus Æbutius impudentie, quam tum in vi facienda cessit audacie. An instance in a more complex sentence we have in Cicero: *Res familiaris primum bene parta sit, nulloque turpi questu; tum quam plurimis modo dignis, se utilem prebeat; deinde augeatur ratione, diligentia, parvisumia; nec libidini potius luxurieque, quam liberalitati & beneficentie pareat.*

But though the proper use of the semi-colon be to distinguish conjunct members, it is not necessary that all the members divided hereby be conjunct. For upon dividing a sentence into great and equal parts, if one of them be conjunct, all those other parts of the same degree are to be distinguished by a semi-colon.— Sometimes also it happens, that members that are opposite to each other, but relate to the same verb, are separated by a semi-colon. Thus Cicero: *Ex hac parte pudor, illinc petulantia; hinc fides, illinc fraudatio; hinc pietas, illinc scelus, &c.* Hither likewise may be referred such sentences, where the whole going before, the parts follow: as, “The parts of oratory are four; invention, disposition, elocution, and pronunciation.”

SEMICUPIDUM, in medicine, an half-bath, wherein the patient is only placed up to the navel.

SEMI-DIAMETER, half the diameter, or a right line drawn from the centre of a circle or sphere to its circumference; being the same with what is otherwise called the *radius*.

SEMI-FLOSCULUS, in botany, a term used to express the flowers of the *syngenesia* class. These semiflosculi are petals, hollow in their lower part, but in their upper flat, and continued in the shape of a tongue.

SEMI-PELAGIANS, in church-history, a branch of the Pelagians, so called because they pretended to keep a medium between the Pelagians and the orthodox.

SEMI-TONE, in music. See INTERVAL.

SEMINAL, something belonging to the semen or seed.

SEMINARY, in its primary sense, the ground where any thing is sown, to be afterwards transplanted.

SEMINARY, in a figurative sense, is frequently applied to places of education, whence scholars are transplanted into life.—In Catholic countries it is particularly used for a kind of college or school, where youth are instructed in the ceremonies, &c. of the sacred ministry. Of these are great numbers; it being ordained by the council of Trent, that there be a seminary belonging to each cathedral, under the direction of the bishop.

SEMINATION, denotes the manner or act of shedding and dispersing the seeds of plants. See SEMEN.

SEMI-RAMIS, a famous queen of Assyria and Babylonia, concerning whom many fables are related, and to whom the wonderful works about the city of Babylon are by many attributed. Her birth is said to have been supernatural, springing from a goddess, by name *Darceto*, who had a temple not far from Ascalon, near a fishy lake; and who is thought to have been the same with the Philistine Dagon. When Semiramis grew up, she so far exceeded all women in beauty and other qualifications, that Menon, the prime minister to Ninus king of Assyria, took her to wife. Ninus was at that time besieging the capital of Bactria

unsuccessfully; and Semiramis happening to pay a visit to her husband before the camp, put the besiegers on such an excellent plan, that the city was quickly obliged to capitulate. Ninus was so charmed with the beauty and address displayed by Semiramis on this occasion, that he soon after married her; upon which Menon her former husband killed himself. Ninus also did not long survive him, and was buried by her at a vast expence.

Semiramis, thus advanced to the imperial dignity, resolved to build the city of Babylon*; which accordingly she did in the most magnificent manner. Several other cities also she built on the banks of the Tigris and Euphrates, for the sake of commerce and communication between the remote parts of the empire. She invaded and conquered Media and Ethiopia; but having undertaken an expedition against India, was defeated, and obliged to fly, after having lost the greatest part of her army. She is said to have vanished from the sight of men, after her son Ninus had attempted to assassinate her; but most probably she was murdered by the conspirators.

SEMPERVIVUM, LIVE-EVER, or *Houfe-leek*; a genus of the *dodecandria* order, belonging to the *dodecandria* class of plants. There are twelve species, four of which are natives of Britain; all of them hardy ever-green perennials, formed of roundish clusters of succulent smooth leaves in expanded open heads, producing very spreading off-sets, and erect succulent stalks from six to twelve inches high, with flowers of a deep-red or yellow colour.—Besides these, there are two species, natives of warm countries; the *arborescens*, or tree *houfe-leek*; and the *canariensis*, or Canary shrub by *houfe-leek*. The former rises with an upright smooth fleshy stem, six or eight feet high, with the branches terminated by large clustering heads of spear-shaped bright-green leaves; and from the centre of the heads large pyramidal spikes of bright yellow flowers. There is a variety with variegated leaves and white flowers, exceedingly ornamental. The *canariensis* rises with an upright succulent rugged stalk, half a yard or more high, appearing ragged with the rudiments of past foliage, having the top crowned by large globular heads of retuse succulent leaves; and from the centre of the head a long pyramidal spike of greenish-coloured flowers.—They are all easily propagated by off-sets, cuttings, or seeds. The four hardy species will thrive on any old wall; but the other two being tender, must be sheltered in the green-house. The leaves of the common *houfe-leek* have been recommended as refrigerant, though their sensible qualities discover no great signs of any virtue of this kind; their taste being herbaceous, with a slight degree of pungency. It is remarkable of this plant, that its juice, purified by filtration, when it appears of a dilute yellowish colour, upon the admixture of an equal quantity of rectified spirit of wine, forms a beautiful white, light coagulum, like the finer kinds of pomatum, which proves extremely volatile; so that, when freed from the aqueous phlegm, and exposed to the air, it in a very little time totally exhales. Hence some have concluded that the juice contained a volatile alkaline salt; but nothing of this kind is discovered by any other trial, and there are many substances besides these salts which coagulate with spirit of wine.

* See Babel.
[10.]

Sena,
Seneca.Senator
Seneca.

SENA, the leaf of the *CASSIA* *fena* of Linnæus, is very common and useful purgative. It is produced from a shrub about a foot high, growing naturally in Egypt and several parts of the Levant. The finest is that from Alexandria, called by the Turks *palte*, which pays a considerable tribute to the grand signior. The leaves are of an oblong figure, sharp-pointed at the ends, about a quarter of an inch broad, and not a full inch in length, of a lively yellowish green colour, a faint not very disagreeable smell, and a subacid, bitterish, nauseous taste. Some inferior sorts are brought from Tripoli and other places; these may be easily distinguished by their being either narrower, longer, and sharper-pointed; or larger, broader, and round-pointed, with small prominent veins; or large and obtuse, of a fresh green colour, without any yellow cast.

Sena is a very useful cathartic, operating mildly, and yet effectually; and, if judiciously dosed and managed, rarely occasioning the ill consequences which too frequently follow the exhibition of the stronger purges. The only inconveniences complained of in this drug are, its being apt to gripe, and its nauseous flavour. The griping quality depends upon a resinous substance, which, like the other bodies of this class, is naturally disposed to adhere to the coats of the intestines; the more this resin is divided by such matters as take off its tenacity, the less adhesive, and consequently the less irritating and griping it will prove; and the less it is divided, the more griping: hence *fena* given by itself, or infusions made in a very small quantity of fluid, gripe severely, and purge less than when diluted by a large portion of suitable menstruum, or divided by mixing the infusion with oily emulsions. The ill flavour of this drug is said to be abated by the greater water-hogwort; but we cannot conceive that this plant, whose smell is manifestly feid, and its taste nauseous and bitter, can at all improve those of *fena*: others recommend bohea tea, though neither has this any considerable effect. The smell of *fena* resides in its more volatile parts, and may be discharged by lightly boiling infusions of it made in water; the liquor thus freed from the peculiar flavour of the *fena*, may be easily rendered grateful to the taste, by the addition of any proper aromatic tincture or distilled water. The colleges both of London and Edinburgh, have given several very elegant infusions of this drug*. The dose of *fena* in substance is from a scruple to a dram; in infusion, from one to three or four drams.—It has been customary to reject the pedicles of the leaves of *fena* as of little or no use; Geoffroy, however, observes, that they are not much inferior in efficacy to the leaves themselves. The pods, or seed-vessels, met with among the *fena* brought to us, are by the college of Brussels preferred to the leaves; they are less apt to gripe, but proportionably less purgative.

SENATE, in general, is an assembly or council of senators; that is, of the principal inhabitants of a state, who have a share in the government.

The senate of ancient Rome is, of all others, the most celebrated. It exercised no contentious jurisdiction; but appointed judges, either from among the senators or knights, to determine processes: it also appointed governors of provinces, and disposed of the revenues of the commonwealth, &c. Yet did not the

whole sovereign power reside in the senate, since it could not elect magistrates, make laws, or decide of war and peace; in all which cases the senate was obliged to consult the people.

According to Dr Middleton, the constant and regular supply of the senate was from the annual magistrates; who, by virtue of their several offices, acquired a right to fit and vote in that assembly: the usual gradation of these offices being that of *questor*, *tribune* of the people, *ædile*, *prætor*, and *consul*.—But though these offices gave both an immediate right, and actual entrance into the senate; yet the senatorial character was not esteemed complete, till the new senators had been enrolled by the censors, at the next general *lustrum*, or review of all the orders of the people.

The senate always met of course on the 1st of January, for the inauguration of the new consuls; and in all months, universally, there were three days, viz. the *kalends*, *nones*, and *ides*, on which it regularly met: but it always met on extraordinary occasions, when called together by *consul*, *tribune*, or *dictator*.

SENATOR, in general, denotes a member of some senate.

Among us, senator is a member of parliament. In the laws of king Edward the Confessor, we are told, that the Britons called those *senators*, whom the Saxons called afterwards *aldermen* and *borough-masters*; tho' not for their age, but their wisdom; for some of them were young men, but very well skilled in the laws. Kenulph king of the Mercians granted a charter, which ran thus, viz. *Consilio et consensu* episcoporum et senatorum *gentis sue largitus fuit dicto monasterio*, &c.

In Scotland, the lords of session are called *senators* of the college of justice.

SENATUS AUCTORITAS, a vote of the Roman senate, drawn up in the same form with a decree, but without its force, as having been hindered from passing into a decree by some of the tribunes of the people.

SENATUS-CONSULTUM, a decree of the Roman senate, pronounced on some question or point of law; which, when pronounced, made part of the Roman law.

SENECA (Lucius Annæus), a stoic philosopher, was born at Corduba in Spain, about the beginning of the Christian era, of an Equestrian family, which had probably been transplanted thither in a colony from Rome. He was the second son of Marcus Annæus Seneca, commonly called the *rhetorician*, whose remains are printed under the title of *Suasoria & Controversia, cum Declamationum excerptis*; and his youngest brother, Annæus Mela, for there were three of them, was memorable for being the father of the poet Lucan. He was removed to Rome, together with his father and the rest of his family, while he was yet in his infancy. There he was educated in the most liberal manner, and under the best masters. He learned eloquence from his father; but his genius rather leading him to philosophy, he put himself under the stoics Attalus, Sotion, and Papirius Fabianus; men famous in their way, and of whom he has made honourable mention in his writings. It is probable, too, that he travelled when he was young, since we find him, in several parts of his works, particularly in his *Questiones Naturales*, making very exact and curious

* See Pharmacology, in 320, &c.

Seneca.

rious observations upon Egypt and the Nile. But this, though entirely agreeable to his own humour, did not at all correspond with that scheme or plan of life which his father had drawn out for him; who therefore forced him to the bar, and put him upon soliciting for public employments; so that he afterwards became quaestor, praetor, and, as Lippius will have it, even consul.

In the first year of the reign of Claudius, when Julia the daughter of Germanicus was accused of adultery by Messalina, and banished, Seneca was banished too, being charged as one of the adulterers. Corsica was the seat of his exile, where he lived eight years; "happy in the midst of those things which usually make other people miserable; *inter eas res beatus, quae solent miseris facere*;" and where he wrote his books of consolation, addressed to his mother Helvia, and to his friend Polybius, and perhaps some of those tragedies which go under his name; for he says, *modo se levioribus studiis ibi oblectasse*. When Agrippina was married to Claudius, as it was upon the death of Messalina, she prevailed with the emperor to recall Seneca from banishment; and afterwards procured him to be tutor to her son Nero, whom she designed for the empire. By the bounty and generosity of his royal pupil, he acquired that prodigious wealth which rendered him in a manner equal to kings. His houses and walks were the most magnificent in Rome. His villas were innumerable: and he had immense sums of money placed out at interest in almost every part of the world. The historian Dio reports him to have had 250,000 l. Sterling at interest in Britain alone; and reckons his calling it in all at a sum, as one of the causes of a war with that nation.

All this wealth, however, together with the luxury and effeminacy of a court, does not appear to have had any ill effect upon the temper and disposition of Seneca. He continued able-minded, exact in his manners, and, above all, free from the vices so commonly prevalent in such places, flattery and ambition. "I had rather (said he to Nero) offend you by speaking the truth, than please you by lying and flattery: *maius enim veris offendere, quam placere adulando*." How well he acquitted himself in quality of preceptor to his prince, may be known from the five first years of Nero's reign, which have always been considered as a perfect pattern of good government; and if that emperor had but been as observant of his master through the whole course of it, as he was at the beginning, he would have been the delight, and not, as he afterwards proved, the curse and detestation, of mankind. But when Poppaea and Tigellinus had got the command of his humour, and hurried him into the most extravagant and abominable vices, he soon grew weary of his master, whose life must indeed have been a constant rebuke to him. Seneca, perceiving that his favour declined at court, and that he had many accusers about the prince, who were perpetually whispering in his ear the great riches of Seneca, his magnificent houses, and fine gardens, and what a favourite through means of these he was grown with the people, made an offer of them all to Nero. Nero refused to accept them: which however did not hinder Seneca from changing his way of life; for, as Tacitus relates, he "kept no more levees, declined the usual civilities which had been

Seneca,
Seneca.

paid to him, and, under a pretence of indispotion or some engagement or other, avoided as much as possible appearing in public."

Nero, in the mean time, who, as it is supposed, had dispatched Burrhus by poison, could not be easy till he had rid himself of Seneca also: for Burrhus and Seneca were, the one the manager of his military concerns, the other of his civil. Accordingly he attempted, by means of Cleonice, a freedman of Seneca, to take him off by poison; but this not succeeding, he ordered him to be put to death, upon an information that he was privy to Piso's conspiracy against his person. Not that he had any real proof of Seneca's being at all concerned in this plot, but only that he was glad to lay hold of any pretence for destroying him. He left Seneca, however, at liberty to choose his manner of dying; who caused his veins to be opened immediately.

His wife Paulina, who was very young in comparison of himself, had yet the resolution and affection to bear him company, and thereupon ordered her veins to be opened at the same time; but as Nero was not willing to make his cruelty more odious and insupportable than there seemed occasion for, he gave orders to have her death prevented: upon which her wounds were bound up, and the blood stopped, in just time enough to save her; though, as Tacitus says, she looked so miserably pale and wan all her life after, that it was easy to read the loss of her blood and spirits in her countenance. In the mean time, Seneca, finding his death slow and lingering, desired Statius Annianus his physician to give him a dose of poison, which had been prepared some time before in case it should be wanted; but this not having its usual effect, he was carried to a hot bath, where he was at length stifled with the steams. He died, as Lippius conjectures, in the 63d or 64th year of his age, and in about the 10th or 11th of Nero's reign. Tacitus, on mentioning his death, observes, that, as he entered the bath, he took of the water, and with it sprinkled some of his nearest domestics, saying, "That he offered those libations to Jupiter the Deliverer." These words are an evident proof that Seneca was not a Christian, as some have imagined him to have been; and that the 13 epistles from Seneca to St Paul, and from St Paul to Seneca, are supposititious pieces. His philosophical works are well known.

SENEGAL, or SENEGAL, a kingdom of Africa, in Negroland, seated on a river of the same name, which some suppose to be a branch of the Niger; but this is very uncertain, no European having travelled so far up as to determine this assertion. However, it overflows like the Nile, and much about the same time of the year. It is 40 days before it comes to the height; when the river overflows its banks, and the channel is difficult to find by those who go up it in boats. The French once sent 30 men up this river, who rowed 1000 miles, undergoing great hardships, inasmuch that only five returned back alive; their boat once stuck fast on the tops of trees, and they got it off with a great deal of difficulty. The kingdom of Senegal was formerly very considerable, but it is now reduced into a very narrow compass: it is populous and full of trees, but the soil is sandy and barren; for which reason they never sow till the rainy season comes on, in June, and get in their harvest in September. The French had a
fort

fort and factory in an island at the mouth of this river, and were entire masters of the gum-trade. It was called *Fort-Louis*, and was taken by the British on the 1st of May 1758, and ceded to Great Britain by the peace of 1763.

SENESCHAL, (*Senshehallus*.) derived from the German *sein* "a house or place," and *scale* "an officer," is a steward, and signifies one who has the dispensing of justice in some particular cases: As the high seneschal or steward of England; *seneschal de la hotel de roy*, "steward of the king's household, seneschal, or steward of courts, &c." *Co. Lit.* 61. *Croke's Jurisd.* 102. *Kitch.* 83. See **STEWARD**.

SENNERTUS (Daniel), an eminent physician, was born in 1572 at Breslaw; and in 1593 he was sent to Wittemberg, where he made a great progress in philosophy and physic. He visited the universities of Leipzig, Jena, Francfort upon the Oder, and Berlin; but soon returned to Wittemberg, where he was promoted to the degree of doctor of physic, and soon after to a professorship in the same faculty. He was the first who introduced the study of chemistry into that university; he gained a great reputation by his works and practice, and was very generous to the poor. He died of the plague at Wittemberg in 1637. He raised himself enemies by contradicting the ancients. He thought the seed of all living creatures animated; and that the soul of this seed produces organization. He was accused of impiety for asserting that the souls of beasts are not material; for this was affirmed to be the same thing with asserting that they are immortal: but he rejected this consequence.

SENONES, (anc. geog.), a people of Gallia Celtica, situate on the Sequana to the south of the Parisii, near the confluence of the Jeuna or Yonne with the above-mentioned river. Their most considerable exploit was their invasion of Italy, and taking and burning **ROME**, as related under that article. This was done by a colony of them long before transported into Italy, and settled on the Adriatic. Their capital, Agendicum in Gaul, was in the lower age called *Senones*, now *Sens*. In Italy the Senones extended themselves as far as the river Aesis; but were afterwards driven beyond the Rubicon, which became the boundary of Gallia Cisalpina, (Polybius, Strabo.)

SENSATION, in philosophy, the perception of external object by means of the senses. See **METAPHYSICS**, n° 21, &c.

SENSE, a faculty of the soul whereby it perceives external objects by means of the impressions they make on certain organs of the body. These organs of sensation are commonly reckoned five, *viz.* the eye, whereby we see objects; the ear, which enables us to hear sounds; the nose, by which we receive the ideas of different smells; the palate, by which we judge of tastes; and the cutis or skin, which enables us to feel the different forms, hardnesses, or softness of bodies.

SENSIBLE NOTE, in music, is that which constitutes a third major above the dominant, and a semitone beneath the tonic. *Si*, or *B*, is the sensible note in the tone of *ut* or *C sol* ♯; or *G* sharp, in the tone of *la* or *A*.

They call it the *sensible note* on this account, that it causes to be perceived the tone or natural series of the key and the tonic itself, upon which, after the chord

of the dominant, the sensible note taking the shortest road, is under a necessity of rising; which has made some authors treat this sensible note as a major dissonance, for want of observing, that dissonance, being a relation, cannot be constituted unless by two notes between which it subsists,

It is not meant that the sensible note is the seventh of the tone, because, in the minor mode, this seventh cannot be a sensible note but in ascending; for, in descending, it is at the distance of a full note from the tonic, and of a third minor from the dominant.

SENSITIVE PLANT. See **MIMOSA** and **DIONÆA Muscipula**.

The sensitive and humble plants are arranged by Linnæus under the same genus with the acacias. These are well known to possess a kind of muscular motion, by which the leaves and stalks are contracted and fall down upon being slightly touched, or shaken with some degree of violence. The sensibility of these plants is lodged in the young branches, in the common foot-stalk of the winged leaves, and in the nerve or middle rib to which the lobes or lesser leaves are attached. These different motions, which seem to be totally independent of each other, may be aptly enough compared, by analogy, with the irritability of certain parts in animals.

The sensitive plant has two kinds of motion; the one natural, occasioned by the action of warm nourishing vapours; the other artificial, in consequence of being touched or shaken.

Mr Duhamel having observed, about the 15th of September, in moderate weather, the natural motion of a branch of sensitive plant, remarked, that at nine in the morning, it formed with the stem an angle of 100 degrees; at noon, 112 degrees; at three afternoon, it returned to 100; and after touching the branch, the angle was reduced to 90. Three quarters of an hour after, it had mounted to 112; and, at eight at night, it descended again, without being touched, to 90. The day after, in finer weather, the same branch, at eight in the morning, made an angle of 135 degrees with the stem; after being touched, the angle was diminished to 80; an hour after, it rose again to 135; being touched a second time, it descended again to 80; an hour and a half after, it had risen to 145; and upon being touched a third time, descended to 135; and remained in that position till five o'clock in the afternoon; when being touched a fourth time, it fell to 110.

With whatever body the sensitive plant is touched or irritated, it is remarkable that the sensibility resides particularly in the articulation or joining either of the branches of the common foot-stalk, or of the particular foot-stalk of each wing.

The time which a branch requires to recover itself after being touched, varies according to the vigour of the plant, the hour of the day, the season of the year, or the heat and other circumstances of the atmosphere.

The order in which the parts recover themselves varies in like manner: Sometimes it is the common foot-stalk; sometimes the rib to which the lobes are attached; and sometimes the lobes themselves are expanded, before the other parts have made any attempt to be reinflected in their former position.

If, without shaking the other smaller leaves, we cut

Milne's
Nat. Hist.

off the half of a lobe belonging to the last pair, at the extremity or summit of a wing, the leaf cut, and its antagonist, that is to say, the first pair, begin to approach each other; then the second; and so on successively, till all the lesser leaves, or lobes of that wing, have collapsed in like manner. Frequently, after 12 or 15 seconds, the lobes of the other wings which were not immediately affected by the stroke, shut; whilst the stalk and its wing, beginning at the bottom, and proceeding in order to the top, gradually recover themselves. If, instead of one of the lesser extreme leaves, we cut off one belonging to the pair that is next the foot-stalk, its antagonist shuts, as do the other pairs successively, from the bottom to the top. If all the lobes of one side of a wing be cut off, the opposite lobes are not affected, but remain expanded. With some address, it is possible even to cut off a branch without hurting the leaves or making them fall. The common foot-stalk of the winged leaves being cut as far as three-fourths of its diameter, all the parts which hang down collapse, but quickly recover without appearing to have suffered any considerable violence by the shock. An incision being made into one of the principal branches, to the depth of one half the diameter, the branches situated betwixt the section and the root will fall down; those above the incision remain as before, and the lesser leaves continue open; but this direction is soon destroyed, by cutting off one of the lobes at the extremity, as was observed above. Lastly, a whole wing being cut off with precaution near its insertion into the common foot-stalk, the other wings are not affected by it, and its own lobes do not shut. No motion, likewise, ensues from piercing the branch with a needle or other sharp instrument.

From the preceding experiments, to omit many others which might be mentioned, these inferences are clearly to be deduced. 1. That when the plant is in its greatest vegetative force, its motions are greater and more sensible. 2. That when the sky is serene, and the sun bright during the whole day, the plant is more sensible in the morning than at noon. 3. That in the circumstances in which they are less sensible, the leaves continue to fold and collapse, although the foot-stalks, which through age become stiff and woody, have lost their motion. 4. That a stroke, or an irritation, produces a more forcible effect than an incision or even an entire section. 5. That a slight irritation only acts upon the neighbouring parts, and extends its influence in proportion to its force. 6. That any given irritation acts more strongly upon some parts than on others. 7. That whatever can produce any effect upon the organs of animals, acts upon the sensitive plant; as a stroke, excess of heat or cold, the steam of boiling water, that of sulphur and volatile spirits, &c. 8. That plunging it in water, or lodging it in the exhausted receiver of an air-pump, seem to have no other effect than that of diminishing its vigour. 9. That there appears to be no more intimate a communication betwixt the opposite lobes of a winged or pinnated leaf, than betwixt the other parts of the plant. 10. That the muscular motion of the sensitive plant is owing to a strong contraction: each foot-stalk seems to be terminated with a kind of joint, on which the leaves turn in all directions with surprising facility.

Different from all the kinds of sensitive plants hi-

ther to known, is the *dionea muscipula*, or Venus's mousetrap, a plant lately discovered in the swamps of North America; for a description of which, see *DIONEA MUSCIPULA*.—The negroes in Senegal call a large species of sensitive plant which grows in that country, *guerackiao*, that is, “good-morrow;” because, say they, when you touch it, or draw near to speak to it, the plant immediately inclines its leaves, to wish you, as it were, a good-morrow, and to show you that it is sensible of the politeness done it. In the same country is produced a small sensitive plant, that is rampant, not spinous, and which Mr Adanson affirms to be infinitely more delicate and sensible than all the other species.

To conclude, the cause of this and the other motions of plants is merely external. The motions themselves, therefore, are not spontaneous as in perfect animals, which have that cause dependent on their choice and will. How many imperfect animals, however, are there, such as those in animal and vegetable infusions, the polypes and animalcules in feed, whose certain motions, like those of the plants in question, are perhaps to be attributed to heat, light, and other external causes? and again, how many, as the gall-insects, the oyster, and other shell-fish, have not a motion so perceptible nor rapid as that of Venus's mousetrap and the sensitive plant!

SENTENCE, in law, a judgment passed in court by the judge on some process, either civil or criminal. See JUDGMENT.

SENTENCE, in grammar, denotes a period; or a set of words comprehending some perfect sense or sentiment of the mind.

The business of pointing is to distinguish the several parts and members of sentences, so as to render the sense thereof the clearest, aptest, and fullest possible. See PUNCTUATION.

In every sentence there are two parts necessarily required; a noun for the subject, and a definite verb; whatever is found more than these two, affects one of them, either immediately, or by the intervention of some other, whereby the first is affected.

Again, every sentence is either simple or conjunct: a simple sentence is that consisting of one single subject, and one finite verb.—A conjunct sentence contains several subjects and finite verbs, either expressly or implicitly.

A simple sentence needs no point or distinction; only a period to close it: as, “A good man loves virtue for itself.”—In such a sentence, the several adjuncts affect either the subject or the verb in a different manner. Thus the word *good*, expresses the quality of the subject, *virtue* the object of the action, and *for itself* the end thereof.—Now none of these adjuncts can be separated from the rest of the sentence: for if one be, why should not all the rest? and if all be, the sentence will be minced into almost as many parts as there are words.

But if several adjuncts be attributed in the same manner either to the subject or the verb, the sentence becomes conjunct, and is to be divided into parts.

In every conjunct sentence, as many subjects, or as many finite verbs as there are, either expressly or implied, so many distinctions may there be. Thus, “My hopes, fears, joys, pains, all centre in you.” And thus Cicero.

Cicero, *Catilina abiit, excessit, evasit, erupit.*—The reason of which pointing is obvious; for as many subjects or finite verbs as there are in a sentence, so many members does it really contain. Whenever, therefore, there occur more nouns than verbs, or contrariwise, they are to be conceived as equal. Since, as every subject requires its verb, so every verb requires its subject, wherewith it may agree: excepting, perhaps, in some figurative expressions.

SENTENCE, is also used, in rhetoric and poetry, for a short pithy remark, or reflection, containing some sentiment of use in the conduct of life. See APORRHEGM, ADAGE, PROVERB, &c.

SENTICOSÆ, (from *sentis*, a "briar or bramble;") the name of the 35th order in Linnæus's fragments of a natural method, consisting of rose, bramble, and other plants which resemble them in port and external structure. See BOTANY, p. 1312.

SENTIMENT, according to Lord Kaimes, is a term appropriated to such thoughts as are prompted by passion. It differs from a perception; for a perception signifies the act by which we become conscious of external objects. It differs from consciousness of an internal action, such as thinking, suspending thought, inclining, resolving, willing, &c. And it differs from the conception of a relation among objects; a conception of that kind being termed *opinion*.

Elements of
Criticism.

SENTIMENTS, in poetry. To talk in the language of music, each passion hath a certain tone, to which every sentiment proceeding from it ought to be tuned with the greatest accuracy: which is no easy work, especially where such harmony ought to be supported during the course of a long theatrical representation. In order to reach such delicacy of execution, it is necessary that a writer assume the precise character and passion of the personage represented; which requires an uncommon genius. But it is the only difficulty; for the writer, who annihilating himself, can thus become another person, need be in no pain about the sentiments that belong to the assumed character: these will flow without the least study, or even preconception; and will frequently be as delightfully new to himself as to his reader. But if a lively picture even of a single emotion, require an effort of genius, how much greater the effort to compose a passionate dialogue with as many different tones of passion as there are speakers? With what ductility of feeling must that writer be endued, who approaches perfection in such a work; when it is necessary to assume different and even opposite characters and passions, in the quickest succession? Yet this work, difficult as it is, yields to that of composing a dialogue in genteel comedy, exhibiting characters without passion. The reason is, that the different tones of character are more delicate, and less in sight, than those of passion; and, accordingly, many writers, who have no genius for drawing characters, make a shift to represent, tolerably well, an ordinary passion in its simple movements. But of all works of this kind, what is truly the most difficult, is a characteristical dialogue upon any philosophical subject: to interweave characters with reasoning, by suiting to the character of each speaker a peculiarity not only of thought but of expression, requires the perfection of genius, taste, and judgment.

How hard dialogue-writing is, will be evident, even

without reasoning, from the miserable compositions of Sentiments that kind found without number in all languages. The art of mimicking any singularity in gesture or in voice, is a rare talent, though directed by sight and hearing, the acutest and most lively of our external senses: how much more rare must that talent be, of imitating characters and internal emotions, tracing all their different tints, and representing them in a lively manner by natural sentiments properly expressed? The truth is, such execution is too delicate for an ordinary genius; and for that reason the bulk of writers, instead of expressing a passion as one does who feels it, content themselves with describing it in the language of a spectator. To awake passion by an internal effort merely, without any external cause, requires great sensibility; and yet that operation is necessary, not less to the writer than to the actor: because none but those who actually feel a passion can represent it to the life. The writer's part is the more complicated: he must add composition to passion; and mult, in the quickest succession, adopt every different character. But a very humble flight of imagination may serve to convert a writer into a spectator, so as to figure, in some obscure manner, an action as passing in his sight and hearing. In that figured situation, being led naturally to write like a spectator, he entertains his readers with his own reflections, with cool description, and florid declamation; instead of making them eye-witnesses, as it were, to a real event, and to every movement of genuine passion. Thus most of our plays appear to be cast in the same mould; personages without character, the mere outlines of passion, a tiresome monotony, and a pompous declamatory style.

This descriptive manner of representing passion is a very cold entertainment; our sympathy is not raised by description; we must first be lulled into a dream of reality, and every thing must appear as passing in our sight. Unhappy is the player of genius who acts a part in what may be termed a *descriptive tragedy*: after assuming the very passion that is to be represented, how is he cramped in action, when he must utter, not the sentiments of the passion he feels, but a cold description in the language of a bystander? It is that imperfection, undoubtedly, in the bulk of our plays, which confines our stage almost entirely to Shakespeare, notwithstanding his many irregularities. In our late English tragedies, we sometimes find sentiments tolerably well adapted to a plain passion: but we must not in any of them expect a sentiment expressive of character; and, upon that very account, our late performances of the dramatic kind are for the most part intolerably insipid.

But it may be proper to illustrate this subject by examples. The first examples shall be of sentiments that appear the legitimate offspring of passion; to which shall be opposed what are descriptive only, and illegitimate: and in making this comparison, the instances shall be borrowed from Shakespeare and Corneille, who for genius in dramatic composition stand uppermost in the rolls of fame.

I. Shakespear shall furnish the first example, being of sentiments dictated by a violent and perturbed passion:

Learn. ————— Filial ingratitude!

It

Sentiments. Is it not as if this mouth should tear this hand
For lifting food to't?—But I'll punish home;
No, I will weep no more.—In such a night,
To shut me out!—Pour on, I will endure.
In such a night as this! O Regan, Gonerill,
Your old kind father, whose frank heart gave all—
O! that way madness lies; let me shun that;
No more of that.

Kent. Good, my lord, enter here.

Lear. Pr'ythee, go in thyself, seek thine own ease,
This tempest will not give me leave to ponder
On things would hurt me more:—but I'll go in;
In, boy, go first. You houseless poverty—
Nay, get thee in; I'll pray, and then I'll sleep—
Poor naked wretches, wheresoe'er you are,
That bide the pelting of this pitiless storm!
How shall your houseless heads, and unfed sides,
Your loop'd and window'd raggedness defend you
From seasons such as these?—O I have ta'en
Too little care of this! take physic, Pomp;
Expose thyself to feel what wretches feel,
That thou may'st shake the superflux to them,
And show the heavens more just.

King Lear, act 3. sc. 5.

The following is an example of the same kind, expressing sentiments arising from remorse and despair:

Othello. Lo! I have a weapon:
A better never did itself sustain
Upon a soldier's thigh. I've seen the day,
That with this little arm, and this good sword,
I've made my way through more impediments
Than twenty times your stop. But, oh vain boast!
Who can control his fate? 'tis not so now.
Be not afraid, though you do see me weapon'd;
Here is my journey's end, here is my butt,
The very sea-mark of my utmost fail.
Do you go back dismay'd? 'tis a lost fear.
Man but a rush against Othello's breast,
And he retires. Where should Othello go?
Now—how dost thou look now! Oh ill-tarr'd wench!
Pale as thy cheek! when we shall meet at compt,
This look of thine will hurl my soul from heav'n,
And fiends will snatch at it. Cold, cold, my girl;
Ev'n like thy chastity. O cursed slave!
Whip me, ye devils,
From the possession of this heav'nly sight:
Blow me about in winds, roast me in sulphur,
Wash me in sleep-down gulfs of liquid fire—
Oh, Desdemona! Desdemona! dead! dead! oh! oh!

Othello, act 5. sc. 9.

The sentiments here displayed flow so naturally from the passions represented, that we cannot conceive any imitation more perfect.

With regard to the French author, truth obliges us to acknowledge, that he describes in the style of a spectator, instead of expressing passion like one who feels it; which naturally betrays him into a tiresome monotony, and a pompous declamatory style. It is scarce necessary to give examples, for he never varies from that tone. We shall, however, take two passages at a venture, in order to be confronted with those transcribed above. In the tragedy of *Cinna*, *Æmilia*, after the conspiracy was discovered, having nothing in view but racks and death to herself and her lover, receives

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a pardon from Augustus, attended with the brightest circumstances of magnanimity and tenderness. This is a lucky situation for representing the passions of surprise and gratitude in their different stages, which seem naturally to be what follow. These passions, raised at once to the utmost pitch, and being at first too big for utterance, must, for some moments, be expressed by violent gestures only: so soon as there is vent for words, the first expressions are broken and interrupted: at last, we ought to expect a tide of intermingled sentiments, occasioned by the fluctuation of the mind between the two passions. *Æmilia* is made to behave in a very different manner: with extreme coolness she describes her own situation, as if she were merely a spectator; or rather the poet takes the talk off her hands:

Et je me rends, Seigneur, à ces hautes bontés:
Je recouvre la vie auprès de leurs clartés.
Je connois mon forfait qui me sembloit justice;
Et ce que n'avoit pu la terreur du supplice,
Je sens naître en mon ame un repentir puissant,
Et mon cœur en secret me dit, qu'il y consent.
Le ciel a résolu votre grandeur suprême;
Et pour preuve, Seigneur, je n'en veux que moi-même.
J'ose avec vanité me donner cet éclat,
Puisqu'il change mon cœur, qu'il veut changer l'état.
Ma haine va mourir, que j'ai crue immortelle;
Elle est morte, et ce cœur devient sujet fidele;
Et prenant désormais cette haine en horreur,
L'ardeur de vous servir succède à sa fureur.

Act 5. sc. 3.

In the tragedy of *Sertorius*, the queen, surprised with the news that her lover was assassinated, instead of venting any passion, degenerates into a cool spectator, and undertakes to instruct the bystanders how a queen ought to behave on such an occasion.

Viriate. Il m'en fait voir ensemble, et l'auteur, et la cause.

Par cet assassinat c'est de moi qu'on dispose,
C'est mon trône, c'est moi qu'on pretend conquerir;
Et c'est mon juste choix qui seul l'a fait perir.
Madame, après sa perte, et parmi ces alarmes,
N'attendez point de moi de soupirs, ni de larmes;
Ce sont amulemens que dédaigne aisément
Le prompt et noble orgueil d'un vif ressentiment.
Qui pleure, l'effoiblit; qui soupire, l'exhale:
Il faut plus de fierté dans une ame royale;
Et ma douleur fourmisse aux soins de le venger, &c.

Act 5. sc. 3.

So much in general upon the genuine sentiments of passion. We proceed to particular observations. And, first, passions seldom continue uniform any considerable time: they generally fluctuate, swelling and subsiding by turns, often in a quick succession; and the sentiments cannot be just unless they correspond to such fluctuation. Accordingly, a climax never shows better than in expressing a swelling passion: the following passages may suffice for an illustration.

Oroonoko. ———Can you raise the dead?
Pursue and overtake the wings of time?
And bring about again the hours, the days,
The years, that made me happy!

Oroonoko, act 2. sc. 2.

Almeria. ———How hast thou charm'd

40 K

The

Sentiments.

The wildness of the waves and rocks to this;
That thus relenting they have giv'n thee back
To earth, to light and life, to love and me?

Mourning Bride, act 1. sc. 7.

I would not be the villain that thou think'st
For the whole space that's in the tyrant's grasp,
And the rich earth to boot.

Macbeth, act 4. sc. 4.

The following passage expresses finely the progress of conviction.

Let me not stir, nor breathe, lest I dissolve
That tender, lovely form, of painted air,
So like Almeria. Ha! it sinks, it falls;
I'll catch it ere it goes, and grasp her shade.
'Tis life! 'tis warm! 'tis she! 'tis she herself!
It is Almeria! 'tis, it is my wife!

Mourning Bride, act 2. sc. 6.

In the progress of thought, our resolutions become more vigorous as well as our passions.

If ever I do yield or give consent,
By any action, word, or thought, to wed
Another lord; may then just heav'n show'r down, &c.

Mourning Bride, act 1. sc. 1.

And this leads to a second observation, That the different stages of a passion, and its different directions, from birth to extinction, must be carefully represented in their order; because otherwise the sentiments, by being misplaced, will appear forced and unnatural. Repentment, for example, when provoked by an atrocious injury, discharges itself first upon the author: sentiments therefore of revenge come always first, and must in some measure be exhausted before the person injured think of grieving for himself. In the *Cid* of Corneille, Don Diegue having been affronted in a cruel manner, expresses scarce any sentiment of revenge, but is totally occupied in contemplating the low situation to which he is reduced by the affront:

O rage! ô desespoir! ô vieillesse ennemie!
N'ai-je donc tant vécu que pour cette infamie?
Et ne suis-je blanchi dans les travaux guerriers,
Que pour voir en un jour flétrir tant de lauriers?
Mon bras, qu'avec respect tout l'Espagne admire,
Mon bras, qui tant de fois a sauvé cet empire,
Tant de fois affermi le trône de son Roi,
Trahit donc ma querelle, et ne fait rien pour moi!
O cruel souvenir de ma gloire passée!
Oeuvre de tant de jours en un jour effacée!
Nouvelle dignité fatale à mon bonheur!
Précipice élevé d'où tombe mon honneur!
Faut-il de votre éclat voir triompher le comte,
Et mourir sans vengeance, ou vivre dans la honte?
Comte, fois de mon prince à présent gouverneur,
Ce haut rang n'admet point un homme sans honneur;
Et ton jaloux orgueil par cet affront insigne,
Malgré le chioix du Roi, m'en a fait rendre indigne.
Et toi, de mes exploits glorieux instrument,
Mais d'un corps tout de glace inutile ornement,
Fer jadis tant à craindre, et qui dans cette offense,
M'as servi de parade, et non pas de défense,
Va, quitte désormais le dernier des humains,
Passe pour me venger en de meilleures mains.

Le Cid, act 1. sc. 7.

These sentiments are certainly not the first that are

suggested by the passion of resentment. As the first movements of resentment are always directed to its object, the very same is the case of grief. Yet with relation to the sudden and severe distemper that seized Alexander bathing in the river Cydnus, Quintus Curtius describes the first emotions of the army as directed to themselves, lamenting that they were left without a leader, far from home, and had scarce any hopes of returning in safety: their king's distress, which must naturally have been their first concern, occupies them but in the second place according to that author. In the *Aminta* of Tasso, Sylvia, upon a report of her lover's death, which she believed certain, instead of bemoaning the loss of her beloved, turns her thoughts upon herself, and wonders her heart does not break:

Ohime, ben son di fallo,
Poi che questa novella non m'uccide. *Act 4. sc. 2.*

In the tragedy of *Jane Shore*, Alicia, in the full purpose of destroying her rival, has the following reflection:

Oh Jealousy! thou bane of pleasing friendship,
Thou worst invader of our tender bosoms;
How does thy rancour poison all our softness,
And turn our gentle nature into bitterness!
See where she comes! Once my heart's dearest blessing,
Now my chang'd eyes are blighted with her beauty,
Loathe that known face, and sicken to behold her.

Act 3. sc. 1.

These are the reflections of a cool spectator. A passion, while it has the ascendant, and is freely indulged, suggests not to the person who feels it any sentiment to its own prejudice: reflections like the foregoing occur not readily till the passion has spent its vigour.

A person sometimes is agitated at once by different passions; and the mind in that case, vibrating like a pendulum, vents itself in sentiments that partake of the same vibration. This we give as a third observation:

Queen. Would I had never trod this English earth,
Or felt the flatteries that grow upon it!
Ye've angels faces, but heav'n knows your hearts.
What shall become of me now? wretched lady!
I am the most unhappy woman living.
Alas! poor wenches, where are now your fortunes?

[To her women.]

Shipwreck'd upon a kingdom, where no pity,
No friends, no hope, no kindred, weep for me!
Almost, no grave allow'd me.

Henry VIII. act 3. sc. 1.

Othello. Oh devil, devil!
If that the earth could team with woman's tears,
Each drop she falls would prove a crocodile.
Out of my sight!

Desdemona. I will not stay to offend you. *[Going.]*
Lodovico. Truly, an obedient lady:
I do beseech your lordship, call her back.

Oth. Mistress—
Des. My lord.
Oth. What would you wish with her, Sir?
Lod. Who, I, my lord?
Oth. Ay; you did wish that I would make her turn:
Sir, she can turn and turn, and yet go on;
And turn again. And she can weep, Sir, weep;
And she's obedient: as you say, obedient:

Very

Sentiments. Very obedient—proceed you in your tears—
Concerning this, Sir,—oh well-painted passion!—
I am commanded home—get you away,
I'll send for you anon—Sir, I obey the mandate,
And will return to Venice.—Hence, avant!

[Exit Delfemona.

Othello, act 4. sc. 6.

Emilia. Oh! my good lord, I would speak a word with you.

Othello. Yes, 'tis Emilia—By and by.—She's dead.
'Tis like she comes to speak of Cassio's death;
The noise was high.—Ha! no more moving?
Still as the grave. Shall she come in? were't good?
I think she stirs again—No—what's the best?
If she come in, she'll, sure, speak to my wife:
My wife! my wife! What wife? I have no wife;
Oh insupportable! oh heavy hour!

Othello, act 5. sc. 7.

A fourth observation is, That nature, which gave us passions, and made them extremely beneficial when moderate, intended undoubtedly that they should be subjected to the government of reason and conscience. It is therefore against the order of nature, that passion in any case should take the lead in contradiction to reason and conscience: such a state of mind is a sort of anarchy which every one is ashamed of, and endeavours to hide or dissemble. Even love, however laudable, is attended with a conscious shame when it becomes immoderate: it is covered from the world, and disclosed only to the beloved object:

Et quel l'amour souvent de remors combattu
Paroisse une foiblesse, et non une vertu.

Boileau, l'Art poet. chant. 3. l. 101.

O, they love least that let men know they love.

Two Gentlemen of Verona, act 1. sc. 3.

Hence a capital rule in the representation of immoderate passions, that they ought to be hid or dissembled as much as possible. And this holds in an especial manner with respect to criminal passions: one never counsels the commission of a crime in plain terms; guilt must not appear in its native colours, even in thought; the proposal must be made by hints, and by representing the action in some favourable light. Of the propriety of sentiment upon such an occasion, Shakespeare, in the Tempest, has given us a beautiful example, in a speech by the usurping duke of Milan, advising Sebastian to murder his brother the king of Naples:

Antonio. —————What might,

Worthy Sebastian,—O, what might—no more.

And yet, methinks, I see it in thy face

What thou shouldst be: the occasion speaks thee, and
My strong imagination sees a crown
Dropping upon thy head.

Act 2. sc. 1.

There cannot be a finer picture of this kind, than that of king John soliciting Hubert to murder the young prince Arthur:

K. John. Come hither, Hubert. O my gentle Hubert,
We owe thee much; within this wall of flesh
There is a soul counts thee her creditor,
And with advantage means to pay thy love.
And, my good friend, thy voluntary oath
Lives in this bosom, dearly cherished.

Give me thy hand, I had a thing to say—
But I will fit it with some better time.
By heav'n, Hubert, I'm almost afraid
To say what good respect I have of thee.
Hubert. I am much bounden to your majesty.
K. John. Good friend, thou hast no cause to say so

Sentiments.

yet—
But thou shalt have—and creep time ne'er so slow,
Yet it shall come for me to do thee good.

I had a thing to say—but, let it go:
The sun is in the heav'n, and the proud day,
Attended with the pleasures of the world,
Is all too wanton and too full of gauds
To give me audience. If the midnight-bell
Did with his iron-tongue and brazen mouth
Sound one into the drowsy race of night;
If this flame were a church-yard where we stand,
And thou possessed with a thousand wrongs;
Or if that surly spirit Melancholy
Had bak'd thy blood, and made it heavy-thick,
Which else runs tickling up and down the veins,
Making that idiot Laughter keep men's eyes,
And strain their cheeks to idle merriment,
(A passion hateful to my purposes);
Or if that thou couldst see me without eyes,
Hear me without thine ears, and make reply
Without a tongue, using conceit alone,
Without eyes, ears, and harmful sounds of words;
Then, in despite of broad-ey'd watchful day,
I would into thy bosom pour my thoughts.
But ah, I will not.—Yet I love thee well;
And, by my troth, I think thou lov'st me well.

Hubert. So well, that what you bid me undertake,
Though that my death were adjunct to my act,
By heav'n, I'd do't.

K. John. Do not I know thou would'st?
Good Hubert, Hubert, Hubert, throw thine eye
On yon young boy. I'll tell thee what, my friend;
He is a very serpent in my way.
And, where'er this foot of mine doth tread,
He lies before me. Doit thou understand me?
Thou art his keeper.

King John, act 3. sc. 5.

II. As things are best illustrated by their contraries, we proceed to faulty sentiments, disdaining to be indebted for examples to any but the most approved authors. The first class shall consist of sentiments that accord not with the passion; or, in other words, sentiments that the passion does not naturally suggest. In the second class, shall be ranged sentiments that may belong to an ordinary passion, but unsuitable to it as tinctured by a singular character. Thoughts that properly are not sentiments, but rather descriptions, make a third. Sentiments that belong to the passion represented, but are faulty as being introduced too early or too late, make a fourth. Vicious sentiments exposed in their native dress, instead of being concealed or disguised, make a fifth. And in the last class shall be collected sentiments suited to no character nor passion, and therefore unnatural.

The first class contains faulty sentiments of various kinds, which we shall endeavour to distinguish from each other.

1. Sentiments that are faulty by being above the tone of the passion:

Obello. — O my soul's joy !

If after every tempest come such calms,
May the winds blow till they have waken'd death :
And let the labouring bark climb hills of seas
Olympus high, and duck again as low
As hell's from heaven ? *Obello, act. 2. sc. 6.*

This sentiment may be suggested by violent and inflamed passion ; but is not suited to the satisfaction, however great, that one feels upon escaping danger.

Philaster. Place me, some god, upon a pyramid
Higher than hills of earth, and lend a voice
Loud as thy thunder to me, that from thence
I may discourse to all the under-world
The worth that dwells in him.

Philaster of Beaumont and Fletcher, act 4.

2. Sentiments below the tone of the passion. Ptolemy, by putting Pompey to death, having incurred the displeasure of Cæsar, was in the utmost dread of being dethroned : in that agitating situation, Cornelle makes him utter a speech full of cool reflection, that is in no degree expressive of the passion.

Ah ! si je t'avois crû, je n'aurois pas de maître,
Je serois dans le trône où le ciel m'a fait naître ;
Mais c'est une imprudence assez commune aux rois,
D'écouter trop d'avis, et se tromper au choix.
Le Destin les aveugle au bord du précipice,
Ou si quelque lumière en leur ame se glisse,
Cette fausse clarté dont il les éblouit,
Le plonge dans une gouffre, et puis s'évanouit.

La mort de Pompé, act 4. sc. 1.

In *Les Freres Ennemis* of Racine, the second act is opened with a love-scene : Hemon talks to his mistress of the torments of absence, of the lustre of her eyes, that he ought to die nowhere but at her feet, and that one moment of absence is a thousand years. Antigone on her part acts the coquette ; pretends that he must be gone to wait on his mother and brother, and cannot stay to listen to her courtship. This is odious French gallantry, below the dignity of the passion of love : it would scarce be excusable in painting modern French manners ; and is insufferable where the ancients are brought upon the stage. The manners painted in the *Alexandre* of the same author are not more just : French gallantry prevails there throughout.

3. Sentiments that agree not with the tone of the passion ; as where a pleasant sentiment is grafted upon a painful passion, or the contrary. In the following instances the sentiments are too gay for a serious passion.

No happier task these faded eyes pursue ;
To read and weep is all they now can do.

Eloïsa to Abelard, l. 47.

Again,
Heav'n first taught letters for some wretch's aid,
Some banish'd lover, or some captive maid :
They live, they speak, they breathe what love inspires,
Warm from the soul, and faithful to its fires ;
The virgin's wish without her fears impart,
Excuse the blush, and pour out all the heart ;
Speed the soft intercourse from soul to soul,
And waft a sigh from Indus to the pole.

Eloïsa to Abelard, l. 51.

These thoughts are pretty : they suit Pope, but not *Sentiments* Eloïsa.

Satan, enraged by a threatening of the angel Gabriel, answers thus :

Then when I am thy captive, talk of chains,
Proud liminary clerb ; but ere then
Far heavier load thyself expect to feel
From my prevailing arm, though heaven's King
Ride on thy wings, and thou with thy compeers,
Us'd to the yoke, draw'st his triumphant wheels
In progress thro' the road of heav'n *star-pav'd.*

Paradise Lost, book 4.

The concluding epithet forms a grand and delightful image, which cannot be the genuine offspring of rage.

4. Sentiments too artificial for a serious passion. The first example is a speech of Piercy expiring.

O, Harry, thou hast robb'd me of my growth :
I better brook the loss of brittle life,
Than those proud titles thou hast won of me ; [*sings.*
They wound my thoughts, worse than thy sword my
But thought's the slave of life, and life time's fool ;
And time, that takes survey of all the world,
Must have a stop.

First Part, Henry IV. act 5. sc. 9.

Livy inserts the following passage in a plaintive oration of the Locrenses, accusing Pléminius the Roman legate of oppression.

In hoc legato vestro, nec hominis quicquam est, Patres Conscripti, præter figuram et speciem ; neque Romani civis, præter habitum vestitumque, et sonum linguæ Latinæ. Pectus et bellua immanis, quales fremitum, quondam, quo ab Sicilia dividitur, ad perniciem, nigrantium circumfudit, fabulæ ferunt.

Livy, l. xxix. § 17.

The sentiments of the *Mourning Bride* are for the most part no less delicate than just copies of nature : in the following exception the picture is beautiful, but too artful to be suggested by severe grief.

Almeria. O no ! Time gives increase to my afflictions.

The circling hours, that gather all the woes
Which are diffus'd through the revolving year,
Come heavy laden with th' oppressive weight
To me ; with me, successively, they leave
The sighs, the tears, the groans, the restless cares,
And all the damps of grief, that did retard their flights,
They shake their downy wings, and scatter all
The dire collected dews on my poor head ;
Then fly with joy and swiftness from me. *Act 1. sc. 1.*

In the same play, Almeria seeing a dead body, which she took to be Alphonso's, expresses sentiments strained and artificial, which nature suggests not to any person upon such an occasion :

Had they our hearts or eyes, that did this deed ?
Could eyes endure to guide such cruel hands ?
Are not my eyes guilty alike with theirs,
That thus can gaze, and yet not turn to stone ?
— I do not weep ! The springs of tears are dry'd,
And of a sudden I am calm, as if [*der'd !*
All things were well ; and yet my husband's mur-
Yes,

Sentiments.

Yes, yes, I know to mourn: I'll sluice this heart,
The source of woe, and let the torrent in.

Act 5. sc. 11.

Lady Trueman. How could you be so cruel to defer giving me that joy which you knew I must receive from your preference? You have robb'd my life of some hours of happiness that ought to have been in it.

Drummer, act 5.

Pope's elegy to the memory of an unfortunate lady, expresses delicately the most tender concern and sorrow that one can feel for the deplorable fate of a person of worth. Such a poem, deeply serious and pathetic, rejects with disdain all fiction. Upon that account, the following passage deserves no quarter; for it is not the language of the heart, but of the imagination indulging its flights at ease, and by that means is eminently discordant with the subject. It would be a still more severe censure, if it should be ascribed to imitation, copying indifferently what has been said by others:

What tho' no weeping loves thy ashes grace,
Nor polish'd marble emulate thy face?
What though no sacred earth allow thee room,
Nor hallow'd dirge be mutter'd o'er thy tomb?
Yet shall thy grave with rising flow'rs be dress'd,
And the green turf lie lightly on thy breast:
There shall the morn her earliest tears bestow,
There the first roses of the year shall blow;
While angels with their silver wings o'er shade
The ground, now sacred by thy relics made.

5. Fanciful or finical sentiments. Sentiments that degenerate into point or conceit, however they may amuse in an idle hour, can never be the offspring of any serious or important passion. In the *Jerusalem* of Tasso, Tancredi, after a single combat, spent with fatigue and loss of blood, falls into a swoon; in which situation, understood to be dead, he is discovered by Erminia, who was in love with him to distraction. A more happy situation cannot be imagined, to raise grief in an instant to its highest pitch; and yet, in venting her sorrow, she descends most abominably into antithesis and conceit, even of the lowest kind:

E in lui versò d'inefficabil vena
Lacrime, e voce di sospirï mista.
In che misero punto hor qui me trista
Fortuna? a che veduta amara e mena?
Dopo gran tempo i' ti ritrovo a pena
Tancredi, e ti rivveggo, e non fon villa
Villa non fon da te, benchè presente
T trovando ti perdo eternamente.

Canto 19. st. 105.

Armida's lamentation respecting her lover Rinaldo is in the same vicious taste. *Vid.* canto 20. Stan. 124, 125, 126.

Queen. Give me no help in lamentation,
I am not barren to bring forth complaints:
All springs reduce their currents to mine eyes,
That I, being govern'd by the wat'ry moon,
May send forth plenteous tears to drown the world,
Ah, for my husband, for my dear lord Edward.

King Richard III. act 2. sc. 2.

Jane Shore. Let me be branded for the public scorn,

Sentiments.

Turn'd forth, and driven to wander like a vagabond,
Be friendless and forsaken, seek my bread
Upon the barren wild and desolate waite,
Feed on my sighs, and drink my falling tears;
Ere I content to teach my lips injustice,
Or wrong the orphan who has none to save him.

Jane Shore, act 4

Give me your drops, ye soft-descending rains;
Give me your streams, ye never ceasing springs;
That my sad eyes may still supply my duty,
And feed an everlasting flood of sorrow.

Ibid. act 5.

Jane Shore utters her last breath in a witty conceit:

Then all is well, and I shall sleep in peace——
'Tis very dark, and I have lost you now——
Was there not something I would have bequeath'd you?
But I have nothing left me to bestow,
Nothing but one sad sigh. Oh mercy, Heav'n! [*Dies.*]

Act 5.

Gilford to Lady Jane Gray, when both were condemned to die:

Thou stand'st, unmov'd;
Calm temper sits upon thy beauteous brow;
Thy eyes that flow'd so fast for Edward's loss,
Gaze unconcern'd upon the ruin round thee,
As if thou hadst resolv'd to brave thy fate,
And triumph in the midst of desolation.
Ha! see, it swells, the liquid crystal rises,
It starts in spite of thee——but I will catch it,
Nor let the earth be wet with dew so rich.

Lady Jane Gray, act 4. near the end.

The concluding sentiment is altogether finical, unsuitable to the importance of the occasion, and even to the dignity of the passion of love.

Cornille, in his *Examen de la Cid*, answering an objection, that his sentiments are sometimes too much refined for persons in deep distress, observes, that if poets did not indulge sentiments more ingenious or refined than are prompted by passion, their performances would often be low, and extreme grief would never suggest but exclamations merely. This is plain language to assert, that forc'd thoughts are more agreeable than those that are natural, and ought to be preferred.

The second class is of sentiments that may belong to an ordinary passion, but are not perfectly concordant with it, as tinged by a singular character.

In the last act of that excellent comedy, *The Careless Husband*, Lady Easy, upon Sir Charles's reformation, is made to express more violent and turbulent sentiments of joy than are consistent with the mildness of her character:

Lady Easy. O the soft treasure! O the dear reward of long-desiring love.——Thus! thus to have you mine, is something more than happiness; 'tis double life, and madness of abounding joy.

If the sentiments of a passion ought to be suited to a peculiar character, it is still more necessary that action be suited to the character. In the 5th act of the *Drummer*, Addison makes his gardener act even below the character of an ignorant credulous rustic: he gives him the behaviour of a gaping idiot.

The following instances are descriptions rather than sentiments, which compose a third class.

Of

Of this descriptive manner of painting the passions, there is in the *Hippolytus* of Euripides, *act* 5. an illustrious instance, viz. the speech of Theseus, upon hearing of his son's dismal exit. In Racine's tragedy of *Esther*, the queen hearing of the decree issued against her people, instead of expressing sentiments suitable to the occasion, turns her attention upon herself, and describes with accuracy her own situation:

Juste ciel ! tout mon sang dans mes veines se glace.

Act 1. *sc.* 3.

Again,

Aman. C'en est fait. Mon orgueil est forcé de plier.
L'inevitable *Aman* est réduit à prier.

Esther, *act* 3. *sc.* 5.

Athalie. Quel prodige nouveau me trouble et m'embarrasse ?

La douceur de sa voix, son enfance, sa grace,
Font insensiblement à mon inimitié
Succéder — Je serois sensible à la pitié ?

Athalie, *act* 2. *sc.* 7.

Titus. O de ma passion fureur desespérée !

Brutus of *Voltaire*, *act* 3. *sc.* 6.

What other are the foregoing instances but describing the passion another feels ?

Captain Flash, in a farce composed by Garrick, endeavours to hide his fear by saying, "What a damn'd passion I am in."

An example is given above of remorse and despair expressed by genuine and natural sentiments. In the fourth book of *Paradise Lost*, Satan is made to express his remorse and despair in sentiments which, tho' beautiful, are not altogether natural: they are rather the sentiments of a spectator than of a person who actually is tormented with these passions.

The fourth class is of sentiments expressed too early or too late.

Some examples mentioned above belong to this class. Add the following from *Venice Preserved*, *act* 5. at the close of the scene between Belvidera and her father Priuli. The account given by Belvidera of the danger she was in, and of her husband's threatening to murder her, ought naturally to have alarmed her relenting father, and to have made him express the most perturbed sentiments. Instead of which, he dissolves into tenderness and love for his daughter, as if he had already delivered her from danger, and as if there were a perfect tranquillity:

Canst thou forgive me all my follies past !
I'll henceforth be indeed a father; never,
Never more thus expose, but cherish thee,
Dear as the vital warmth that feeds my life,
Dear as those eyes that weep in fondness o'er thee:
Peace to thy heart.

Immoral sentiments exposed in their native colours, instead of being concealed or disguised, compose the fifth class.

The Lady Macbeth, projecting the death of the king, has the following soliloquy.

———— The raven himself's not hoarse
That croaks the fatal entrance of Duncan
Under my battlements. Come, all you spirits
That tend on mortal thoughts, unsex me here,
And fill me from the crown to the toe, top-full

Of direct cruelty ; make thick my blood,
Stop up th' access and passage to remorse,
That no compunctious visitings of nature
Shake my fell purpose.

Macbeth, *act* 1. *sc.* 7.

This speech is not natural. A treacherous murder was never perpetrated even by the most hardened mercenary without compunction: and that the lady here must have been in horrible agitation, appears from her invoking the infernal spirits to fill her with cruelty, and to stop up all avenues to remorse. But in that state of mind, it is a never-failing artifice of self-deceit to draw the thickest veil over the wicked action, and to extenuate it by all the circumstances that imagination can suggest: and if the crime cannot bear disguise, the next attempt is to thrust it out of mind altogether, and to rush on to action without thought. This last was the husband's method.

Strange things I have in head, that will to hand ;
Which must be acted ere they must be scann'd.

Act 3. *sc.* 5.

The lady follows neither of these courses, but in a deliberate manner endeavours to fortify her heart in the commission of an execrable crime, without even attempting to colour it. This, we think, is not natural; we hope there is no such wretch to be found as is here represented.

In the *Pompey* of Corneille, Photine counsels a wicked action in the plainest terms without disguise; *act* 1. *sc.* 1.

In the tragedy of *Esther*, (*act* 2. *sc.* 1.) Homan acknowledges without disguise his cruelty, insolence, and pride. And there is another example of the same kind in the *Agamemnon* of Seneca (beginning of *act* 2.) In the tragedy of *Athalie*, Mathan, in cool blood, relates to his friend many black crimes he had been guilty of, to satisfy his ambition. (*Act* 2. close of *sc.* 3.)

In Congreve's *Double-dealer*, Malkwell, instead of disguising or colouring his crimes, values himself upon them in a soliloquy:

Cynthia, let thy beauty gild my crimes; and what soever I commit of treachery or deceit, shall be imputed to me as a merit. — Treachery ! what treachery ? Love cancels all the bonds of friendship, and sets men right upon their first foundations.

Act 2. *sc.* 8.

In French plays, love, instead of being hid or disguised, is treated as a serious concern, and of greater importance than fortune, family, or dignity. The reason may be, that, in the capital of France, love, by the easiness of intercourse, has dwindled down from a real passion, to be a connection that is regulated entirely by the mode or fashion. This may in some measure excuse their writers, but will never make their plays be relished among foreigners.

The last class comprehends sentiments that are unnatural, as being suited to no character nor passion. These may be subdivided into three branches: first, sentiments unsuitable to the constitution of man, and to the laws of his nature; second, inconsistent sentiments; third, sentiments that are pure rant and extravagance.

When the fable is of human affairs, every event, every incident, and every circumstance, ought to be natural, otherwise the imitation is imperfect. But an imperfect imitation is a venial fault, compared with that

Sentiments.

Sentiments.

that of running crofs to nature. In the *Hippolytus* of Euripides, (*act* iv. *sc.* 5.) Hippolytus, wishing for another self in his own situation, "How much (says he) 'should I be touched with his misfortune!' as if it were natural to grieve more for the misfortunes of another than for one's own.

Ofsyn. Yet I behold her—yet—and now no more. Turn your lights inward, Eyes, and view my thought; So shall you still behold her—'Twill not be. O impotence of sight! mechanic sense, Which to exterior objects ow'nt thy faculty, Not seeing of election, but necessity. 'Thus do our eyes, as do all common mirrors, Successively reflect succeeding images. Nor what they would, but must; a star or toad; Just as the hand of chance administrators!

Mourning Bride, act 2. *sc.* 8. No man, in his senses, ever thought of applying his eyes to discover what passes in his mind; far less of blaming his eyes for not seeing a thought or idea. In Moliere's *P'Avare*, (*act* iv. *sc.* 7.) Harpagon being robbed of his money, seizes himself by the arm, mistaking it for that of the robber. And again he expresses himself as follows:

Je veux aller querir la justice, et faire donner la question à toute ma maison; à servantes, à valets, à fils, à fille, et à moi aussi.

This is so absurd as scarce to provoke a smile, if it be not at the author.

Of the second branch the following are examples.

Now bid me run,
And I will strive with things impossible,
Yea, get the better of them.

Julius Cæsar, act 2. *sc.* 3. Vos mains seules ont droit de vaincre un invincible.

Le Cid, act 5. *sc.* last. Que son nom soit beni. Que son nom soit chanté.

Esther, act 5. *sc.* last. Au de la de l'Éternité.

Me miserable! which way shall I fly
Infinite wrath and infinite despair?
Which way I fly is hell: myself am hell;
And in the lowest deep, a lower deep,
Still threatening to devour me, opens wide;
To which the hell I suffer seems a heav'n.

Paradise Lost, book 4. Of the third branch, take the following samples.

Lucan talking of Pompey's sepulchre,
Romanum nomen, et omne
Imperium magno est tumuli modus. Obrue fixa
Crimine plena desim. Si tota est Herculis Oete,
Et juga tota vacant Bromio Nyctea; quare
Unus in Egypto Magno lapis: Omnia Lagi
Rura tenere potest, si nullo cespite nomen
Hæserit. Erremus populi, cinerumque tuorum,
Magne, metu nullas Nili calcemus arenas.

L. viii. l. 798.

Thus, in Rowe's translation:

Where there are seas, or air, or earth, or skies,
Where-e'er Rome's empire stretches, Pompey lies.
Far be the vile memorial then convey'd!
Nor let this stone the partial gods upbraid.

Shall Hercules all Oeta's heights demand,
And Nyssa's hill for Bacchus only stand;
While one poor pebble is the warrior's doom
That fought the cause of liberty and Rome?
If Fate decrees he must in Egypt lie,
Let the whole fertile realm his grave supply,
Yield the wide country to his awful shade,
Nor let us dare on any part to tread,
Fearful we violate the mighty dead.

The following passages are pure rant. Coriolanus, speaking to his mother,

What is this?
Your knees to me? to your corrected son?
Then let the pebbles on the hungry beach
Fillop the stars: then let the mutinous winds
Strike the proud cedars 'gainst the fiery fun:
Murdring impossibility, to make
What cannot be, slight work.

Coriolanus, act 5. *sc.* 3. *Cæsar.* Danger knows full well,
That Cæsar is more dangerous than he.
We were two lions litter'd in one day,
And I the elder and more terrible.

Julius Cæsar, act 2. *sc.* 4. *Almabide.* This day
I gave my faith to him, he his to me.

Almanzor. Good Heaven, thy book of fate be-fore me lay

But to tear out the journal of this day.
Or if the order of the world below,
Will not the gap of one whole day allow,
Give me that minute when she made that vow.
That minute ev'n the happy from their bliss might give,
And those who live in grief a shorter time would live,
So small a link, if broke, th' eternal chain
Would like divided waters join again.

Conquest of Granada, act 3. *Almanzor.* I'll hold it fast
As life; and when life's gone, I'll hold this last.
And if thou tak'it it after I am slain,
I'll send my ghost to fetch it back again.

Conquest of Granada, part 2. *act* 3. *Lyndiraxa.* A crown is come, and will not fate allow,
And yet I feel something like death is near.

My guards, my guards—
Let not that ugly skeleton appear.
Sure Destiny mistakes; this death's not mine;
She doats, and meant to cut another line.
Tell her I am a queen—but 'tis too late;
Dying, I charge rebellion on my fate;
Bow down, ye slaves—
Bow quickly down, and your submission show;
I'm pleas'd to taste an empire ere I go.

Conquest of Granada, part 2. *act* 5. *Ventidius.* But you, ere love mis'd your wand'ring eyes,

Were sure the chief and best of human race,
Fram'd in the very pride and boast of nature,
So perfect, that the gods who form'd you wonder'd
At their own skill, and cry'd, A lucky hit
Has mend'd our design. *Dryden, All for Love, act* v.

Not to talk of the impiety of this sentiment, it is ludicrous instead of being lofty.

The

Sentinel,
Sepia.

The famous epitaph on Raphael is not less absurd than any of the foregoing passages:

Raphael, timuit, quo sospite, vincis,
Rerum magna parens, et moriente mori.

Imitated by Pope, in his epitaph on Sir Godfrey Kneller:

Living, great Nature fear'd he might outvie
Her works; and dying, fears herself may die.

Such is the force of imitation; for Pope of himself would never have been guilty of a thought so extravagant.

SENTINEL, or SENTRY, in military affairs, a private soldier placed in some post to watch the approach of the enemy, to prevent surprises, to stop such as would pass without orders or discovering who they are. They are placed before the arms of all guards, at the tents and doors of general officers, officers, colonels of regiments, &c.

SENTINEL *Perdu*, a soldier posted near an enemy, or in some very dangerous post where he is in hazard of being lost.

All sentinels are to be vigilant on their posts; neither are they to sing, smoke tobacco, nor suffer any noise to be made near them. They are to have a watchful eye over the things committed to their charge. They are not to suffer any light to remain, or any fire to be made, near their posts in the night-time; neither is any sentry to be relieved or removed from his post but by the corporal of the guard. They are not to suffer any one to touch or handle their arms, or in the night-time to come within ten yards of their post.

No person is to strike or abuse a sentry on his post; but when he has committed a crime, he is to be relieved, and then punished according to the rules and articles of war.

A sentinel, on his post in the night, is to know nobody but by the counter-sign: when he challenges, and is answered, *Relief*; he calls out, *Stand, relief! advance, corporal!* upon which the corporal halts his men, and advances alone within a yard of the sentry's firelock, (first ordering his party to rest, on which the sentry does the same), and gives him the counter-sign, taking care that no one hear it.

SEPIA, the CUTTLE-FISH, a genus belonging to the order of vermes mollusca. There are eight brachia interspersed on the interior side, with little round serrated cups, by the contraction of which the animal lays flat hold of any thing. Besides these eight arms, it has two tentacula longer than the arms, and frequently pedunculated. The mouth is situated in the centre of the arms, and is horny and hooked, like the bill of a hawk. The eyes are below the tentacula, towards the body of the animal. The body is fleshy, and received into a sheath as far as the breast. There are five species. See Plate CCLXII.

1. The loligo, or great cuttle, with short arms and long tentacula; the lower part of the body rhomboid and pinnated, the upper thick and cylindric. Inhabit all our seas: are gregarious; swift in their motions: take their prey by means of their arms; and embracing it, bring it to their central mouth. Adhere

to the rocks, when they wish to be quiescent, by means of the concave discs that are placed along their arms.

2. The octopodia, with eight arms, connected at their bottom by a membrane. This is the polyopus of Pliny, which he distinguishes from the loligo and sepia by the want of tentacula. Inhabits our seas. In hot climates these are found of an enormous size. The Indians affirm, that some have been seen two fathoms broad over their centre, and each arm nine fathoms long. When the Indians navigate their little boats, they go in dread of them; and lest these animals should sling their arms over and sink them, they never sail without an ax to cut them off.

3. The media, or middle cuttle, with a long, slender, cylindric body; tail finned, pointed, and carinated on each side; two long tentacula; the body almost transparent, green, but convertible into a dirty brown; confirming the remark of Pliny †, that they change their colour through fear, adapting it, chameleon-like, to that of the place they are in. The eyes are large and smaragdine.

4. The fepiola, or small cuttle, with a short body, rounded at the bottom; a round fin on each side; two tentacula. Taken off Flintshire.

5. The officialis, or official cuttle, with an ovated body; fins along the whole of the sides, and almost meeting at the bottom; two long tentacula; the body contains the bone, the cuttle-bone of the shops, which was formerly used as an absorbent. The bones are frequently flung on all our shores; the animal very rarely. This emits, (in common with the other species) when frightened or pursued, the black liquor which the ancients supposed darkened the circumambient wave, and concealed it from the enemy.

Th' endanger'd cuttle thus evades his fears,
And native hoards of fluid safety bears.
A pitchy ink peculiar glands supply,
Whose shades the sharpest beam of light defy.
Pursu'd, he bids the fable fountains flow,
And, wrapt in clouds, eludes th' impending foe.
The fish retreats unseen, while felt-born night,
With pious shade bescreens her parent's flight.

The ancients sometimes made use of it instead of ink. Perius mentions the species in his description of the noble Rudent.

*Jam liber, et bicolor positis membrana capillis,
Inque manus charta, nodisque venit arundo.
Tum queritur, crassus calamo quod pectus imbor;
Nigra quod insula venefica sepia lymphæ.*

At length, his book he spreads, his pen he takes;
His papers here in learned order lays,
And there his parchment's smoother side displays.
But oh! what croffes wait on studious men!
The cuttle's juice hangs clotted at our pen.
*In all my life such stuff I never knew,
So gummy this—Dilute it, it will do.
Nay, now 'tis water!* DRYDEN.

This animal was esteemed a delicacy by the ancients, and is eaten even at present by the Italians. Rondeletius gives us two receipts for the dressing, which may be continued to this day. Athenæus also leaves us the method of making an antique cuttle-fish sausage; and we learn from Aristotle, that those animals are in highest season when pregnant.

SEPIARIE, (from *seper*, "a hedge"), the name of the 44th order of Linnaeus's Fragments of a Natural Method, consisting of a beautiful collection of woody plants, some of which, from their size and elegance,

Sepia
Seps.Lib. ix.
29.

Septs
Septics.

are very proper furniture for hedges. See BOTANY, p. 315.

SEPS, in zoology. See LACERTA.

SEPTARIÆ, in natural history, a large class of fossils, commonly known by the names of *lulus Helmontii* and *waxen veins*.

They are defined to be fossils not inflammable, nor soluble in water; of a moderately firm texture and dusky hue, divided by several septa or thin partitions, and composed of a sparry matter greatly debased by earth; not giving fire with steel; fermenting with acids, and in great part dissolved by them; and calcining in a moderate fire.

Of this class there are two distinct orders of bodies, and under those six genera. The septariæ of the first order are those which are usually found in large masses, of a simple uniform construction, but divided by large septa either into larger and more irregular portions, or into smaller and more equal ones, called *talcs*. The genera of this order are four. 1. Those divided by septa or spar, called *seemie*: 2. Those divided by septa of earthy matter, called *gaophragmia*: 3. Those divided by septa of the matter of the pyrites, called *pyritica*: And, 4. Those divided by septa of spar, with an admixture of crystal, called *diaugophragmia*.

Those of the second order are such as are usually found in smaller masses, of a crusted structure, formed by various incrustations round a central nucleus, and divided by very thin septa. Of this order are only two genera. 1. Those with a short roundish nucleus, inclosed within the body of the mass; and, 2. Those with a long nucleus, standing out beyond the ends of the mass.

SEPTEMBER, the ninth month of the year, consisting of only thirty days: it took its name as being the seventh month, reckoning from March, with which the Romans began their year.

SEPTENNIAL, any thing lasting seven years.

SEPTENNIAL Elections. Blackstone, in his *Commentaries*, Vol. I. p. 189. says, (after observing that the utmost extent of time allowed the same parliament to sit by the stat. 6 W. and M. c. 2. was three years), "But, by the statute 1 Geo. I. Æ. 2. c. 38. (in order *professedly* to prevent the great and continued expenses of frequent elections, and the violent heats and animosities consequent thereupon, and for the peace and security of the government, just then recovering from the late rebellion), this term was prolonged to seven years; and what alone is an instance of the vast authority of parliament, the very same house that was chosen for three years enacted its own continuance for seven."

SEPTENTRIO, in astronomy, a constellation, more usually called *ursa minor*.

In cosmography, the term *septentrio* denotes the same with *north*: and hence septentrional is applied to any thing belonging to the north; as *septentrional signi*, *parallels*, &c.

SEPTICS, are those substances which promote putrefaction, chiefly the calcareous earths, magnesia, and tefaceous powders. Dr Pringle has reckoned common salt among the septic substances; but later observations give reason to believe, that it is only in consequence of its impurities that salt acts in this manner,

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it being highly probable that all pure salts are antiseptic. Septizon

SEPTIZON, or SEPTIZONIUM, in Roman antiquity, a celebrated mausoleum, built by Septimius Severus, in the tenth region of the city of Rome: it was so called from *septem* and *zona*, by reason it consisted of seven stories, each of which was surrounded by a row of columns.

SEPTUAGESIMA, in the kalendar, denotes the third Sunday before Lent, or before Quadragesima Sunday: supposed by some to take its name from its being about seventy days before Easter.

SEPTUAGINT, the name given to a Greek version of the books of the Old Testament, from its being supposed to be performed by seventy-two Jews, who are usually called the *seventy interpreters*; because seventy is a round number.

The history of this version is expressly written by Aristæas, an officer of the guards to Ptolemy Philadelphus, the substance of whose account is as follows: Ptolemy having erected a fine library at Alexandria, which he took care to fill with the most curious and valuable books from all parts of the world, was informed that the Jews had one containing the laws of Moses, and the history of that people; and being desirous of enriching his library with a Greek translation of it, applied to the high-priest of the Jews; and to engage him to comply with his request, set at liberty all the Jews whom his father Ptolemy Soter had reduced to slavery. After such a step, he easily obtained what he desired; Eleazar the Jewish high-priest sent back his ambassadors with an exact copy of the mosaical law, written in letters of gold, and six elders of each tribe, in all seventy-two; who were received with marks of respect by the king, and then conducted into the isle of Pharos, where they were lodged in a house prepared for their reception, and supplied with every thing necessary in abundance. They set about the translation without loss of time, and finished it in seventy-two days: and the whole being read in the presence of the king, he admired the profound wisdom of the laws of Moses; and sent back the deputies laden with presents, for themselves, the high-priest, and the temple.

This version was in use to the time of our blessed Saviour, and is that out of which all the citations in the New Testament, from the Old, are taken. It was also the ordinary and canonical translation made use of by the Christian church in the earliest ages; and it still subsists in the churches both of the east and west. It is however observable, that the chronology of the septuagint is different from the Hebrew text.

SEPTUM, in anatomy, an inclosure, or partition; a term applied to several parts of the body, which serve to separate one part from another; as, *septum narium*, or partition between the nostrils, &c.

SEPULCHRAL, something belonging to sepulchres or tombs: thus a sepulchral column is a column erected over a tomb, with an inscription on its shaft; and sepulchral lamps, those said to have been found burning in the tombs of several martyrs and others. See LAMP.

SEPULCHRE, a tomb or place destined for the interment of the dead. This term is chiefly used in speaking of the burying-places of the ancients, those

Septizon
Sepulchre.

Sepulchre
||
Sequestration.
—

of the moderns being usually called *tombs*.

Sepulchres were held sacred and inviolable; and the care taken of them has always been held a religious duty, grounded on the fear of God, and the belief of the soul's immortality. Those who have searched or violated them, have been thought odious by all nations, and were always severely punished.

The Egyptians called sepulchres *eternal houses*, in contradistinction to their ordinary houses or palaces, which they called *inns*, on account of their short stay in the one, in comparison of their long abode in the other.

Regular Canons of St SEPULCHRE, a religious order, formerly instituted at Jerusalem, in honour of the holy sepulchre, or the tomb of Jesus Christ.

Many of these canons were brought from the Holy Land into Europe, particularly into France, by Lewis the younger; into Poland, by Jaxa a Polish gentleman; and into Flanders, by the counts thereof; many also came into England. This order was, however, suppressed by pope Innocent VIII. who gave its revenues and effects to that of our Lady of Bethlehem: which also becoming extinct, they were bestowed on the knights of St John of Jerusalem. But the suppression did not take effect in Poland, where they still subsist, as also in several provinces of Germany. These canons follow the rule of St Augustine.

Knights of the Holy SEPULCHRE, a military order, established in Palestine about the year 1114.

The knights of this order in Flanders chose Philip II. king of Spain, for their master, in 1558, and afterwards his son; but the grand-master of the order of Malta prevailed on the last to resign: and when afterwards the duke of Nevers assumed the same quality in France, the same grand-master, by his interest and credit, procured a like renunciation of him, and a confirmation of the union of this order to that of Malta.

SEQUANI, a people anciently forming a part of Gallia Celtica, but annexed to Belgica by Augustus, separated from the Helvetii by mount Jura, with the Rhine on the east (Strabo), bordering on the Ædui, and Segutiano to the south, and Lingones to the west, (Tacitus). Now the Franche Comte.

SEQUESTRATION, in common law, is setting aside the thing in controversy from the possession of both the parties that contend for it. In which sense it is either voluntary, as when done by the consent of the parties; or necessary, as where it is done by the judge, of his own authority, whether the parties will or not.

A sequestration is also a kind of extent on an execution for debt, in the case of a beneficed clergyman, of the profits of his living, directed to the churchwardens to receive the same to satisfy the judgment.

Sequestration is granted on a person's standing out, and all the processes of contempt for non-appearance in the court of chancery, or exchequer, upon a bill exhibited; and also where obedience is not yielded to a decree, in which case the court grants a sequestration of the party's lands.

A sequestration is also made, in London, upon an action of debt; the course of proceeding in which case is this: The action being entered, the officer goes to

the defendant's shop or warehouse, when no person is there, and takes a padlock, and hangs it on the door, uttering these words: "I do sequester this warehouse, and the goods and merchandise therein, of the defendant in this action, to the use of the plaintiff," &c. after which he sets on his seal, and makes a return of the sequestration in the comptroller; and four days being passed after the return made, the plaintiff may, at the next court, have judgment to open the shop or warehouse, and to have the goods appraised by two freemen, who are to be sworn at the next court held for that comptroller; and then the serjeant puts his hand to the bill of appraisement, and the court grants judgment thereon: but yet the defendant may put in bail before satisfaction, and by that means dissolve the sequestration; and after satisfaction, may put in bail to disprove the debt, &c.

In the time of the civil wars, sequestration was used for a seizing of the estates of delinquents for the use of the commonwealth.

SEQUESTRATION, in Scots law. See LAW, N° clxxii. 10. and clxxiii. 12.

SEQUIN, a gold coin, struck at Venice, and in several parts of the grand signior's dominions. See the article COIN.

SERAGLIO, a Persian word, which signifies the "palace of a prince or lord;" in which sense the houses of the ambassadors of Britain, France, &c. are, at Constantinople, called their *seraglios*. But the term *seraglio* is used, by way of eminence, for the palace of the grand signior at Constantinople, where he keeps his court, in which his concubines are lodged, and where the youth are trained up for the principal posts of the empire. It is in form of a triangle, about two miles round, at the end of the promontory Chryfoceras, now called the *seraglio-point*: the buildings extend to the top of the hill, and from thence there are gardens that reach to the sea. The outward appearance is not very beautiful, the architecture being irregular, consisting of separate edifices in the manner of pavilions and domes. The old *seraglio* is the palace where the grand signior's old mistresses are kept.

The ladies of the haram, which is the part allotted to the women, are a collection of young beautiful girls, who, on their admission, are committed to the charge of some old lady, and taught music, dancing, and other accomplishments. These frequently play and dance before the grand signior, while others entertain him with their conversation. Besides these ladies, there are a great many black eunuchs and female slaves in the *seraglio*, whose business it is to guard and wait upon them.

SERAPH, or SERAPHIM; a spirit of the highest rank in the hierarchy of angels; who are thus called from their being supposed to be most inflamed with divine love, by their nearer and more immediate attendance at the throne of God, and to communicate their fervour to the remoter and inferior orders. See ANGEL.

SERAPHIC, burning or inflamed with love or zeal, like a seraphim: thus St Bonaventure is called the *seraphic doctor*, from his abundant zeal and fervour.

SERAPION, a physician of Alexandria. He and
Phi.

Sequestration
||
Serapion.
—

Sergeade
||
Sergeant.

Sergeanty
||
Serpens.

Philinus of the Isle of Cos were both scholars of Herophilus, and were founders of the Empiric sect; which happened about 287 B. C.

SERENADE, a kind of concert given in the night by a lover to his mistress, under her window. These sometimes only consist of instrumental music, but at other times voices are added: the music and songs composed for these occasions are also called *serenades*.

SERENE, a title of honour given to several princes, and to the principal magistrates of republics. The king of England, the republic and doge of Venice, and the children of the king of Spain, are called *myff serene*; and when the pope or the sacred college write to the emperor, to kings, or to the doge, they give them no other title. In like manner, the emperor gives no other title to any king, except to the king of France.

SERENUS (Sammonicus), a celebrated physician in the reigns of the emperors Severus and Caracalla, in and about the year 200. He wrote several treatises on history and the works of nature; but there is only one of them extant, which is a very indifferent poem on the Remedies of Diseases. He was murdered at a festival by the order of Caracalla. He had a library that contained 62,000 volumes, which Quintus Serenus Sammonicus his son gave to Gordian the Younger, to whom he was preceptor.

SERES, (Ptolemy); a people of the Farther Asia; bounded on the west by Scythia extra Imaum; on the north and east, by Terra Incognita; and on the south, by India extra Gangem. According to these limits, their country answers nearly to Cathay or North China. Other authors vary greatly in placing them, though the generality agree in placing them far to the east. Mela places them between the Indi and Scythæ; and perhaps beyond the Indi, if we distinguish the Sinæ from them. The ancients commend them for their cotton manufactures, different from the produce of the bombyces or silk-worms, called *seres* by the Greeks; whence *serica*, "silk."

SERGE, a woollen stuff, manufactured in a loom; of which there are various kinds, denominated either from their different qualities, or from the places where they are wrought. The most considerable is the London serge, which is highly valued abroad; and of which a manufacture has for some years been carried on in France.

SERGEANT, or SERJEANT *at Law*, or of the *Coin*, is the highest degree taken at the common law, as that of Doctor is of the civil law; and as these are supposed to be the most learned and experienced in the practice of the courts, there is one court appointed for them to plead in by themselves, which is the common pleas, where the common law of England is most strictly observed: but they are not restricted from pleading in any other court, where the judges, who cannot have that honour till they have taken the degree of serjeant at law, call them *brothers*.

SERGEANT *at Arms*, or *Mace*, an officer appointed to attend the person of the king; to arrest traitors, and such persons of quality as offend; and to attend the lord high steward, when sitting in judgment on a traitor.—The number of these officers is by statute limited to 30.

SERGEANT, in war, is an inferior officer in a

company of foot or troop of dragoons, armed with an halbert, and appointed to see discipline observed, to teach the soldiers the exercise of their arms, to order, frainen, and form their ranks, files, &c. He receives the orders from the adjutant, which he communicates to his officers. Each company generally has two sergeants.

SERGEANTY (*Sorjeantia*), signifies, in law, a service that cannot be due by a tenant to any lord but the king; and this is either *grand serjeanty*, or *petit*. The first is a tenure by which the one holds his lands of the king by such services as he ought to do in person to the king at his coronation; and may also concern matters military, or services of honour in peace; as to be the king's butler, carver, &c. *Petit serjeanty* is where a man holds lands of the king to furnish him yearly with some small thing towards his wars; and is in effect payable as rent. Though all tenures are turned into *focage* by the 12 Car. II. cap. 24; yet the honorary services of grand serjeanty still remain, being therein excepted. See *KNIGHT-SERVICE*.

SERIES, in general, denotes a continued succession of things in the same order, and having the same relation or connection with each other: in this sense we say, a series of emperors, kings, bishops, &c.

In natural history, a series is used for an order or subdivision of some class of natural bodies; comprehending all such as are distinguished from the other bodies of that class, by certain characters which they possess in common, and which the rest of the bodies of that class have not.

SERIES, in mathematics, is a number of terms, whether of numbers or quantities, increasing or decreasing in a given proportion.

SERIPHUS (anc. geog.) one of the Cyclades or islands in the Egean sea, called *Saxum Seriphium* by Tacitus, as if all a rock; one of the usual places of banishment among the Romans. The people, *Seriphii*; who, together with the Siphni, joined Greece against Xerxes, and were almost the only islanders who refused to give him earth and water in token of submission, (Herodotus). *Seriphia Rena*, a proverbial saying concerning a person who can neither sing nor say; frogs in this island being said to be dumb, (Pliny).

SEROSITY, in medicine, denotes an over-abundance of serum.

SERPENS, in astronomy, a constellation of the northern hemisphere, consisting of 17 stars, according to Ptolemy; of 19, according to Tycho; and of 59 in the Britannic catalogue.

SERPENS *Biceps*, or *Double-headed Snake*; a monster of the serpent kind, there being no permanent species of this conformation. That represented on Plate CCLXII. and copied from Edwards, came from the island of Barbadoes; and was said to have been taken out of an egg of the size of a small pullet's egg, by a man who found it under-ground as he was digging. The heads were not in a horizontal position when the snake lay on its belly, but inclined to each other on their under-sides, leaving an opening for the throat to come in between the two heads underneath, as is expressed at A. The upper-side, for the whole length, was covered with small scales, falling one over another; the belly was covered with single scales running across it, in the form of half rings. It was all over of a yellowish

Serpent. lowish colour, without any spots or variation. Mr Edwards also informs us that a person brought to him a common English snake, which had two heads quite separate from each other, the necks parting about an inch from the head.

SERPENT, SERPENS, in zoology, a general term for all amphibious animals without legs. See COLUBER, BOA, ANGUIS, CÆCILIA, AMPHISBÆNA, CROTALUS, &c.

The serpent has from the beginning been the enemy of man; and it has hitherto continued to terrify and annoy him, notwithstanding all the arts which have been practised to destroy it. Formidable in itself, it deters the invader from the pursuit; and from its figure, capable of finding shelter in a little space, it is not easily discovered by those who would venture to try the encounter. Thus possessed at once of potent arms and inaccessible or secure retreats, it baffles all the arts of man, though ever so earnestly bent upon its destruction. For this reason, there is scarce a country in the world that does not still give birth to this poisonous brood, that seem formed to quell human pride, and repress the boasts of security. Mankind have driven the lion, the tiger, and the wolf, from their vicinity; but the snake and the viper still defy their power.

Their numbers, however, are thinned by human assiduity; and it is possible some of the kinds are wholly destroyed. In none of the countries of Europe are they sufficiently numerous to be truly terrible. The various malignity that has been ascribed to European serpents of old, is now utterly unknown; there are not above three or four kinds that are dangerous, and their poison operates in all in the same manner†. The drowly death, the starting of the blood from every pore, the insatiable and burning thirst, the melting down the solid mass of the whole form into one heap of putrefaction, said to be occasioned by the bites of African serpents, are horrors with which we are entirely unacquainted.

But though we have thus reduced these dangers, having been incapable of wholly removing them, in other parts of the world they still rage with all their ancient malignity. In the warm countries that lie within the tropic, as well as in the cold regions of the north, where the inhabitants are few, the serpents propagate in equal proportion. But of all countries, those regions have them in the greatest abundance where the fields are unpeopled and fertile, and where the climate supplies warmth and humidity. All along the swampy banks of the river Niger or Oroonoko, where the sun is hot, the forests thick, and the men but few, the serpents cling among the branches of the trees in infinite numbers, and carry on an unceasing war against all other animals in their vicinity. Travellers have assured us, that they have often seen large snakes twining round the trunk of a tall tree, encompassing it like a wreath, and thus rising and descending at pleasure. We are not, therefore, to reject as wholly fabulous the accounts left us by the ancients of the terrible devastations committed by a single serpent. It is probable, in early times, when the arts were little known, and mankind were but thinly scattered over the earth, that serpents, continuing undisputed possessors of the forest, grew to an amazing magnitude; and every other tribe of animals fell before them. It then might have hap-

pened, that serpents reigned the tyrants of a district for centuries together. To animals of this kind, grown by time and rapacity to 100 or 150 feet in length, the lion, the tiger, and even the elephant itself, were but feeble opponents. That horrible fætor, which even the commonest and the most harmless snakes are still found to diffuse, might, in these larger ones, become too powerful for any living being to withstand; and while they preyed without distinction, they might thus also have poisoned the atmosphere around them. In this manner, having for ages lived in the hidden and unpeopled forest, and finding, as their appetites were more powerful, the quantity of their prey decreasing, it is possible they might venture boldly from their retreats into the more cultivated parts of the country, and carry conflagration among mankind, as they had before desolation among the lower ranks of nature. We have many histories of antiquity, presenting us such a picture; and exhibiting a whole nation sinking under the ravages of a single serpent. At that time man had not learned the art of uniting the efforts of many to effect one great purpose. Opposing multitudes only added new victims to the general calamity, and increased mutual embarrassment and terror. The animal was therefore to be singly opposed by him who had the greatest strength, the best armour, and the most undaunted courage. In such an encounter, hundreds must have fallen; till one, more lucky than the rest, by a fortunate blow, or by taking the monster in its torpid interval, and surcharged with spoil, might kill, and thus rid his country of the destroyer. Such was the original occupation of heroes; and those who first obtained that name, from their destroying the ravagers of the earth, gained it much more deservedly than their successors, who acquired their reputation only for their skill in destroying each other. But as we descend into more enlightened antiquity, we find these animals less formidable, as being attacked in a more successful manner. We are told, that while Regulus led his army along the banks of the river Bagrada in Africa, an enormous serpent disputed his passage over. We are assured by Pliny, who says that he himself saw the skin, that it was 120 feet long, and that it had destroyed many of the army. At last, however, the battering engines were brought out against it; and these assailing it at a distance, it was soon destroyed. Its spoils were carried to Rome, and the general was decreed an ovation for his success. There are, perhaps, few facts better ascertained in history than this: an ovation was a remarkable honour; and was given only for some signal exploit that did not deserve a triumph: no historian would offer to invent that part of the story at least, without being subject to the most shameful detection. The skin was kept for several years after in the Capitol; and Pliny says he saw it there. At present, indeed, such ravages from serpents are scarce seen in any part of the world; not but that, in Africa and America, some of them are powerful enough to brave the assaults of men to this day.

*Negant expleri corda tuendo
Terriles oculos villosaque setis pectore.*

If we take a survey of serpents in general, they have marks by which they are distinguished from all the rest of animated nature. They have the length and the suppleness of the eel, but want fins to swim with; they have

† See Poisson.

have the scaly covering and pointed tail of the lizard, but they want legs to walk with; they have the crawling motion of the worm, but, unlike that animal, they have lungs to breathe with: like all the reptile kind, they are resentful when offended; and nature has supplied them with terrible arms to revenge every injury.

Though they are possessed of very different degrees of malignity, yet they are all formidable to man, and have a strong similitude of form to each other. With respect to their conformation, all serpents have a very wide mouth in proportion to the size of the head; and what is very extraordinary, they can gape and swallow the head of another animal which is three times as big as their own. However, it is no way surprising that the skin of the snake should stretch to receive so large a morsel; the wonder seems how the jaws could take it in. To explain this, it must be observed, that the jaws of this animal do not open as ours, in the manner of a pair of hinges, where bones are applied to bones and play upon one another: on the contrary, the serpent's jaws are held together at the roots by a stretching muscular skin; by which means they open as widely as the animal chooses to stretch them, and admit of a prey much thicker than the snake's own body. The throat, like stretching leather, dilates to admit the morsel; the stomach receives it in part, and the rest remains in the gullet, till putrefaction and the juices of the serpent's body unite to dissolve it.

Some serpents have fangs or canine teeth, and others are without them. The teeth in all are crooked and hollow; and, by a peculiar contrivance, are capable of being erected or depressed at pleasure.

The eyes of all serpents are small, if compared to the length of the body; and though differently coloured in different kinds, yet the appearance of all is malign and heavy; and, from their known qualities, they strike the imagination with the idea of a creature meditating mischief. In some, the upper eye-lid is wanting, and the serpent winks only with that below; in others, the animal has a nictitating membrane or skin, resembling that which is found in birds, which keeps the eye clean and preserves the sight. The substance of the eye in all is hard and horny; the crystalline humour occupying a great part of the globe.

The holes for hearing are very visible in all: but there are no conduits for smelling; though it is probable that some of them enjoy that sense in tolerable perfection.

The tongue in all these animals is long and forky. It is composed of two long fleshy substances, which terminate in sharp points, and are very pliable. At the root it is connected very strongly to the neck by two tendons, that give it a variety of play. Some of the viper kind have tongues a fifth part of the length of their bodies; they are continually darting them out; but they are entirely harmless, and only terrify those who are ignorant of the real situation of their poison.

If from the jaws we go on to the gullet, we shall find it very wide for the animal's size, and capable of being distended to a great degree; at the bottom of this lies the stomach, which is not so capacious, and receives only a part of the prey, while the rest continues in the gullet for digestion. When the substance in the stomach is dissolved into chyle, it passes into the

intestines, and from thence goes to nourishment, or to be excluded by the vent.

Like most other animals, serpents are furnished with lungs, which we suppose are serviceable in breathing, though we cannot perceive the manner in which this operation is performed; for though serpents are often seen apparently to draw in their breath, yet we cannot find the smallest signs of their ever respiring it again. Their lungs, however, are long and large, and doubtless are necessary to promote their languid circulation. The heart is formed as in the tortoise, the frog, and the lizard kinds, so as to work without the assistance of the lungs. It is single; the greatest part of the blood flowing from the great vein to the great artery by the shortest course. By this contrivance of nature we easily gather two consequences; that snakes are amphibious, being equally capable of living on land and in the water; and that also they are torpid in winter, like the bat, the lizard, and other animals formed in the same manner.

The vent in these animals serves for the emission of the urine and the feces, and for the purposes of generation. The instrument of generation in the male is double, being forked like the tongue: the ovaries in the female are double also; and the aperture is very large, in order to receive the double instrument of the male. They copulate in their retreats; and it is said by the ancients, that in this situation they appear like one serpent with two heads.

As the body of this animal is long, slender, and capable of bending in every direction, the number of joints in the back-bone are numerous beyond what one would imagine. In the generality of quadrupeds, they amount to not above 30 or 40; in the serpent kind they amount to 145 from the head to the vent, and 25 more from that to the tail. The number of these joints must give the back-bone a surprising degree of pliancy; but this is still increased by the manner in which each of these joints are locked into the other. In man and quadrupeds, the flat surfaces of the bones are laid one against the other, and bound tight by sinews; but in serpents, the bones play one within the other like ball and socket, so that they have full motion upon each other in every direction.

Though the number of joints in the back-bone is great, yet that of the ribs is still greater; for, from the head to the vent, there are two ribs to every joint, which makes their number 290 in all. These ribs are furnished with muscles, four in number; which being inserted into the head, run along to the end of the tail, and give the animal great strength and agility in all its motions.

The skin also contributes to its motions, being composed of a number of scales, united to each other by a transparent membrane, which grows harder as it grows older, until the animal changes, which is generally done twice a-year. This cover then bursts near the head, and the serpent creeps from it by an undulatory motion, in a new skin, much more vivid than the former. If the old slough be then viewed, every scale will be distinctly seen like a piece of net-work, and will be found greatest where the part of the body they covered was largest.

There is much geometrical neatness in the disposal

of the serpent's scales, for assisting the animal's sinuous motion. As the edges of the foremost scales lie over the ends of their following scales, so those edges, when the scales are erected, which the animal has a power of doing in a small degree, catch in the ground, like the nails in the wheel of a chariot, and so promote and facilitate the animal's progressive motion. The erecting these scales is by means of a multitude of distinct muscles with which each is supplied, and one end of which is tacked each to the middle of the foregoing.

In some of the serpent kind there is the exactest symmetry in these scales; in others they are disposed more irregularly. In some there are larger scales on the belly, and often answering to the number of ribs; in others, however, the animal is without them. Upon this slight difference, Linnæus has founded his distinctions of the various classes of the serpent tribe.

When we come to compare serpents with each other, the first great distinction appears in their size; no other tribe of animals differing so widely in this particular. This tribe of animals, like that of fishes, seems to have no bounds put to their growth: their bones are in a great measure cartilaginous, and they are consequently capable of great extension: the older, therefore, a serpent becomes, the larger it grows; and as they seem to live to a great age, they arrive at an enormous size.

Leguat assures us, that he saw one in Java that was 50 feet long. Carli mentions their growing to above 40 feet; and we have now the skin of one in the British Museum that measures 32. Mr Wentworth, who had large concerns in the Berberies in America, assures us, that in that country they grow to an enormous length. He one day sent out a soldier, with an Indian, to kill wild-fowl for the table; and they accordingly went some miles from the fort: in pursuing their game, the Indian, who generally marched before, beginning to tire, went to rest himself upon the fallen trunk of a tree, as he supposed it to be; but when he was just going to sit down, the enormous monster began to move; and the poor savage perceiving that he had approached a boa, the greatest of all the serpent kind, dropped down in an agony. The soldier, who perceived at some distance what had happened, levelled at the serpent's head, and by a lucky aim shot it dead: however, he continued his fire until he was assured that the animal was killed; and then going up to rescue his companion, who was fallen motionless by its side, he, to his astonishment, found him dead likewise, being killed by the fright. Upon his return to the fort, and telling what had happened, Mr Wentworth ordered the animal to be brought up, when it was measured, and found to be 36 feet long. He had the skin stuffed, and then sent to Europe as a present to the prince of Orange, in whose cabinet it is now to be seen at the Hague; but the skin is shrunk, by drying, two or three feet. In the East Indies they grow also to an enormous size, particularly in the island of Java, where, we are assured, that one of them will destroy and devour a buffalo. See Boa.

But it is happy for mankind that the rapacity of these frightful creatures is often their punishment; for whenever any of the serpent kind have gorged themselves in this manner, whenever their body is seen particularly

distended with food, they then become torpid, and may be approached and destroyed with safety. Patient of hunger to a surprising degree, whenever they seize and swallow their prey, they seem, like surfeited gluttons, unwieldy, stupid, helpless, and sleepy: they at that time seek some retreat, where they may lurk for several days together, and digest their meal in safety: the smallest effort at that time is capable of destroying them; they can scarce make any resistance; and they are equally unqualified for flight or opposition: that is the happy opportunity of attacking them with success; at that time the naked Indian himself does not fear to assail them. But it is otherwise when this sleepy interval of digestion is over; they then issue, with famished appetites, from their retreats, and with accumulated terrors, while every animal of the forest flies before them.

Carli describes the long serpent of Congo, making its track through the tall grass, like mowers in a summer's day. He could not without terror behold whole lines of grass lying levelled under the sweep of its tail. In this manner it moved forward with great rapidity, until it found a proper situation frequented by its prey: there it continued to lurk, in patient expectation; and would have remained for weeks together, had it not been disturbed by the natives.

Other creatures have a choice in their provision: but the serpent indiscriminately preys upon all; the buffalo, the tiger, and the gazelle. One would think that the porcupine's quills might be sufficient to protect it; but whatever has life, serves to appease the hunger of these devouring creatures: porcupines, with all their quills, have frequently been found in their stomachs when killed and opened; nay, they most frequently are seen to devour each other.

A life of savage hostility in the forest, offers the imagination one of the most tremendous pictures in nature. In those burning countries, where the sun dries up every brook for hundreds of miles round; when what had the appearance of a great river in the rainy season, becomes, in summer, one dreary bed of sand; in those countries, a lake that is never dry, or a brook that is perennial, is considered by every animal as the greatest convenience of nature. When they have discovered this, no dangers can deter them from attempting to slake their thirst. Thus the neighbourhood of a rivulet, in the heart of the tropical continents, is generally the place where all the hostile tribes of nature draw up for the engagement. On the banks of this little envied spot, thousands of animals of various kinds are seen venturing to quench their thirst, or preparing to seize their prey. The elephants are perceived in a long line, marching from the darker parts of the forest; the buffaloes are there, depending upon numbers for security; the gazells relying solely upon their swiftness; the lion and tiger waiting a proper opportunity to seize; but chiefly the larger serpents are upon guard there, and defend the accesses of the lake. Not an hour passes without some dreadful combat; but the serpent, defended by its scales, and naturally capable of sustaining a multitude of wounds, is, of all others, the most formidable. It is the most wakeful also; for the whole tribe sleep with their eyes open, and are consequently for ever upon the

the watch; so that, till their rapacity is satisfied, few other animals will venture to approach their station.

But though these animals are of all others the most voracious; and though the morsel which they swallow without chewing, is greater than what any other creature, either by land or water, can devour; yet no animals upon earth bear abstinence so long as they. A single meal, with many of the naked kind, seems to be the adventure of a season; it is an occurrence, of which they have been for weeks, nay sometimes for months, in patient expectation. When they have seized their prey, their industry for several weeks is entirely discontinued; the fortunate capture of an hour often satisfies them for the remaining period of their annual activity. As their blood is colder than that of most other terrestrial animals, and as it circulates but slowly through their bodies, so their powers of digestion are but feeble. Their prey continues, for a long time, partly in the stomach, partly in the gullet, and is often seen in part hanging out of the mouth. In this manner it digests by degrees; and in proportion as the part below is dissolved, the part above is taken in. It is not therefore till this tedious operation is entirely performed, that the serpent renews its appetite and its activity. But should any accident prevent it from issuing once more from its cell, it will continue to bear famine, for weeks, months, nay for years together. Vipers† are often kept in boxes for six or eight months, without any food whatever; and there are little serpents sometimes sent over to Europe from Grand Cairo, that live for several years in glasses, and never eat at all, nor even stain the glass with their excrements.

If, leaving the consideration of their appetites, we come to compare serpents as to their voices, some are found silent, some have a peculiar cry; but hissing is the sound which they most commonly send forth, either as a call to their kind, or as a threat to their enemies. In the countries where they abound, they are generally silent in the middle of the day, when they are obliged to retire from the heat of the climate; but as the cool of the evening approaches, they are then heard issuing from their cells, with continued hissings; and such is the variety of their notes, that some have assured us they very much resemble the music of an English grove. This some will hardly credit: at any rate, such notes, however pleasing, can give but very little delight, when we call to mind the malignity of the miscreant. If considered, indeed, as they answer the animal's own occasions, they will be found well adapted to its nature, and fully answering the purposes of terrifying such as would venture to offend it.

With respect to motion, some serpents, particularly those of the viper kind, move slowly; while others dart with amazing swiftness. The motion in all is similar; but the strength of body in some gives a very different appearance. The viper, that is but a slow feeble-bodied animal, makes way in a heavy undulating manner; advancing its head, then drawing up its tail behind, and bending the body into a bow; then from the spot where the head and tail were united, advancing the head forward as before. This, which is the motion of all serpents, is very different from that of the earth-worm or the naked snail. The serpent, as

was said above, has a back-bone, with numerous joints; and this bone the animal has a power of bending in every direction, but without being able to shorten or lengthen it at pleasure. The earth-worm, on the other hand, has no back-bone; but its body is composed of rings, which, like a barber's puff, it can lengthen or shorten as it finds necessary. The earth-worm, therefore, in order to move forward, lengthens the body; then by the fore part clings to the ground where it has reached, and then contracts and brings up its rear: then, when the body is thus shortened, the fore-part is lengthened again for another progression, and so on. The serpent, instead of shortening the body, bends it into an arch; and this is the principal difference between serpentine and vermicular progression.

We have instanced this motion in the viper, as most easily discerned; but there are many serpents that dart with such amazing swiftness, that they appear rather to leap than crawl. It is most probable, however, that no serpent can dart upon even ground farther than its own length at one effort. Our fears indeed may increase the force of their speed, which is sometimes found so fatal. We are told by some, that they will dart to a very great distance; but this we have never been able to ascertain. The manner of progression in the swiftest serpent we know, which is the jacobus, is by instantly coiling itself upon its tail, and darting from thence to its full extent; then carrying the tail, as quick as lightning, to the head; coiling and darting again: and by this means proceeding with extreme rapidity, without ever quitting the ground. Indeed, if we consider the length and the weakness of the back-bone in all these animals; if we regard the make of the vertebrae, in which we shall find the junctures all formed to give play, and none to give power; we cannot be of opinion that they have a faculty of springing from the ground, as they entirely want a *fulcrum*, if we may so express it, from whence to take their spring; the whole body being composed of unsupported muscles and joints that are yielding.

Though all serpents are amphibious, some are much fonder of the water than others; and, though destitute of fins or gills, remain at the bottom, or swim along the surface with great ease. From their internal structure, we see how well adapted they are for either element; and how capable their blood is of circulating at the bottom, as freely as in the frog or the tortoise. They can, however, endure to live in fresh water only; for salt is an effectual bane to the whole tribe. The greatest serpents are most usually found in fresh water, either choosing it as their favourite element, or finding their prey in such places in the greatest abundance. But that all will live and swim in liquids, appears from an experiment of Redi; who put a serpent into a large glass vessel of wine, where it lived swimming about six hours; though, when it was by force immersed and put under that liquid, it lived only one hour and an half. He put another in common water, where it lived three days; but when it was kept under water, it lived only about 12 hours. Their motion there, however, is perfectly the reverse of what it is upon land; for, in order to support themselves upon an element lighter than their bodies, they are obliged to increase their surface in a very artificial

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manner. On earth their windings are perpendicular to the surface; in water they are parallel to it: in other words, if a person should wave his hand up and down, it will give an idea of the animal's progress on land; if to the right and left, it will give some idea of its progress on the water.

Some serpents have a most horrible fætor attending them, which is alone capable of intimidating the brave. This proceeds from two glands near the vent, like those in the weasel or polecat; and, like those animals, in proportion as they are excited by rage or by fear, the scent grows stronger. It would seem, however, that such serpents are as most venomous are least offensive in this particular; since the rattlesnake and the viper have no smell whatever; nay, we are told, that at Calcutt and Cranganon, in the East Indies, there are some very noxious serpents, who are so far from being disagreeable, that their excrements are sought after, and kept as the most pleasing perfume. The Eculapian serpent is also of this number.

Some serpents bring forth their young alive, as the viper; some bring forth eggs, which are hatched by the heat of their situation, as the common black snake, and the majority of the serpent tribe. When a reader, ignorant of anatomy, is told, that some of those animals produce their young alive, and that some produce eggs only, he is apt to suppose a very great difference in the internal conformation, which makes such a variety in the manner of bringing forth. But this is not the case: these animals are internally alike, in whatever manner they produce their young; and the variety in their bringing forth is rather a slight than a real discrimination. The only difference is, that the viper hatches her eggs, and brings them to maturity, within her body; the snake is more premature in her productions, and sends her eggs into the light some time before the young ones are capable of leaving the shell. Thus, if either are opened, the eggs will be found in the womb, covered with their membranous shell, and adhering to each other like large beads on a string. In the eggs of both, the young ones will be found, though at different stages of maturity: those of the viper will crawl and bite in the moment the shell that incloses them is broke open; those of the snake are not yet arrived at their perfect form.

Father Labat took a serpent of the viper kind that was nine feet long, and ordered it to be opened in his presence. He then saw the manner in which the eggs of these animals lie in the womb. In this creature there were six eggs, each of the size of a goose egg, but longer, more pointed, and covered with a membranous skin, by which also they were united to each other. Each of these eggs contained from 13 to 15 young ones, about six inches long, and as thick as a goose-quill. Though the female from whence they were taken was spotted, the young seemed to have a variety of colours very different from the parent; and this led the traveller to suppose that the colour was no characteristic mark among serpents. These little mischievous animals were no sooner let loose from the shell, than they crept about, and put themselves into a threatening posture, coiling themselves up and biting the stick with which he was destroying them. In this manner he killed 74 young ones; those that were contained in one of the eggs escaped at the place where the female

was killed, by the bursting of the egg and their getting among the bushes.

The last distinction that we shall mention, but the most material among serpents is, that some are venomous, and some, inoffensive. The various calamities that the poison of serpents is capable of producing, are not only inflicted by the animal itself, but by men more mischievous even than serpents, who prepare their venom to destroy each other. With this the savages poison their arms, and also prepare their revengeful potions. The ancients were known to preserve it for the purposes of suicide; and even among semi-barbarous countries at this day, the venom of snakes is used as a philtre.

But though the poison be justly terrible to us, it has been given to very good purposes for the animal's own proper support and defence. Without this, serpents, of all other animals, would be the most exposed and defenceless; without feet for escaping a pursuit, without teeth capable of inflicting a dangerous wound, or without strength for resistance; incapable, from their size, of finding security in very small retreats like the earth-worm, and disgusting all from their deformity, nothing was left for them but a speedy extirpation. But furnished as they are with powerful poison, every rank of animals approach them with dread, and never seize them but at an advantage. Nor is this all the benefit they derive from it. The malignity of a few serves for the protection of all. Tho' not above a tenth of their number are actually venomous, yet the similitude they all bear to each other, excites a general terror of the whole tribe; and the uncertainty of their enemies in which the poison chiefly resides, makes even the most harmless formidable. Thus Providence seems to have acted with double precaution: it has given some of them poison for the general defence of a tribe naturally feeble; but it has thinned the numbers of those which are venomous, lest they should become too powerful for the rest of animated nature.

From these noxious qualities in the serpent kind, it is no wonder that not only man, but beasts and birds, carry on an unceasing war against them. The ichneumon of the Indians, and the peccary † of America, destroy them in great numbers. These animals have the art of seizing them near the head; and it is said that they can skin them with great dexterity. The vulture and the eagle also prey upon them in great abundance; and often, fousing down from the clouds, drop upon a long serpent, which they snatch up frugging and writhing in the air. Dogs also are bred up to oppose them. Father Feuillée tells us, that being in the woods of Martinico, he was attacked by a large serpent, which he could not easily avoid, when his dog immediately came to his relief, and seized the assailant with great courage. The serpent entwined him, and pressed him so violently, that the blood came out of his mouth, and yet the dog never ceased till he had tore it to pieces. The dog was not sensible of his wounds during the fight; but soon after his head swelled prodigiously, and he lay on the ground as dead. But his master having found hard by a banana tree, he applied its juice, mixed with treacle, to the wounds; which recovered the dog, and quickly healed his fcores.

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† See the articles SU and VERRA.

Serpent. The Pythi of old were famous for charming and destroying serpents†. Some moderns pretend to the same art. Casaubon says that he knew a man who could at any time summon 100 serpents together, and draw them into the fire. Upon a certain occasion, when one of them, bigger than the rest, would not be brought in, he only repeated his charm, and it came forward, like the rest, to submit to the flames. Philostratus describes particularly how the Indians charm serpents. "They take a scarlet robe, embroidered with golden letters, and spread it before a serpent's hole. The golden letters have a fascinating power; and by looking stedfastly, the serpent's eyes are overcome and laid asleep." These and many other feats have been often practised upon these animals by artful men, who had first prepared the serpents for their exercise, and then exhibited them as adventiciously assembled at their call. In India there is nothing so common as dancing serpents, which are carried about in a broad flat vessel, somewhat resembling a sieve. These erect and put themselves in motion at the word of command. When their keeper sings a slow tune, they seem by their heads to keep time; when he sings a quicker measure, they appear to move more brisk and lively. All animals have a certain degree of docility; and we find that serpents themselves can be brought to move and approach at the voice of their master. From this trick, successfully practised before the ignorant, it is most probable has arisen most of the boasted pretensions which some have made to charming of serpents; an art to which the native Americans pretend at this very day, but the existence of which we are assured of by Mr Hasselquist amongst the native Egyptians.

Though the generality of mankind regard this formidable race with horror, yet there have been some nations, and there are some at this day, that consider them with veneration and regard. The adoration paid by the ancient Egyptians to a serpent, is well known: many of the nations at present along the western coast of Africa retain the same unaccountable veneration. Upon the gold and slave coasts, a stranger, upon entering the cottages of the natives, is often surprised to see the roof swarming with serpents, that cling there without molesting and unmolested by the natives. But his surprise will increase upon going farther southward to the kingdom of Widah, when he finds that a serpent is the god of the country. This animal, which travellers describe as a huge overgrown creature, has its habitation, its temple, and its priests. These impress the vulgar with an opinion of its virtues; and numbers are daily seen to offer not only their goods, their provisions, and their prayers, at the shrine of their hideous deity, but also their wives and daughters. These the priests readily accept of, and after some days of penance, return them to their supplicants, much benefited by the serpent's supposed embraces.

Serpent, a musical instrument, serving as a basis to the cornet or small shawm, to sustain a chorus of fingers in a large edifice.—It has its name *serpent*, from its figure; as consisting of several folds or wreaths, which serve to reduce its length, which would otherwise be six or seven feet.—It is usually covered with leather; and consists of three parts, a mouth-piece, a

neck, and a tail. It has six holes, by means whereof it takes in the compass of two octaves.

Serpent-Stones. See CORNU AMMONIS.

Sea-Serpent. See SEA-Serpent.

SERPENTARIA, SNAKE-ROOT; a species of *ARISTOLOCHIA*.

SERPENTARIUS, in astronomy, a constellation of the northern hemisphere, consisting, according to different authors, of 25, 29, or even 69 stars.

SERPENTINE, in general, denotes any thing that resembles a serpent; hence the worm or pipe of a still, twisted in a spiral manner, is termed a *serpentine* *worm*.

SERRATED, in general, something indented or notched in the manner of a saw; a term much used in the description of the leaves of plants. See *BOTANY*, p. 1296.

SERRATULA, SAW-WORT; a genus of the polygamia aequalis order, belonging to the syngenesia class of plants. There are 16 species; the most remarkable of which are, 1. The tinctoria, or dyer's saw-wort, growing naturally in woods and pastures in many places of Britain. The leaves are lyre-shaped, with winged clefts; the terminating segment very large; the florets uniform: blossoms purple, but sometimes white. This is much used by the dyers to give a yellow colour; but being inferior to the yellow-weed, its use is confined to the coarser woollen cloths.—Goats eat it; horses are not fond of it; sheep, swine, and cows, refuse it. 2. The arvensis, corn saw-wort, or way-thistle, has toothed, thorny leaves; blossoms, pale purple. It grows wild in corn-fields and road-sides, and is said to yield a very pure fixed alkali when burnt. Goats eat it; neither cows, horses, sheep, nor swine, are fond of it.

SERRATUS, in anatomy, a name given to several muscles, from their resemblance to a saw. See *ANATOMY*, *Table of the Muscles*.

SERVANT, a term of relation, signifying a person who owes and pays obedience for a certain time to another in quality of a master.

As to the several sorts of servants: It was observed, under the article *LIBERTY*, that pure and proper slavery does not, nay cannot, subsist in Britain; such, we mean, whereby an absolute and unlimited power is given to the master over the life and fortune of the slave. And indeed it is repugnant to reason, and the principles of natural law, that such a state should subsist any where. The three origins of the right of slavery, assigned by Justinian, are all of them built upon false foundations. As, first, slavery is held to arise *jure gentium*, from a state of captivity in war; whence slaves are called *mancipia*, *quasi manu capti*. The conqueror, say the civilians, had a right to the life of his captive; and, having spared that, has a right to deal with him as he pleases. But it is an untrue position, when taken generally, that, by the law of nature or nations, a man may kill his enemy: he has only a right to kill him in particular cases; in cases of absolute necessity, for self-defence; and it is plain this absolute necessity did not subsist, since the victor did not actually kill him, but made him prisoner. War is itself justifiable only on principles of self-preservation; and therefore it gives no other right over prisoners, but merely to disable them from doing harm to us, by confining their persons: much less

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can it give a right to kill, torture, abuse, plunder, or even to enslave, an enemy, when the war is over. Since, therefore, the right of making slaves by captivity, depends on a supposed right of slaughter, that foundation failing, the consequence drawn from it must fail likewise. But, 2dly, it is said, that slavery may begin *jure civilis* when one man sells himself to another. This, if only meant of contracts to serve or work for another, is very just: but when applied to strict slavery, in the sense of the laws of old Rome or modern Barbary, is also impossible. Every sale implies a price, a *quid pro quo*, an equivalent given to the seller in lieu of what he transfers to the buyer: but what equivalent can be given for life and liberty, both of which (in absolute slavery) are held to be in the master's disposal? His property also, the very price he seems to receive, devolves *ipso facto* to his master, the instant he becomes his slave. In this case, therefore, the buyer gives nothing, and the seller receives nothing: of what validity, then, can a sale be, which destroys the very principles upon which all sales are founded? Lastly, we are told, that besides these two ways by which slaves *hant*, or are acquired, they may also be hereditary: *servi nascuntur*, the children of acquired slaves are, *jure nature*, by a negative kind of birthright, slaves also. But this, being built on the two former rights, must fall together with them. If neither captivity, nor the sale of one's self, can by the law of nature and reason reduce the parent to slavery, much less can they reduce the offspring.

Upon these principles the law of England abhors, and will not endure the existence of, slavery within this nation: so that, when an attempt was made to introduce it, by statute i. Edw. VI. c. 3, which ordained, that all idle vagabonds should be made slaves, and fed upon bread, water, or small drink, and refuse-meat; should wear a ring of iron round their necks, arms, or legs; and should be compelled, by beating, chaining, or otherwise, to perform the work assigned them, were it ever so vile; the spirit of the nation could not brook this condition, even in the most abandoned rogues; and therefore this statute was repealed in two years afterwards. And now it is laid down, that a slave or negro, the instant he lands in Britain, becomes a freeman; that is, the law will protect him in the enjoyment of his person, and his property. Yet, with regard to any right which the master may have lawfully acquired to the perpetual service of John or Thomas, this will remain exactly in the same state as before: for this is no more than the same state of subjection for life, which every apprentice submits to for the space of seven years, or sometimes for a longer term. Hence, too, it follows, that the infamous and unchristian practice of withholding baptism from negro-servants, lest they should thereby gain their liberty, is totally without foundation, as well as without excuse. The law of England acts upon general and extensive principles: it gives liberty, rightly understood, that is, protection, to a Jew, a Turk, or a Heathen, as well as to those who profess the true religion of Christ; and it will not dissolve a civil obligation between master and servant, on account of the alteration of faith in either of the parties: but the slave is entitled to the same protection in England before, as after baptism; and, whatever service the Heathen negro owed of right to

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his American master, by general, not by local law, the same (whatever it be) is he bound to render when brought to England and made a Christian.

1. The first sort of servants, therefore, acknowledged by the laws of England, are *menial servants*; so called from being *intra mania*, or domestics. The contract between them and their masters arises upon the hiring. If the hiring be general, without any particular time limited, the law construes it to be a hiring for a year; upon a principle of natural equity, that the servant shall serve, and the master maintain him, throughout all the revolutions of the respective seasons; as well when there is work to be done, as when there is not: but the contract may be made for any larger or smaller term. All single men between 12 years old and 60, and married ones under 30 years of age, and all single women between 12 and 40, not having any visible livelihood, are compellable by two justices to go out to service in husbandry or certain specific trades, for the promotion of honest industry: and no master can put away his servant, or servant leave his master, after being so retained, either before or at the end of his term, without a quarter's warning; unless upon reasonable cause, to be allowed by a justice of the peace: but they may part by consent, or make a special bargain.

2. Another species of servants are called *apprentices*, (from *apprendre*, to learn); and are usually bound for a term of years, by deed indented or indentures, to serve their masters, and be maintained and instructed by them. This is usually done to persons of trade, in order to learn their art and mystery; and sometimes very large sums are given with them, as a premium for such their instruction: but it may be done to husbandmen, nay to gentlemen, and others. And children of poor persons may be apprenticed out by the overseers, with consent of two justices, till 24 years of age, to such persons as are thought fitting; who are also compellable to take them: and it is held, that gentlemen of fortune, and clergymen, are equally liable with others to such compulsion: for which purposes our statutes have made the indentures obligatory, even though such parish-apprentice be a minor. Apprentices to trades may be discharged on reasonable cause, either at the request of themselves or masters, at the quarter-sessions, or by one justice, with appeal to the sessions; who may, by the equity of the statute, if they think it reasonable, direct restitution of a rateable share of the money given with the apprentice: and parish-apprentices may be discharged in the same manner, by two justices. But if an apprentice, with whom less than 10 pounds hath been given, runs away from his master, he is compellable to serve out his time of absence, or make satisfaction for the same, at any time within seven years after the expiration of his original contract.

3. A third species of servants are *labourers*, who are only hired by the day or the week, and do not live *intra mania*, as part of the family; concerning whom the statutes before-cited have made many very good regulations: 1. Directing that all persons who have no visible effects may be compelled to work: 2. Defining how long they must continue at work in summer and in winter: 3. Punishing such as leave or desert their master: 4. Empowering the justices at sessions, or the sheriff of the county, to settle their wages: and,

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Servetists
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Servia.

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and, 5. Inflicting penalties on such as either give or exact more wages than are so settled.

4. There is yet a fourth species of servants, if they may be so called, being rather in a superior, a ministerial, capacity; such as *stewards, factors, and bailiffs*: whom, however, the law considers as servants *pro tempore*, with regard to such of their acts as affect their master's or employer's property.

As to the manner in which this relation affects the master, the servant himself, or third parties, see the article *MASTER and Servant*.

For the condition of servants by the law of Scotland, see *Law*, N° clxi. 34, 35.

SERVETISTS, a name given to the modern Antitrinitarians, from their being supposed to be the followers of Michael Servetus; who, in the year 1553, was burnt at Geneva, together with his books.

SERVETUS (Michael), an ingenious and learned Spaniard, born in 1509 at Villeneuve in Arragon. He studied the civil law at Toulouse, where he began to read the Scriptures, and to be fond of Antitrinitarian notions; so that after he had been two or three years there, he resolved to retire into Germany and set up for a reformer. He there printed two tracts, *De Trinitatis erroribus*, and *Dialogorum de Trinitate libri duo*; which raised a great tumult among the German divines, and spread his name throughout Europe. After publishing these works, Servetus returned to Paris, where he studied physic, and was admitted a doctor of physic into the university there. All this while Calvin the reformer, who was the head of the church at Geneva, kept up a correspondence with Servetus by letters; for he tells us, that he endeavoured for the space of sixteen years to reclaim that physician from his errors. Servetus consulted him on many occasions, and sent him a MS. to have his opinion of it; a confidence which Calvin made an ungenerous and base use of: for he sent this MS. together with the letters he had received from him, containing heretical opinions, to the magistrates of Lyons, where Servetus resided, who thereupon distressed him. This unfortunate man made his escape, and fled to Vienne in Dauphiny; but there, by means of Calvin's correspondence with some principal divines, he was put in prison. Calvin now, under pretence of a reconciliation, invited him, when he was set at liberty, to retire to Geneva: but he was scarce arrived there, when, to the eternal disgrace of that reformer, he accused him of heresy; and by continual preachings and declamations on the danger the true religion was in from such impostors, he hurried the magistrates into an unjust sentence against him; which was as cruelly executed, for he was burnt alive in 1553.

—Servetus was a man of great acuteness, of prodigious learning, and so admirably skilled in his own profession, that he appears to have had some obscure conception of the circulation of the blood. There are several of his books extant; the scarcest of which are, 1. *De Trinitatis Erroribus*, lib. vii. 2. *Dialogorum de Trinitate*, lib. ii. 3. *De Justitia Regni Christi Capitula*, lib. iv. These works are very scarce, because both Calvin and the Papists took great pains in burning all the copies they could find.

SERVIA, a province of Turkey in Europe, bounded on the north by the rivers Danube and Save, which

separate it from Hungary; on the east, by Bulgaria; on the west, by Bosnia; and on the south, by Albania and Macedonia. It is about 190 miles in length from east to west; 95 in breadth from north to south; and is divided into four sangiacates. Two of these were ceded to the Christians in 1718, who united them into one. This continued till 1739, when the Turks were victorious; and then they were abandoned to the Turks by the treaty of Belgrade. Belgrade is the capital town.

SERVICE, in law, is a duty which a tenant, on account of his fee, owes to his lord.

There are many divisions of services; as, 1. Into personal, where something is to be done by the tenant in person, as homage and fealty. 2. Real, such as wards, marriages, &c. 3. Accidental, including heriots, reliefs, and the like. 4. Entire, where, on the alienation of any part of the lands by a tenant, the services become multiplied. 5. Frank-service, which was performed by freemen, who were not obliged to perform any base service, but only to find a man and horse to attend the lord into the army or to court. 6. Knight's service, by which lands were anciently held of the king, on paying homage, service in war, &c.

SERVICE-Tree. See **SORBUS**.

SERVITES, a religious order in the church of Rome, founded about the year 1233, by seven Florentine merchants, who, with the approbation of the bishop of Florence, renounced the world, and lived together in a religious community on mount Senar, two leagues from that city.

SERVITOR, in the university of Oxford, a student who attends on another for his maintenance and learning.

SERVITUDE, the condition of a servant, or rather slave.

SERVITUDE, in Scots law. See there, N° clxx.

SERVUS (Maurus Honoratus), a celebrated grammarian and critic of antiquity, who flourished about the time of Arcadius and Honorius; now chiefly known by his *Commentaries on Virgil*. There is also extant a piece of Servius upon the feet of verses and the quantity of syllables, called *Centimetrum*.

SERUM, a thin, transparent, saltish liquor, which makes a considerable part of the mass of blood. See **ANATOMY**, N° 389. **AIR**, N° 48, and **BLOOD**.

SESAMOIDEA OSSA, certain small bones somewhat resembling the seeds of sesamum, whence their name. They are placed at the under part of the bones of the last joints of the fingers and toes.

SESAMUM, ONLY GRAIN, in botany, a genus of the angiospermia order, belonging to the didynamia class of plants. The species are, 1. The orientale, with oblong, oval, entire bases: it is cultivated in great plenty in the Levant, but is supposed to have been brought there from India. It is an annual plant, rising with an herbaceous four cornered stalk, two feet high, sending out a few short side-branches; the leaves are oblong, oval, a little hairy, and stand opposite. The flowers terminate the stalks in loose spikes; they are small, of a dirty white colour, shaped somewhat like those of the foxglove. After the flowers are past, the germin turns to an oval acute-pointed capsule with four cells, filled with oval compressed seeds, which ripen in autumn. 2. The indicum, with trifid lower leaves, grows naturally in India: this is also an annual

nual plant; the stalk rises taller than that of the former; the lower leaves are cut into three parts, which is the only difference between them. 3. The trifolium, with all the leaves trifid; grows naturally in Africa. This is also an annual plant, with a taller and more branched stalk than that of the former, in which it differs from both the other.

The first sort is frequently cultivated in all the eastern countries, and also in Africa, as a pulse; and of late years the seeds have been introduced into Carolina by the African negroes, where they succeed extremely well. The inhabitants of that country make an oil from the seed, which will keep good many years, without having any rancid smell or taste, but in two years becomes quite mild; so that when the warm taste of the seed, which is in the oil when first drawn, is worn off, they use it as a salad-oil, and for all the purposes of sweet oil. The seeds of this plant are also used by the negroes for food; which seeds they parch over the fire, and then mix them with water, and stew other ingredients with them, which makes an hearty food. Sometimes a sort of pudding is made of these seeds, in the same manner as with millet or rice, and is by some persons esteemed, but is rarely used for these purposes in Europe. This is called *benny*, or *benny*, in Carolina. In England these plants are preferred in botanic gardens as curiosities. Their seeds must be sown in the spring upon a hot-bed; and when the plants are come up, they must be transplanted into a fresh hot-bed to bring them forward. After they have acquired a tolerable degree of strength, they should be planted into pots, and plunged into another hot-bed, managing them as hath been directed for amaranthuses; for if these plants are not thus brought forward in the former part of the summer, they will not produce good seeds in this country.

The seeds of the first sort is mentioned in the list of official simples in the college dispensatory, but is rarely used in medicine in England. From nine pounds of this seed which came from Carolina, there were upwards of two quarts of oil drawn, which is as great a quantity as hath been obtained from any vegetable whatever. This might occasion its being called the *oily grain*.

SESOSTRIS, king of Egypt or Ramefes. Of the eight kings of the 16th dynasty there were six of the name of Sesostris or Ramefes; and it was upon the death of Ramefes Miriam, the great persecutor of the Jews in Egypt, that they were delivered from their first captivity: but it is supposed that the Egyptian priests have ascribed the various, real or fictitious, exploits of several of these princes to one man, under the name of *Sesostris Ramefes Miriam*. Sir Isaac Newton supposes the great Sesostris to have been the same with Shishak, who plundered Jerusalem after the death of Solomon. See *EGYPT*, n° 3—5.

SESQUĪ, a Latin particle, signifying a whole and a half; which, joined with *altera*, *terza*, *quarta*, &c. is much used in the Italian music to express a kind of ratios, particularly several species of triples.

SESSILE, among botanists. See *BOTANY*, p. 1296.

SESSION, in general, denotes each sitting or assembly of a council, &c.

Session of Parliament, is the season or space from its meeting to its prorogation. See *PARLIAMENT*,

Court of Session. See *LAW*, N° clvii. 4.

Court of Quarter-Sessions, an English court that must be held in every county once in every quarter of a year; which, by statute 2 Hen. V. c. 4. is appointed to be in the first week after Michaelmas-day, the first week after the epiphany, the first week after the close of Easter, and in the week after the translation of St Thomas the martyr, or the 7th of July. It is held before two or more justices of the peace, one of which must be of the quorum. The jurisdiction of this court, by 34 Edw. III. c. 1. extends to the trying and determining all felonies and trespasses whatsoever: though they seldom, if ever, try any greater offence than small felonies within the benefit of clergy; their commission providing, that if any case of difficulty arises, they shall not proceed to judgment, but in the presence of one of the justices of the courts of king's-bench or common-pleas, or one of the judges of assize: and therefore murders, and other capital felonies, are usually remitted for a more solemn trial to the assizes. They cannot also try any new-created offence, without express power given them by the statute which creates it. But there are many offences and particular matters which, by particular statutes, belong properly to this jurisdiction, and ought to be prosecuted in this court; as, the smaller misdemeanors against the public or commonwealth, not amounting to felony; and especially offences relating to the game, highways, alehouses, bastard children, the settlement and provision for the poor, vagrants, servants wages, and Popish recusants. Some of these are proceeded upon by indictment: others in a summary way, by motion, and order thereupon; which order may for the most part, unless guarded against by particular statutes, be removed into the court of king's bench by writ of *certiorari facias*, and be there either quashed or confirmed. The records or rolls of the sessions are committed to the custody of a special officer, denominated *custos rotulorum*, who is always a justice of the quorum; and among them of the quorum (saith Lambard) a man for the most part especially picked out, either for wisdom, countenance, or credit. The nomination of the *custos rotulorum* (who is the principal officer in the county, as the lord lieutenant is chief in military command) is by the king's sign-manual: and to him the nomination of the clerk of the peace belongs; which office he is expressly forbidden to sell for money.

In most corporation-towns there are quarter-sessions kept before justices of their own, within their respective limits; which have exactly the same authority as the general quarter-sessions of the county, except in a very few instances; one of the most considerable of which is the matter of appeals from orders of removal of the poor, which, though they be from the orders of corporation-justices, must be to the sessions of the county, by statute 8 and 9 W. III. c. 30. In both corporations and counties at large, there is sometimes kept a special or petty session, by a few justices, for dispatching smaller business in the neighbourhood between the times of the general sessions; as for licensing alehouses, passing the account of parish-officers, and the like.

SESTERCE, *sestertius*, a silver coin in use among the Romans.

Sestios
Sethians.

Setimo
Severn.

Some authors make two kinds of festerces; the less, called *sestertius*, in the masculine gender; and the great one, called *sestertium*, in the neuter; the latter containing a thousand of the other. Others will have any such distinction of great and little festerces unknown to the Romans. *Sestertius*, say they, was an adjective, and signified *as sestertius*, or two ases and an half; and when used plurally, as in *quingenta sestertia*, or *sestertia*, it was only by way of abbreviation, and there was always understood *millia* or thousands.

SESTERCE, or *sestertius*, was also used by the ancients for a thing containing two wholes and an half of another, as *as* was taken for any whole or integer.

SESTOS, a noted fortress of European Turkey, situated at the entrance of the Hellespont or Dardanelles, 24 miles south-west of Gallipoli. This place is famous for the loves of HERO and LEANDER, sung by the poet Muses.

SET, or SEES, a term used by the farmers and gardeners to express the young plants of the white thorn and other shrubs, with which they use to raise their quick or quickest hedges.

SETACEOUS WORM, in natural history, a name given by Dr Lister to that long and slender water-worm, which so much resembles a horse-hair, that it has been supposed by the vulgar to be an animated hair of that creature. These creatures, supposed to be living hairs, are a peculiar sort of insects, which are bred and nourished within the bodies of other insects, as the worms of the ichneumon flies are in the bodies of the caterpillars.

Aldrovand describes the creature, and tells us it was unknown to the ancients; but called *seta aquatica*, and *vermis setarius*, by the moderns, either from its figure resembling that of a hair, or from the supposition of its once having been the hair of some animal. We generally suppose it, in the imaginary state of the hair, to have belonged to a horse; but the Germans say it was once the hair of a calf, and call it by a name signifying *villus aquaticus*, or the "water-calf."

Albertus, an author much revered by the common people, has declared that this animal is generated of a hair; and adds, that any hair thrown into a standing water, will, in a very little time, obtain life and motion. Other authors have differed from this opinion, and supposed them generated of the fibrous roots of water-plants; and others, of the parts of grasshoppers fallen into the water. This last opinion is rejected by Aldrovand as the most improbable of all; yet in reality it comes nearest the truth of any of them. Standing and foul waters are most plentifully stored with them; but they are sometimes found in the clearest and purest springs, and sometimes out of the water, on the leaves of trees and plants, as on the fruit-trees in our gardens, and the elms in hedges. They are from three to five inches long, of the thickness of a large hair; and are brown upon the back, and white under the belly, and the tail is white on every part.

SETH, the third son of Adam, the father of Enos, was born 3874 B. C. and lived 912 years.

SETHIANS, in church-history, Christian heretics; so called because they paid divine worship to Seth, whom they looked upon to be Jesus Christ the son of God, but who was made by a third divinity, and substituted in the room of the two families of Abel and

Cain, which had been destroyed by the deluge. These heretics appeared in Egypt in the second century; and as they were addicted to all sorts of debauchery, they did not want for followers; and continued in Egypt above 200 years.

SETIMO, a town of Italy in the province of Piedmont, situated on the river Po, eight miles north of Turin.

SETON, in surgery, a few horse-hairs, small threads, or large packthread, drawn through the skin, chiefly the neck, by means of a large needle or probe, with a view to restore or preserve health.

We find by experience, that setons are very useful in catarrhs, inflammations, and other disorders, particularly those of the eyes, as a gutta serena, cataract, and incipient suffusion; to those we may add intense headaches, with stupidity, drowsiness, epilepsies, and even the apoplexy itself.

SETTING, in astronomy, the withdrawing of a star or planet, or its sinking below the horizon. Astronomers and poets make three different kinds of setting of the stars, viz. the COSMICAL, ACRONYCAL, and HELIACAL. See these articles.

SETTING, in the sea-language. To set the land or the sun by the compass, is to observe how the land bears on any point of the compass, or on what point of the compass the sun is. Also when two ships sail in sight of one another, to mark on what point the chased bears, is termed *setting the chase by the compass*.

SETTING, among sportsmen, a term used to express the manner of taking partridges by means of a dog peculiarly trained to that purpose. See SHOOTING.

SEVENTH, in music, an interval called by the Greeks *heptachordon*. See INTERVAL.

SEVERIA, a province of the Russian empire, with the title of a duchy, bounded on the north by Smolensko and Muscovy, on the east by Vorotinski and the country of the Cossacks, on the south by the same, and on the west by Zerogovia. It is a country overrun with woods, and on the fourth part is a forest of great length. Novogrodec, or Novogorod, is the capital town.

SEVERINA (St), a town of Italy, in the kingdom of Naples, and in Lower Calabria, with an archbishop's see. It is very well fortified, and seated on a craggy rock, on the river Neeto; in E. Long. 17. 20. N. Lat. 39. 15.

SEVERINO, a town of Italy, in the territory of the church, and in the Marche of Ancona, with a bishop's see. It has fine vineyards, and is seated between two hills on the river Petenza; in E. Long. 13. 20. N. Lat. 43. 10.

SEVERN, a river of England, which rises near Plinnilliom-hill in Montgomeryshire, and before it enters Shropshire receives about 30 streams, and passes down to Lauding, where it receives the Morda, that flows from Oswestry. When it arrives at Shrewsbury, it receives the river Mon; passing on to Morebury, which it almost surrounds; then to Bridgnorth; afterwards it runs through the skirts of Staffordshire, enters Worcestershire, and passes by Worcester: then it runs to Tewksbury, where it joins the Avon; and from thence to Gloucester, keeping a north-westerly course till it falls into the Bristol channel. It begins to be navigable for boats at Welch Pool in Montgomeryshire,

Severus. Thire, and takes in several other rivers in its course besides those already mentioned; it is the second in England.

SEVERUS (Cornelius), an ancient Latin poet of the Augustan age; whose *Ælina*, together with a fragment *De morte Ciceronis*, were published, with notes and a prose interpretation, by Le Clerc, 12mo, Amsterdam, 1703. They were before inserted among the *Calestea Virgilii* published by Scaliger; whose notes, with others, Le Clerc has received among his own.

SEVERUS (Septimius), a Roman emperor, born at Leptis in Africa. On pretence of revenging the death of the emperor Pertinax, he leapt into his room in 193. He next overcame Pescennius Niger, who was declared emperor by the legions of Syria; and took Byzantium. He conquered the Parthians, Medes, Arabians, &c. and punished the rebelling Jews. After this, he defeated Albinus near Lyons. He began the fifth persecution against the Christians; quelled the Britons rebelling against him, and built the wall that bears his name. He had two sons, Antoninus Caracalla and Geta, both Cæsars. Caracalla had designed, one day as he was marching behind his father, to have stabbed him, and drew his sword to that intent; but was hindered by some that were near him. Severus himself took notice of it, but dissembled his knowledge; yet the horror of so unnatural an attempt cast him into a deep melancholy, of which he died at York in 211. He was a man of wit, understanding, and ability; understood mathematics and history; loved learned men; and wrote the history of his own life.

SEVERUS's Wall, in British topography, the fourth and last barrier erected by the Romans against the incursions of the North Britons. See the articles AGRICOLA, ADRIAN, and ANTONINUS's Wall.

We learn from several hints in the Roman historians, that the country between the walls of Hadrian and Antoninus continued to be a scene of perpetual war and subject of contention between the Romans and Britons, from the beginning of the reign of Commodus to the arrival of the emperor Septimius Severus in Britain, A. D. 206. This last emperor having subdued the Macætzæ, and repulsed the Caledonians, determined to erect a stronger and more impenetrable barrier than any of the former, against their future incursions.

Though neither Dio nor Herodian make any mention of a wall built by Severus in Britain for the protection of the Roman province, yet we have abundant evidence from other writers of equal authority, that he really built such a wall. "He fortified Britain (says Spartian) with a wall drawn cross the island from sea to sea; which is the greatest glory of his reign. After the wall was finished, he retired to the next station (York), not only a conqueror, but founder of an eternal peace." To the same purpose, Aurelius Victor and Orosius, to say nothing of Eutropius and Cassiodorus. "Having repelled the enemy in Britain, he fortified the country, which was suited to that purpose, with a wall drawn cross the island from sea to sea."—"Severus drew a great ditch, and built a strong wall, tised with several turrets, from sea to sea, to protect that part of the island which he had recovered, from the yet unconquered nations." As the residence of the emperor Severus in Britain was not quite four

years, it is probable that the two last of them were employed in building this wall; according to which account, it was begun A. D. 209, and finished A. D. 210.

This wall of Severus was built nearly on the same tract with Hadrian's rampart, at the distance only of a few paces north. The length of this wall, from Coufins-house near the mouth of the river Tyne on the east, to Boulnefs on the Solway frith on the west, hath been found, from two actual mensurations, to be a little more than 68 English miles, and a little less than 74 Roman miles. To the north of the wall was a broad and deep ditch, the original dimensions of which cannot now be ascertained, only it seems to have been larger than that of Hadrian. The wall itself, which stood on the south brink of the ditch, was built of solid stone, strongly cemented with the best mortar; the stones which formed both the faces being square ashlers, and the filling stones large flags, set a little slanting. The height of this wall was 12 feet besides the parapet, and its breadth 8 feet, according to Bede, who lived only at a small distance from the east end of it, and in whose time it was almost quite entire in many places. Such was the wall erected by the command and under the direction of the emperor Severus in the north of England; and, considering the length, breadth, height, and solidity, it was certainly a work of great magnificence and prodigious labour. But the wall itself was but a part, and not the most extraordinary part, of this work. The great number and different kinds of fortresses which were built along the line of it for its defence, and the military-ways with which it was attended, are still more worthy of our admiration, and come now to be described.

The fortresses which were erected along the line of Severus's wall for its defence, were of three different kinds, and three different degrees of strength; and were called by three different Latin words, which may be translated *stations*, *castles*, and *turrets*. Of each of these in their order.

The *stations*, *stations*, were so called from their stability and the stated residence of garrisons. They were also called *castra*, which hath been converted into *cheffres*, a name which many of them still bear. These were by far the largest, strongest, and most magnificent of the fortresses which were built upon the wall, and were designed for the head-quarters of the cohorts of troops which were placed there in garrison, and from whence detachments were sent into the adjoining callies and turrets. These *stations*, as appears from the vestiges of them which are still visible, were not all exactly of the same figure nor of the same dimensions; some of them being exactly squares, and others oblong, and some of them a little larger than others. These variations were no doubt occasioned by the difference of situation and other circumstances. The *stations* were fortified with deep ditches and strong walls, the wall itself coinciding with and forming the north wall of each station. Within the *stations* were lodgings for the officers and soldiers in garrison; the smallest of them being sufficient to contain a cohort, or 600 men. Without the walls of each station was a town, inhabited by labourers, artificers, and others, both Romans and Britons, who chose to dwell under the protection of these fortresses. The number of the *stations* upon the

the wall was exactly 18; and if they had been placed at equal distances, the interval between every two of them would have been four miles and a few paces: but the intervention of rivers, marshes, and mountains; the convenience of situation for strength, prospect, and water; and many other circumstances to us unknown, determined them to place these stations at unequal distances. The situation which was always chosen by the Romans, both here and everywhere else in Britain where they could obtain it, was the gentle declivity of a hill, near a river, and facing the meridian sun. Such was the situation of the far greatest part of the stations on this wall. In general we may observe, that the stations stood thickest near the two ends and in the middle, probably because the danger of invasion was greatest in these places. But the reader will form a clearer idea of the number of these stations, their Latin and English names, their situation and distance from one another, by inspecting the following table, than we can give him with equal brevity in any other way. The first column contains the number of the station, reckoning from east to west; the second contains its Latin, and the third its English name; and the three last its distance from the next station to the west of it, in miles, furlongs, and chains.

N ^o	Latin Name.	English Name.	M.	F.	C.
1	Segedunum	Cousins'-house	3	5	1½
2	Pons Ælii	Newcastle	2	0	9
3	Condercum	Benwell-hill	6	6	5
4	Vindobala	Rutchester	7	0	3½
5	Hannum	Halton-chesters	5	1	7
6	Cilurnum	Walwick-chesters	3	1	8
7	Procolitia	Carrawburgh	4	5	3½
8	Borcovius	Houfesteeds	1	3	8
9	Vindolana	Little-chesters	3	6	4
10	Ælica	Great-chesters	2	1	6½
11	Magna	Cartvoran	2	6	0
12	Ambogianna	Burfordwald	6	2	8
13	Petrianæ	Cambeck	2	6	6
14	Atallaba	Watchcros	5	1	9
15	Convagata	Stanwix	3	3	4
16	Axelodunum	Brugh	4	0	9
17	Gabrofantum	Brumbrugh	3	4	1
18	Tunnocelum	Boulnefs	0	0	0
Length of the wall			68	3	3

The *castella*, or castles, were the second kind of fortifications which were built along the line of this wall for its defence. These castles were neither so large nor strong as the stations, but much more numerous, being no fewer than 81. The shape and dimensions of the castles, as appears from the foundations of many of them which are still visible, were exact squares of 66 feet every way. They were fortified on every side with thick and lofty walls, but without any ditch, except on the north side; on which the wall itself, raised much above its usual height, with the ditch attending it, formed the fortification. The castles were situated in the intervals between the stations, at the distance of about seven furlongs from each other; though in this, particular circumstances sometimes occasioned a little variation. In these castles guards were constantly

kept by a competent number of men detached from the nearest stations.

The *turrets*, or turrets, were the third and last kind of fortifications on the wall. These were still much smaller than the castles, and formed only a square of about 12 feet, standing out of the wall on its south side. Being so small, they are more entirely ruined than the stations and castles, which makes it difficult to discover their exact number. They stood in the intervals between the castles; and from the faint vestiges of a few of them, it is conjectured that there were four of them between every two castles, at the distance of about 300 yards from one another. According to this conjecture, the number of the turrets amounted to 324. They were designed for watch-towers and places for centinels, who, being within hearing of one another, could convey an alarm or intelligence to all parts of the wall in a very little time.

Such were the stations, castles, and turrets on the wall of Severus; and a very considerable body of troops was constantly quartered in them for its defence. The usual complement allowed for this service was as follows:

1. Twelve cohorts of foot, consisting of 600 men each 7,200
2. One cohort of mariners in the station at Boulnefs 600
3. One detachment of Moors, probably equal to a cohort 600
4. Four alæ or wings of horse, consisting, at the lowest computation, of 400 each 1,600

10,000

For the convenience of marching these troops from one part of the wall to another, with the greater ease and expedition, on any service, it was attended with two military ways, paved with square stones, in the most solid and beautiful manner. One of these ways was smaller, and the other larger. The smaller military way ran close along the south side of the wall, from turret to turret, and castle to castle, for the use of the soldiers in relieving their guards and centinels, and such services. The larger way did not keep so near the wall, nor touch at the turrets or castles, but pursued the most direct course from one station to another, and was designed for the convenience of marching larger bodies of troops.

It is to be regretted, that we cannot gratify the reader's curiosity, by informing him by what particular bodies of Roman troops the several parts of this great work were executed; as we were enabled to do with regard to the wall of Antoninus Pius from inscriptions. For though it is probable that there were stones with inscriptions of the same kind, mentioning the several bodies of troops, and the quantity of work performed by each of them, originally inserted in the face of this wall, yet none of them are now to be found. There have indeed been discovered, in or near the ruins of this wall, a great number of small square stones, with very short, and generally imperfect, inscriptions upon them; mentioning particular legions, cohorts, and centuries; but without directly asserting that they had built any part of the wall, or naming any number of paces. Of these inscriptions, the reader

reader may see no fewer than twenty-nine among the Northumberland and Cumberland inscriptions in Mr Horsley's *Britannia Romana*. As the stones on which these inscriptions are cut, are of the same shape and size with the other facing-stones of this wall, it is almost certain that they have been originally placed in the face of it. It is equally certain, from the uniformity of these inscriptions, that they were all intended to intimate some one thing, and nothing so probable as that the adjacent wall was built by the troops mentioned in them. This was, perhaps, so well understood, that it was not thought necessary to be expressed; and the distance of these inscriptions from one another showed the quantity of work performed. If this was really the case, we know in general, that this great work was executed by the second and sixth legions, these being the only legions mentioned in these inscriptions. Now, if this prodigious wall, with all its appendages of ditches, stations, castles, turrets, and military ways, was executed in the space of two years by two legions only, which, when most complete, made no more than 12,000 men, how greatly must we admire the skill, the industry, and excellent discipline of the Roman soldiers, who were not only the valiant guardians of the empire in times of war, but its most active and useful members in times of peace?

This wall of Severus, and its fortresses, proved an impenetrable barrier to the Roman territories for near 200 years. But about the beginning of the 5th century, the Roman empire being assailed on all sides, and the bulk of their forces withdrawn from Britain, the Meates and Caledonians, now called Scots and Picts, became more daring; and some of them breaking through the wall, and others sailing round the ends of it, they carried their ravages into the very heart of Provincial Britain. These invaders were indeed several times repulsed after this by the Roman legions sent to the relief of the Britons. The last of these legions, under the command of Gallio of Ravenna, having, with the assistance of the Britons, thoroughly repaired the breaches of Severus's wall and its fortresses, and exhorted the Britons to make a brave defence, took their final farewell of Britain. It soon appeared, that the strongest walls and ramparts are no security to an undisciplined and dastardly rabble, as the unhappy Britons then were. The Scots and Picts met with little resistance in breaking through the wall, whose towns and castles were tamely abandoned to their destructive rage. In many places they levelled it with the ground, that it might prove no obstruction to their future inroads. From this time no attempts were ever made to repair this noble work. Its beauty and grandeur procured it no respect in the dark and tasteless ages which succeeded. It became the common quarry for more than a thousand years, out of which all the towns and villages around were built; and is now so entirely ruined, that the penetrating eyes of the most poring and patient antiquarian can hardly trace its vanishing foundations.

SEVIGNE (Marie de Rabutin, Marquise de), a French lady, celebrated for her wit and her fine sense, was born in 1626, and was not above a year old when her father was killed at the defeat of the English upon the isle of Rhe. In 1644, she married the mar-

quis of Seigne, who was killed in a duel in 1651. She had by him a son and a daughter; to the care of whose education the afterwards most religiously devoted herself: they became accordingly most accomplished persons, as it was reasonable to expect. This illustrious lady was acquainted with all the wits and learned of her time. It is said she decided the famous dispute between Perrault and Boileau, concerning the preference of the ancients to the moderns, thus: "The ancients are the finest, and we are the "prettiest." She died in 1696, and left us a most valuable collection of letters; the best edition of which is that of Paris 1754, in eight volumes 12mo. "These letters," says Voltaire, "filled with anecdotes, written with freedom, and in a natural and animated style, are an excellent criticism upon studied letters of wit, and still more upon those fictitious letters which aim to imitate the epistolary style, by a recital of false sentiments and feigned adventures to imaginary correspondents." A *Sevigniana* was published at Paris in 1756; which is nothing more than a collection of literary and historical anecdotes, fine sentiments, and moral apophthegms, scattered throughout these letters.

SEVILLE, a large and populous city of Spain, situated on the Guadalquivir river, in W. Long. 5. 5. N. Lat. 37. 20. This city is supposed to have been founded by the Phœnicians, who gave it the name of *Hispalis*. When it fell under the power of the Romans, it was called *Julia*: and at last, after a variety of corruptions, was called *Sebilla* or *Sevilla*; both of which names are retained by the Spaniards. The Romans embellished it with many magnificent edifices; of which scarce any vestige now remains. The Gothic kings for some time made it their residence: but in process of time they removed their court to Toledo; and Seville was taken by storm soon after the victory obtained at Xeres over the Gothic king Rodrigo. In 1027, Seville became an independent monarchy; but was conquered 70 years afterwards by Yusuf Almoravides, an African prince. At last it was taken by Ferdinand III. after a year's siege; and 300,000 Moors were then obliged to leave the place. Notwithstanding this prodigious emigration, Seville continued to be a great and populous city, and soon after it was enlarged and adorned with many magnificent buildings, the chief of which is the cathedral. Seville arrived at its utmost pitch of grandeur a little after the discovery of America, by reason that all the valuable productions of the West Indies were brought hither. Its court was then the most splendid in Europe; but in the course of a few years all this grandeur disappeared, owing to the impediments in navigating the Guadalquivir. The superior excellence of the port of Cadiz induced government to order the galleons to be stationed there in time to come.

The shape of Seville is circular, without any great rising in the whole space. The walls seem to be of Moorish construction, and are about five miles and an half in circumference. The ditch is filled up in many places. On the west side of the river is a suburb called *Triana*, as large as many towns, but remarkable for nothing but its Gothic castle; where, in 1482, the inquisition was first established in Spain.

The streets of Seville are crooked, dirty, and narrow; so that two coaches can scarcely pass one another

Seville,
Sewell.

ther abreast. The widest and handomest place is called the *Alameda*, or *Great Walk of Old Elms*, in the heart of the city. The length of this is 600 yards, and its breadth 150; decorated with three fountains, the statues of Hercules the supposed founder, and of Julius Cæsar the restorer, of Seville. The cathedral is 420 feet by 273 within, and 126 feet high; the circumference of each cluster of pillars, 42 feet. It has nine doors, 80 windows, and 80 altars, at which 500 masses are daily celebrated. At one angle stands the Giralda, a tower 350 feet high, erected by the Moors in the year 1000. The Christians added two stories, with a prodigious large weathercock; and as the whole rises much higher than any other edifice in Seville, it has a noble effect. According to tradition, the Moors, in order to form a solid foundation for this edifice, made a deep hole, in which they cast all the marble and stone monuments of the Romans that could be found; and indeed, when repairs have been necessary, this tradition seems to have been countenanced by the many monuments of antiquity discovered on such occasions. The whole work is brick and mortar, with a winding stair-case within, so easy and wide, as to admit two horsemen riding abreast above half way up. The other churches are unworthy of notice; and even the cathedral, according to Mr Swinburne, is inferior to York Minster. This cathedral was begun by Don Sancho the Brave about the close of the 13th century, and finished by John II. about an hundred years after.

The Canos de Carmone, or great aqueduct of Seville, is reckoned, by the historians of this city, one of the most wonderful works of antiquity. Mr Swinburne, however, remarks, that it is ugly, crooked, the arches unequal, and the architecture neglected. The conduit, besides, is so leaky, that a rivulet is formed by the waste water. Nevertheless, it still conveys to the city an ample supply of water sufficient to turn several mills, and to give almost every house in town the benefit of it.

The only other remarkable building about Seville is the snuff-manufactory. For the more convenient carrying on this branch of commerce, Ferdinand VI. erected a most magnificent roomy palace, in a grand, but rather heavy style of architecture, which was finished in 1756. A thousand men are employed constantly here at about four or six reals per day, for nine hours work. One hundred and eighty mules work 28 mills or machines for mixing the tobacco with a red earth from Almazaron. The excessive adulteration with this earth, however, has of late occasioned a prodigious falling off in the exportation of the manufactory: the northern nations have long refused to take any off their hands; and unless they alter their method, the trade will probably soon be confined to Spain and its dominions. The neat profits, for one year, have amounted to more than six millions of dollars.

SEWELL (George), an eminent physician, elegant writer, and excellent poet, was the eldest son of Mr John Sewell treasurer and chapter-clerk of the college of Windsor; and was educated at Eton school, and at Peter-house in Cambridge, where he took the degree of bachelor in physic. In order to complete

his knowledge in medicine, he went to Leyden, and studied under the celebrated Boerhaave; and on his return practised physic in London with good success. Towards the latter part of his life he retired to Hampstead, where he continued to pursue the business of his profession till the time of his death, which happened in the year 1726. He wrote several essays in the Spectators and Tatlers; and was concerned in the translation of Ovid's Metamorphoses, with Dr Garth and others. He likewise wrote, 1. The life of Mr John Philips, author of the poem on cyder. 2. A vindication of the English Stage, exemplified in the Cato of Mr Addison, in a letter to a nobleman. 3. Sir Walter Raleigh, a tragedy: and several miscellaneous poems.

SEWER, in the HOUSEHOLD, an officer who comes in before the meat of a king or nobleman, to place and range it on the table.

SEWER is also a passage or gutter made to carry water into the sea or a river, whereby to preserve the land, &c. from inundations and other annoyances.

Court of Commissioners of SEWERS in England. A temporary tribunal, erected by virtue of a commission under the great seal; which formerly used to be granted *pro re nata* at the pleasure of the crown, but now at the discretion and nomination of the lord chancellor, lord treasurer, and chief justices, pursuant to the statute 23 Hen. VIII. c. 5. Their jurisdiction is to overlook the repairs of sea-banks and sea-walls, and the cleansing of rivers, public streams, ditches, and other conduits, whereby any waters are carried off; and is confined to such county or particular district as the commission shall expressly name. The commissioners are a court of record, and may fine and imprison for contempts; and in the execution of their duty, may proceed by jury, or upon their own view, and may take order for the removal of any annoyances, or the safeguard and conservation of the sewers within their commission, either according to the laws and customs of Romney-marsh, or otherwise at their own discretion. They may also assess such rates or scots upon the owners of lands within their district, as they shall judge necessary: and if any person refuses to pay them, the commissioners may levy the same by distress of his goods and chattels: or they may, by statute 23 Hen. VIII. c. 5. sell his freehold-lands, (and by the 7 Ann. c. 10. his copyhold also), in order to pay such scots or assessments. But their conduct is under the controul of the court of King's Bench, which will prevent or punish any illegal or tyrannical proceedings. And yet in the reign of king James I. (8 Nov. 1616.) the privy-council took upon them to order, that no action or complaint should be prosecuted against the commissioners unless before that board; and committed several to prison who had brought such actions at common law, till they should release the same: and one of the reasons for discharging Sir Edward Coke from his office of lord chief-justice, was for countenancing those legal proceedings.

The pretence for these arbitrary measures was no other than the tyrant's plea of the necessity of unlimited powers in works of evident utility to the public, "the supreme reason above all reasons, which is the salvation of the king's lands and people." But now it

Sewer.

Sex.

is clearly held, that this (as well as all other inferior jurisdictions) is subject to the discretionary coercion of his majesty's court of King's-bench.

SEX, something in the body which distinguishes male from female.

SEX of Bees. See BEE.

SEXES of Plants. Theophrastus, the father of botany, frequently mentions the sexes of plants. He observes, that trees may be distinguished into several classes, on account of their great variety: but that their most common distinction is into *male* and *female*; the one of which is fertile; the other, in some sorts, barren. This distinction of the sexes, however, is not so much founded upon an analogy betwixt vegetables and animals, as upon the greater or less perfection of the fruit in the plants in question. In a species of palm-tree, mentioned by this author and Aristotle, the analogy in question is more strictly preserved. "If the dust of a branch of the male palm (says Aristotle) is shaken over the female, the fruit of the latter will quickly ripen; nay, (continues the same author), if this male dust shall be carried along with the wind, and dispersed upon the female, the same effect will follow as if a branch of the male had been suspended over it." To the same purpose Theophrastus observes, that unless the dust or down of the male palm is sprinkled over the fruit of the female, it will never ripen, but fall off. That these naturalists, however, were not clear in opinion that the fruit so sprinkled with the male dust was impregnated by it in the same manner as the ovary is fecundated in animals, appears from another passage in the last quoted author, in which he asserts, that though the fact just mentioned cannot be denied, yet no reason whatever can be assigned for the effect of the sprinkling.

Dioscorides, the next Greek botanist of note after Theophrastus, denominates many plants male and female, but without regard to analogy, or to their fertility or barrenness. Thus his male mercury carries the seed, and the female is barren. These ideas of the sexes of plants have been transferred to our own times; and it is not uncommon to hear peasants confounding the sexes of hemp, spinage, and hop, by calling the male plant *female*, and the female plant, or that which bears the seeds, *male*.

Aristotle, as well as Dioscorides, errs widely in his manner of distinguishing the male from the female plant; the former of which, in his opinion, is larger and stronger; the female weaker, but more fruitful.

"Naturalists," says Pliny, "admit the distinction of sex, not only in trees, but in herbs and all plants. Yet (continues the same author) this is no where more observable than in palms, the females of which never propagate but when they are fecundated by the dust of the male."

The palm-tree is the only instance among the ancients where sexes are attributed to particular plants on account of fertility or barrenness; other plants being, as we have seen, distinguished into male and female, merely for distinction's sake, and often erroneously. Cæsalpinus was the first who corrected the mistakes of the ancients with respect to the sex of plants, and established what are now generally called orthodox opinions on that subject. He observed, that

in some trees, as yew; and in some herbaceous vegetables, as mercury, hemp, and nettle; the fruit was produced on one root, and flowers only on the other: the last being barren, was denominated the *male plant*; the other being fertile, the *female*. The female plants, continues the same intelligent author, succeed better, that is, become more fruitful, if sowed in the neighbourhood of the male: certain exhalations from the latter dispersing themselves over their surface, and, by an operation not to be explained, disposing them to produce riper and more perfect seeds.

Cæsalpinus's idea of sex in plants was restricted to a very inconsiderable number; those, to wit, in which the pretended organs are placed apart from each other, on separate roots produced from the same seed. In plants of this description, their analogy to animals would, in a manner, suggest itself. From the same seed are produced two different plants; the one barren, the other fertile. The analogy to the sexes of animals immediately presents itself to the mind, and we denominate that which is barren, or bears no seeds, *male*; that which is fertile, or bears seeds, *female*. The same analogy carries us farther, and induces a conjecture, that these male and female plants are connected together in such a manner, that the fecundation of the seeds of the female is operated, as in animals, by the male. This conjecture, furnished by analogy, leads to observations and experiments for its support: and thus the doctrine of the sexes, small and inconsiderable in its beginnings, becomes enlarged, and, from being confined to a very small number of plants, extends itself over the whole vegetable kingdom.

Dr Nehemiah Grew is thought to have first suggested the universality of sexes in plants, and the primary use of the *antheræ apices*, or tops of the stamina, in impregnating the seed. These tops, he observes, are chiefly useful to the plant itself; because all plants, even such as want the foliage or petals, are provided with them: he then plainly asserts, as his opinion, that when the tops, which he calls the *attire*, *break* or *open*, their inclosed *pollen*, or dust, falls down on the seed-bud, the vegetable uterus, and endues it with a prolific virtue; not, as he explains himself, by entering into it bodily, as the *semen masculinum* in animals, but by communicating to it some subtle and vivific effluvia.

This opinion of Grew was adopted by several succeeding botanists, particularly Mr Ray, Camerarius, Geoffroy, Samuel Morland, Dr Blair, Jusieu, Bradley, Van Royen, Malpighi, Vaillant, Ludwig, Wolfius, Logan, Monro, and the justly celebrated Linnæus.

Ray, at first, mentions Grew's doctrine only as probable; but afterwards declares his full assent to it, and collects the arguments that are used to support it.

Rudolphus Jacobus Camerarius, about the end of the last century, endeavoured to demonstrate the analogy betwixt the generation of plants and animals. Among other arguments for the sex of plants, he makes use of the following: "That copulation (says he) is necessary in the generation of animals is past a doubt: that a similar junction obtains in that of plants appears from this circumstance, that if either the tops (*antheræ*) of the male, or the styles of the female, or both,

Sex.

are wanting, no fecundation, and consequently no generation, can take place." This assertion he exemplifies in the mulberry-tree, may, and mercury, in which the stamina of the male flowers being either picked off before they had attained maturity, as in the two first instances, or placed at a distance from the female plant, as in the last, the buds that ought to have produced fruit came not to maturity. The same author speaks of the number of stamina in flowers; so that in his works we may recognize almost the first principles of the celebrated sexual system of Linnæus.

However, almost a century before Grew, Zaluzianski, a native of Poland, had clearly distinguished the sexes of plants, and pointed out the difference betwixt male, female, androgynous, and hermaphrodite plants. Grew's improvements on the idea of Cæsalpinus and Zaluzianski, have made him generally be considered as the author of the doctrine alluded to. Certain it is, that he has handled the subject with great accuracy, and endeavoured, by repeated microscopical examinations, to throw light upon this obscure, but curious inquiry.

Signor Malpighi, who was contemporary with Grew, likewise examined by the microscope the male or fecundating dust, the styles of the feed-bud, and the manner in which the *antheræ* open, or burst, when ripe.

Morland, Geoffroy, and Vaillant, who have written successively upon this subject, all concur in asserting, that the dust of the *antheræ* or tops of the stamina is entirely analogous to the *semen masculinum* of animals, and absolutely necessary for fecundating the feed. Morland, however, differs from Grew, in his conception of the manner in which the fecundation in question is accomplished. The latter, as we have seen, gave it for his opinion, that the fecundating dust did not enter bodily into the ovary of the plant, but operated its effect by means of some spirituous emanations, or vivifying effluvia. Morland, on the other hand, asserted, that "the male-dust is a congeries of seminal plants; one of which must be conveyed through the style into every *ovum* or feed, before it can become prolific." This hypothesis, as the reader will easily perceive, is analogous to that of animal generation, by means of *animalcula* in *femine masculinæ*. Geoffroy, in a memoir presented to the Academy of Sciences at Paris in 1711, on the structure and use of the principal parts of flowers, asserts, that the germ, or *punctum vite*, is never to be seen in the feed till the *antheræ* have shed their dust; and that if the stamina be cut out before the *antheræ* open, the feed will either not ripen, or be barren if it ripens. This last is Camerarius's great argument repeated.

In 1717, Mr Vaillant made some very ingenious discoveries with respect to the nature of the fecundating dust, and the manner of its explosion. He seems, says an ingenious French author, to have been the first eye-witness of this secret of nature, this admirable sport that passes in the flowers of plants between the organs of different sexes. Vaillant is entirely of Grew's opinion, that it is the volatile spirit of the male dust, not its gross or bodily substance, that enters the feeds of plants; the style, which leads to the

case containing the seeds, being frequently found perfectly solid and impenetrable by that substance.

Lastly, the celebrated Sir Charles Linnæus has completed the doctrine of the sex of plants, by collecting all the arguments in support of it that can possibly be advanced; and by founding upon it a system, in which all vegetables are arranged under particular classes, distinguished by the number and other circumstances of their stamina or male organs. See BOTANY, *passim*.

SEXAGENARY, something relating to the number sixty: thus sexagenary or sexagesimal arithmetic, is a method of computation proceeding by sixties; such is that used in the division of a degree into sixty minutes, of the minute into sixty seconds, of the second into sixty thirds, &c. Also sexagenary tables are tables of proportional parts, showing the product of two sexagenaries that are to be multiplied, or the quotient of the two that are to be divided.

SEXAGESIMA, the second Sunday before Lent, or the next to Shrove-Sunday, so called as being about the 60th day before Easter.

SEXAGESIMALS, or SEXAGESIMAL Fractions, fractions whose denominators proceed in a sexagecuple ratio; that is, a prime, or the first minute, $=\frac{1}{60}$; a second $=\frac{1}{3600}$; a third $=\frac{1}{216000}$. Anciently, there were no other than sexagesimals used in astronomy; and they are still retained in many cases, though decimal arithmetic begins to grow in use now in astronomical calculations. In these fractions, which some call *astronomical fractions*, the denominator being always 60, or a multiple thereof, is usually omitted, and the numerator only written down: thus, 4', 59', 32'', 50''', is to be read, 4 degrees, 59 minutes, 32 seconds, 50 thirds, 16 fourths, &c.

SEXTANS, SEXTANT, a sixth part of certain things. The Romans having divided their *as* into 12 ounces or uncia, the sixth part of that, or two ounces, was the sextans.—*Sextans* was also a measure which contained two ounces of liquor, or two cyathi.

SEXTANT, in mathematics, denotes the sixth part of a circle, or an arch comprehending 60 degrees.

The word *sextant* is more particularly used for an astronomical instrument made like a quadrant, excepting that its limb only comprehends 60 degrees. The use and application of the sextant is the same with that of the quadrant. See QUADRANT.

SEXTILE, *sextilis*, the position or aspect of two planets when at 60 degrees distance, or at the distance of two signs from one another. It is marked thus (*). See ASPECT.

SEXTON, a church-officer, whose business is to take care of the vessels, vestments, &c. belonging to the church, and to attend the minister, churchwardens, &c. at church.

SEXTUPLE, in music, denotes a mixed sort of triple, which is beaten in double time.

SEXTUS EMPIRICUS, a famous Pyrrhonian philosopher, lived in the second century, under the reign of Antoninus the Debonair. He was a physician of the sect of the Empirics, and is said to have been one of the preceptors of Antoninus the philosopher. There are still extant his Pyrrhonian Institutions, and a large

Sexagenary

Sextus.

† See BOTANY, sect. v.

Sexualistz work against the mathematicians, &c. The best edition of Sextus Empiricus is that of Fabricius in Greek and Latin, printed at Leipzig in 1718, folio.

Shalwell.

SEXUALISTÆ, among botanical writers, those who have established the classes of plants upon the differences of the sexes and parts of fructification in plants, according to the modern method; as Linnæus, &c.

SEINE, a river of France, which, arising near Dijon in Burgundy, runs north-west through Champagne and the Isle of France, through Paris, &c. and, crossing Normandy, falls into the British Channel between Havre de Grace and Honfleur.

SFORZA (James), slyed the Great, count de Corignoli, a renowned warrior, was born in 1639. He was the son of a labourer; but by his military talents he ennobled his family, and was the founder of the illustrious house of the Sforzas dukes of Milan. Drowned in passing the river Pescara in pursuit of Alphonso king of Arragon in 1424.

SFORZA (Francis), natural son to the former; an able statesman, and a renowned general. He served under his father against Alphonso king of Arragon; and, though illegitimate, he succeeded to his estate, and to his post in the army, under Jane II. queen of Naples. He afterwards attached himself to René duke of Anjou, her successor. The reputation of his valour engaged the pope, the Venetians, and the Florentines, to appoint him their general in the war against the duke of Milan, though he had married his daughter. The duke dying in 1447, the Milanese chose Sforza to be their general against the Venetians; and, after many signal services performed for them, he turned his arms against them, laid siege to Milan, and obliged them to acknowledge him duke of Milan. The dukedom, by hereditary right, belonged to Charles duke of Orleans; but Louis XI. who hated the duke of Orleans, entered into a treaty with Sforza, and, in 1464, transferred to him all the claims of France to Milan and Genoa; upon which he made himself master of the latter. Died in 1466.

SHAD, in ichthyology, a species of *CLUPEA*.

SHADDOCK, a species of *CITRUS*.

SHADOW, in optics, a privation or diminution of light, by the interposition of an opaque body; or it is a plane where the light is either altogether obstructed, or greatly weakened, by the interposition of some opaque body between it and the luminary.

SHADOW, in painting, an imitation of a real shadow, effected by gradually heightening and darkening the colours of such figures as by their dispositions cannot receive any direct rays from the luminary that is supposed to enlighten the piece.

SHADWELL (Thomas), descended of an ancient family in Staffordshire, was born in 1640, and educated at Caius college, Cambridge. He then was placed in the Middle Temple to study the laws; where having spent some time, he travelled abroad. Upon his return home, he became acquainted with the most celebrated persons of wit in that age. He applied himself chiefly to dramatic writing, in which he had great success; and upon the Revolution was made poet-laureat and historiographer to king William and queen Mary, in the room of Mr Dryden. These employments he enjoyed till his death, which happened

in 1692. Beside his dramatic writings, he composed several other pieces of poetry; the chief of which are his congratulatory poem on the prince of Orange's coming to England; another on queen Mary; his translation of Juvenal's 10th satire, &c. Mr Dryden treats him with great contempt, in his satire called *Mac-Fleckno*. The best judges of that age, however, gave their testimony in favour of his comedies; which have in them fine strokes of humour; the characters are often original, strongly marked, and well sustained. An edition of his works, with some account of his life and writings prefixed, was published in 1720, in 4 vols 8vo.

SILIAFT of a *COLUMN*, in building, is the body thereof between the base and capital; so called from its straightness. See *ARCHITECTURE*.

SHAFT, in mining, is the pit or hollow entrance into the mine.

SHAFTESBURY, a town of Dorsetshire in England, in W. Long. 2. 10. N. Lat. 51. 0. It stands on a high hill, and is built in the form of a bow. It enjoys a serene wholesome air, and has a fine prospect, but has little water. It is a good thoroughfare, is governed by a mayor, and sends two members to parliament. It gives the title of earl to the noble family of Cooper.

SHAFTESBURY (earl of). See *COOPER*.

SHAG, in ornithology, a species of *PELICANUS*.

SHAGREEN, or *CHAGREEN*, in commerce, a kind of grained leather prepared of the skin of a species of *SQUALUS*, much used in covering cases, books, &c.

SHAKE, in singing. See *GRUPPO*.

SHAKESPEARE (William), the great poet of nature, and the glory of the British nation, was descended of a reputable family, at Stratford upon Avon. His father was in the wool-trade, and dealt considerably that way. He had ten children, of whom our immortal poet was the eldest, and was born in April 1564. At a proper age, he was put to the free-school in Stratford, where he acquired the rudiments of grammar-learning. Whether he discovered at this time any extraordinary genius or inclination for literature, is uncertain. His father had no design to make a scholar of him; on the contrary, he took him early from school, and employed him in his own business; but he did not continue long in it under the controul of his father; for at seventeen years of age he married, commenced master of a family, and became the father of children before he was out of his minority. He now settled in business for himself, and had no other thoughts than of pursuing the wool-trade, when, happening to fall into acquaintance with some persons who followed the practice of deer-stealing, he was prevailed upon to engage with them in robbing Sir Thomas Lucy's park, near Stratford. The injury being repeated more than once, that gentleman was provoked to enter a prosecution against the delinquents; and Shakespeare, in revenge, made him the subject of a ballad, which, tradition says, (for the piece is lost), was pointed with so much bitterness, that it became unsafe for the author to stay any longer in the country. To escape the law, he fled to London. There, destitute of friends and money, he approached the play-house, and, for present support, engaged

Shake
Shake

Shakespeare engaged in the servile employment of holding the horfes of those who rode to the theatre: but conversing accidentally with some of the players, he at length gained admittance into the house, in the capacity of an inferior actor; nor did his performance entitle him to advancement, so that the highest character he ever played was that of the Ghost in his own Hamlet. The part of an under-actor neither engaged nor deferred his attention. It was far from filling, or being adequate to the powers of his mind; and therefore he turned the advantage which that situation afforded him to a higher and nobler use. Having, by practice and observation, acquainted himself with the mechanical economy of the theatre, his native genius supplied the rest: But the whole view of his first attempts in stage-poetry being to procure a subsistence, he directed his endeavours solely to hit the taste and humour that then prevailed among the meaner sort of people, of whom the audience was generally composed; and therefore his images of life were drawn from those of that rank. Thus did Shakespeare set out, without the advantage of education, the advice or assistance of the learned, the patronage of the better sort, or any acquaintance among them. But when his performances had merited the protection of his prince, and the encouragement of the court had succeeded to that of the town, the works of his riper years were manifestly raised above the level of his former productions.

In this way of writing he was an absolute original, and of such a peculiar cast, as hath perpetually raised and confounded the emulation of his successors; a compound of such very singular blemishes, as well as beauties, that these latter have not more mocked the toil of every aspiring undertaker to emulate them, than the former, as flaws intimately united to diamonds, have baffled every attempt of the ablest artists to take them out without spoiling the whole. Queen Elizabeth, who showed Shakespeare many marks of her favour, was so much pleased with the delightful character of Sir John Falstaff, in the two parts of Henry the Fourth, that she commanded the author to continue it for one play more, and to show the knight in love; which he executed inimitably, in the Merry Wives of Windsor.

Among his other patrons, the earl of Southampton is particularly honoured by him, in the dedication of two poems, Venus and Adonis, and Lucrece; in the latter especially, he expresses himself in such terms as gives countenance to what is related of that patron's distinguished generosity to him. In the beginning of king James I.'s reign (if not sooner) he was one of the principal managers of the play-house, and continued in it several years afterwards; till, having acquired such a fortune as satisfied his moderate wishes and views in life, he quitted the stage, and all other business, and passed the remainder of his time in an honourable ease, at his native town of Stratford, where he lived in a handsome house of his own purchasing, to which he gave the name of *New Place*; and he had the good fortune to save it from the flames in the dreadful fire that consumed the greatest part of the town in 1614.

In the beginning of the year 1616, he made his will, wherein he testified his respect to his quondam

partners in the theatre: he appointed his youngest daughter, jointly with her husband, his executors, and bequeathed to them the best part of his estate, which they came into the possession of not long after. He died on the 23d of April following, being the 53d year of his age; and was interred among his ancestors on the north side of the chancel, in the great church of Stratford, where there is a handsome monument erected for him, inscribed with the following elegiac distich in Latin.

*Judicio Pylum, genio Socratem, arte Maronem,
Terra tegit, Populus marcet, Olympus habet.*

In the year 1740, another very noble one was raised to his memory, at the public expence, in Westminster-abbey; an ample contribution for this purpose being made upon exhibiting his tragedy of Julius Cæsar, at the theatre-royal in Drury-Lane, April 28th 1738.

Nor must we omit mentioning another testimony of the veneration paid to his manes by the public in general, which is, that a mulberry-tree, planted upon his estate by the hands of this revered bard, was cut down not many years ago; and the wood being converted to several domestic uses, was all eagerly bought at a high price, and each single piece treasured up by its purchaser as a precious memorial of the planter. The late commemorative jubilee, celebrated at his birth-place by the most illustrious persons in the nation, is fresh in every one's memory.

The learned editors of the works of this immortal bard have exerted their utmost power in praise of his extensive genius and universal knowledge of human nature. If, indeed, there ever existed an inspired writer, (if by inspiration we mean originality), Shakespeare was indisputably inspired. "His characters," says Mr Pope, "are so much nature's self, that it were injurious to call them by so distant a name as *copies*." It is astonishing, when we consider the infinite variety of his characters, that a poet, who from his education had so little opportunity of acquiring a knowledge of mankind, should, as it were by intuition, have delineated the whole world with such accuracy and truth! But to an English reader it is sufficient, independent of his judgment, to appeal to his feelings. Some foreigners have foolishly attempted to ridicule particular scenes, and to condemn his inattention to their rules of the drama; but such criticisms serve only to expose their total ignorance of his capacity, his design, his invention. He despised their rules as he would have despised their criticisms. Some of his plays are intentionally neither tragedies nor comedies, but a natural mixture of both: others are professedly historical: but they are always just representations of human nature, call them by what name you will. They say Shakespeare was illiterate. The supposition implies more than panegyric with a hundred tongues could have expressed. If he was unlearned, he was the only instance of a human being to whom learning was unnecessary; the favourite child of Nature, produced and educated entirely by herself; but so educated, that the pedant Art had nothing new to add.

The following is a list of his works. 1. The tempest, a comedy. 2. The two gentlemen of Verona, C. 3. Henry IV. historical play, 2 parts. 4. Merry wives of Windsor, C. 5. Measure for measure, C. 6. The comedy of errors. 7. Much ado about nothing, C.

8. Love's

Shakespeare 8. Love's labour lost, C. 9. The midsummer night's dream, C. 10. The merchant of Venice, C. 11. As you like it, C. 12. The taming of the shrew, C. 13. All's well that ends well, C. Taken from the ninth novel of day iii. of Boccace's Decameron. 14. The twelfth night, or What you will. 15. The winter's tale, tragi-com. The plot from Robert Green's novel of Dorastus and Faunus. 16. King John, tragedy. 17. King Richard II. T. 18. King Henry V. historical play. 19. King Henry VI. historical play, in three parts. 20. King Richard III. T. 21. King Henry VIII. T. 22. Troilus and Cressida, T. From Chaucer. 23. Coriolanus, T. 24. Romeo and Juliet, T. 25. Timon of Athens, T. The story is in Lucian's dialogues, Plutarch's Life of Anthony, &c. 26. Julius Cæsar, T. 27. Macbeth, T. 28. Hamlet prince of Denmark, T. 29. King Lear, T. The story originally from Geoffrey of Monmouth, but immediately from an old ballad. Vide Johnson's Shakespeare, vol. vi. 30. Othello the Moor of Venice, T. The story from Cinthio's novels. 31. Anthony and Cleopatra, T. 32. Cymbeline, T. The plot partly from Boccace's Decameron, day ii. nov. 9. 33. Titus Andronicus, T. This tragedy, being supposed spurious, is rejected by the later editors of Shakespeare. It is however in Theobald's edition.—Eleven of these plays only were printed during Shakespeare's life, and those not corrected by himself, nor published under his inspection.

The several editions of Shakespeare's plays are, by Hemmings and Condell, Lond. 1623, 1632, 1663, 1685.—Nic. Rowe, 1714, 8vo, 9 vol.—Alex. Pope, 1721, 1725, 4to.—Mr Theobald, 1733, 8vo. 1740, 1757, 1762, 1773, 12mo.—Sir Tho. Hanmer, Oxf. 1744, 4to, 6 vol. 1745, 1749, 1771, 8vo.—Mr Warburton, Lond. 1747, 8vo, 8 vol.—Dr Johnson, 1765, 1768, 8vo. 8 vol.—G. Stevens, 20 plays, 1766, 4 vol. 8vo.—Mr Capel, 1768, 8vo. 10 vol.—Johnson and Stevens, 1773, 10 vol. 8vo.

Besides his dramatic works, Shakespeare is said to have written several poems, which are published in a single 8vo volume. His sonnets were published in 1609, 4to.

SHAKLES, in a ship, are the rings with which the ports are shut fast, by lashing the port-bar to them. There are also shakles put upon bilbow-bolts, for confining the men who have deserved corporal punishment.

SHALLOP, a sort of large boat with two masts, and usually rigged like a schooner. See **SCHOONER**.

SHAMBLES, among miners, a sort of niches or landing-places, left at such distances in the adits of the mines, that the shovel-men may conveniently throw up the ore from shamble to shamble, till it comes to the top of the mine.

SHAMMY, or **CHAMOIS-LEATHER**, a kind of leather, either dressed in oil or tanned; and much esteemed for its softness, pliancy, and being capable of bearing soap without hurt.—The true shammy is prepared of the skin of the chamois-goat, a species of **CAPRA**.

SHANK, in the manege, that part of a horse's fore-leg which lies between the knee and the fetlock.

SHANKER, or **CHANCER**, in medicine, a malignant ulcer, usually occasioned by some venereal disorder. See **MEDICINE**, n° 447.

SHANNON, a river of Ireland, and the largest in that island. It rises in the county of Leitrim, running from north to south, and divides the provinces of Leinster and Connaught; it then turns south-west, runs through the province of Munster, passes by the city of Limerick, and falls into the western ocean between the counties of Clare and Limerick.

SHARE of a **PLOUGH**, that part which cuts the ground; the extremity forwards being covered with a sharp-pointed iron, called the *point of the share*; and the end of the wood behind, the *tail of the share*.

SHARK, in ichthyology. See **SQUALUS**.

SHARP, in music. See **INTERVAL**.

SHARP (Dr John), archbishop of York, was descended from the Sharps of Little Norton, a family of Bradford Dale in Yorkshire; and was son of an eminent tradesman of Bradford, where he was born in 1644. He was educated at Cambridge, and in 1667 entered into orders. That same year he became domestic chaplain to Sir Heneage Finch, then attorney-general. In 1672, he was collated to the archdeaconry of Berkshire. In 1675, he was installed a prebendary in the cathedral church of Norwich; and the year following, was instituted into the rectory of St Bartholomew near the Royal Exchange, London. In 1681, he was, by the interest of his patron Sir Heneage Finch, then lord high chancellor of England, made dean of Norwich; but in 1686 was suspended, for taking occasion, in some of his sermons, to vindicate the doctrine of the church of England in opposition to Popery. In 1688, he was sworn chaplain to king James II. being then probably restored after his suspension; for it is certain that he was chaplain to king Charles II. and attended as a court-chaplain at the coronation of king James II. In 1689, he was declared dean of Canterbury; but never could be persuaded to fill up any of the vacancies made by the deprived bishops. Upon the death of Dr Lamplugh, he was promoted to the see of York. In 1702 he preached the sermon at the coronation of queen Anne; and the same year was sworn of the privy-council, and made lord almoner to her majesty. He died at Bath in 1713; and was interred in the cathedral of York, where a monument is erected to his memory.—His sermons, which were collected after his death and published in 7 vols 8vo, are justly admired.

SHASTER, or **SHASTRAM**, a sacred book, containing the religion of the Banians; it consists of three tracts; the first of which contains the moral law, the second the ceremonial, and the third delivers the peculiar observances for each tribe of Indians.—The shaster is looked upon by some as a commentary on the vedam, and by others as an original work, an extract of which has been lately published in England, and has thrown some light upon the subject. This book teaches, that the Eternal Being, absorbed in the contemplation of his own essence, formed the resolution of created beings who might partake of his glory. He spoke, and angels rose into existence; they sang in concert the praises of their Creator, and harmony reigned in the celestial regions; when two of these spirits having revolted, drew a legion after them. The Supreme Being drove them into a place of torment, from whence they were released at the intercession of the faithful angels, upon conditions which at once inspired them with joy and

Shannon
Shafter.

Shaw and terror. The rebels were sentenced, under different forms, to undergo punishments in the lowest of the 15 planets, in proportion to the enormity of their first offence; accordingly each angel underwent 87 transmigrations upon earth, before he animated the body of a cow, which holds the highest rank among the animal-tribes. These different transmigrations are considered as so many stages of expiation, preparatory to a state of probation, which commences as soon as the angel transmigrates from the body of the cow into a human body: in this situation the Creator enlarges his intellectual faculties, and constitutes him a free agent; and his good or bad conduct hastens or retards the time of his pardon. The good are at their death re-united to the Supreme Being, and the wicked begin anew the zera of their expiation.

SHAW (Dr Thomas), known to the learned world by his travels to Barbary and the Levant, was born at Kendal in Westmoreland, about the year 1692. He was appointed chaplain to the English consul at Algiers, in which station he continued for several years; and from thence took proper opportunities of travelling into different parts. He returned in 1733; was elected fellow of the royal society; and published the account of his travels at Oxford, folio, 1738. In 1740 he was nominated principal of St Edmund-hall, which he raised from a ruinous state by his munificence; and was regius professor of Greek at Oxford until his death, which happened in 1751. Dr Clayton, bishop of Clogher, having attacked these travels in his "Description of the East," Dr Shaw published a supplement by way of vindication, which is incorporated into the second edition of his travels, prepared by himself, and published in 4to, 1757.

SHEATHING, in the sea-language, is the casing that part of a ship which is to be under water with fir-board of an inch thick; first laying hair and tar, mixed together, under the boards, and then nailing them on, in order to prevent worms from eating the ship's bottom.—Ships of war are now generally sheathed with copper.

SHEATS, in a ship, are ropes bent to the clews of the sails; serving in the lower sails to haul aft the clews of the sail; but in top sails they serve to haul home the clew of the sail close to the yard-arm.

SHEEP, in zoology. See Ovis.

SHEEP *Nose-Worms*, in natural history, a species of fly-worm found in the noses of sheep, goats, and stags, and produced there from the egg of a large two-winged fly.

The frontal sinuses above the nose in sheep and other animals, are the places where these worms live, and attain their full growth. These sinuses are always full of a soft white matter, which furnishes these worms with a proper nourishment, and are sufficiently large for their habitation; and when they have here acquired their destined growth, and come to the condition in which they are fit to undergo their changes for the fly-state, they leave their old habitation, and falling to the earth, bury themselves there; and when these are hatched into flies, the female, when she has been impregnated by the male, knows that the nose of a sheep, or other animal, is the only place to deposit her eggs in order to their coming to good.

Mr Vallinieri, to whom the world owes so many dif-

coveries in the insect-class, is the first who has given any true account of the origin of these worms. Tho' their true history had been till that time unknown, the creatures themselves were very early discovered, and many ages since were esteemed great medicines in epilepsies.

It is very common to find only one worm in the head of the creature that has them, often two are found, and sometimes three, but very seldom any more than that.

Redi has given a very imperfect figure of this creature, nor is that of Mr Vallinieri much better. The worm has two brown hooks at the anterior part of its head, placed parallel, or nearly parallel, to one another. It is composed of 11 rings, which together form a conic figure, something flattened, of which the head of the worm is the point. When the worm is young, it is very white; but has two brown spots placed over-against each other, in the hinder part of its body, which are its two posterior stigmata. Each of these spots is parted into two by a concentric circle, which is sensible, as it is whitish, the rest of the spot being brown. It is plainly this very separation which gives passage to the air. When the creature pleases, it shows these; but it can also draw them into a sort of purse in its posterior ring. The anus is just below, and is usually hid by the folds of the skin. The hooks are brown and strong; just above these are two little fleshy horns, and between them is placed the mouth.

This worm, when at its full growth, is considerably large, and becomes brownish, or of a dirty white. Its belly, examined by the microscope, is seen furnished with a number of fine short prickles between the rings: the points of all these are turned backward, and one may even feel these prickles, in drawing the finger along the belly from the hinder part toward the head.

These worms are capable of moving themselves very swiftly; and it is doubtless owing to their motions in the head of the creature, and to the pain that the sensible membranes there must have from being wounded by the hooks and prickles of this animal, that sheep are often seen to grow outrageous, and strike their heads against trees and other hard bodies.

When these worms are taken out of the heads of sheep, if they are put upon the earth, they immediately bury themselves very deeply in it; and if not yet at their full growth, or in a proper state for their changes, they die there: but if it be near the time that they would naturally have quitted their ancient habitation, which may be known by their being changed from their fine white to a brownish colour, then they undergo all their proper changes under a shell made by the hardening of their own skin. This shell is of the same shape with the animal itself, but is of a deep brown.

It takes some time for the creature to undergo its several changes, and that more or less according to the season. Mr Vallinieri had one produced in the perfect fly-state, after 40 days from the time of its first change. Mr Reaumur found those which formed their shell on the 24th of April, not to produce the fly before the 27th of June.

The creature, when ready to appear in the fly-state, has no great difficulty in the getting out of its case; the swelling and inflating its head, and throwing out
its.

Sheep,
Sheering.

its bladder, which is the practice of these creatures on this occasion, easily detaches a piece of the shell, originally loose, and gives the fly a sufficient passage.

The fly produced from this worm has all the time of its life a very lazy disposition, and does not like to make any use either of its legs or wings. Its head and corcelet together are about as long as its body, which is composed of five rings, streaked on the back; a pale yellow and brown are there disposed in irregular spots: the belly is of the same colour; but they are there more regularly disposed, for the brown here makes three lines, one in the middle, and one on each side, and all the intermediate spaces are yellow. The wings are nearly of the same length with the body, and are a little inclined in their position, so as to lie upon the body; they do not, however, cover it, but a naked space is left between them. The ailerons, or petty wings, which are found under each of the wings, are of a whitish colour, and perfectly cover the balancers, so that they are not to be seen without lifting up these. The upper part of the corcelet is full of small black prominences, which, when examined by the microscope, appear as so many corns of gunpowder. Its head is large in proportion to the size of the body, and its reticular eyes are of a deep changeable green. These eyes take up less space in the head than those of most other flies: they leave a considerable space between them; and in that are placed the three smaller or glossy eyes, which are placed in form of a small triangle, and stand so near as to touch one another. The rest of the upper part of the head is yellowish, and, viewed by the microscope, appears cavernous like a sponge, or morel; and in the bottom of each of these small cavities is a little black prominence. There are other two hollows in the anterior part of the head, in which the antennæ are placed; these are of the battledoor form, but rather round than flat, and have each a large hair going from them. The under part of the head, which is rounder than the upper, is whitish, and very smooth; it has two sorts of bands directed downward, which are the elongations of the rims of the arches where the antennæ are lodged. The smoothness of the under part of the head makes one see very distinctly these three little tubercles; the upper one brown, the under ones of a pale deadish yellow. The mouth of the fly seems to be placed between these, immediately under the upper tubercle.

The fly will live two months after it is first produced from the shell, but will take no nourishment of any kind; and possibly it may be of the same nature with the butterflies, which never take any food during the whole time of their living in that state.

SHEEP-Stealing. See **THEFT**.

Composition for Marking SHEEP. For this purpose Dr Lewis recommends tallow mixed with a certain proportion of tar, and the mixture thickened by powder of charcoal. The proportions he tried were an eighth, a sixth, and a fourth part of tar. None of these could be discharged by any washing or rubbing with water, but all of them completely by soap; that which had the smallest proportion, easily enough; the others more difficultly.

SHEERING, in the sea-language. When a ship is not steered steadily, they say she sheers, or goes sheering; or when, at anchor, she goes in and out by means of the current of the tide, they also say she sheers.

SHEERNESS, a fort in Kent, seated on the point where the river Medway falls into the Thames. It was built by king Charles II. after the insult of the Dutch, who burnt the men of war at Chatham. The buildings belonging to it, in which the officers lodge, make a pretty little neat town; and there is also a yard and a dock, a chapel and a chaplain. Mr Lyons, who failed with the Hon. Captain Phipps in his voyage towards the pole, fixed the longitude of Sheerness to $0^{\circ} 31' E$. its latitude $51^{\circ} 31' 30'' N$.

SHEERS, in a ship, are two masts set across at the upper end of each other; a contrivance generally used for setting or taking out the masts of a ship, where there is no hulk to do that office.

SHEFFIELD, a town in the West Riding of Yorkshire, with a market on Tuesdays, and two fairs, on Tuesday after Trinity-Sunday and November 28, for cattle and horses. It is seated on the river Don, or Dune; and had a strong castle, which was demolished in the late civil wars. It is a large place, whose houses are built of stone, and has been long noted for edge-tools, knives, and swords; for Chaucer, in one of his tales, takes notice of a man with a Sheffield whittle by his side. It is now a place where there is the most considerable manufactures for hardware in England, next to Birmingham. W. Long. 1. 20. N. Lat. 53. 23.

SHEFFIELD (John) duke of Buckinghamshire, one of the finest writers of the last and present century, of great personal bravery, and an able minister of state, was born about 1646. He lost his father at nine years of age; and his mother marrying with lord Osfulton, the care of his education was left entirely to a governor, who did not greatly improve him in his studies. Finding that he was deficient in many parts of literature, he resolved to devote a certain number of hours every day to his studies; and thereby improved himself to the degree of learning he afterwards attained. Though possessed of a good estate, he did not abandon himself to pleasure and indolence, but offered to go a volunteer in the second Dutch war; and accordingly was in that famous naval engagement where the duke of York commanded as admiral: on which occasion his lordship behaved so gallantly, that he was appointed commander of the Royal Catherine. He afterward made a campaign in the French service, under M. de Turenne. As Tangier was in danger of being taken by the Moors, he offered to lead the forces which were sent to defend it; and accordingly was appointed commander of them. He was then earl of Mulgrave, and one of the lords of the bed-chamber to king Charles II. The Moors retired on the approach of his majesty's forces; and the result of the expedition was the blowing up of Tangier. He continued in several great posts during the short reign of king James II. till that unfortunate prince was de-throned. Lord Mulgrave, though he paid his respects to king William before he was advanced to the throne, yet he did not accept of any post in the government till some years after. In the sixth year of William and Mary, he was created marquis of Normanby in the county of Lincoln. He was one of the most active and zealous opposers of the bill which took away Sir John Fenwick's life; and exerted the utmost vigour in carrying through those two admirable bills, the Treason Bill, and that for Triennial Parliaments. He

Sheerness
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Sheffield.

Sheffield,
Sheik.

He enjoyed some considerable posts under king William, and was generally pretty well in his favour and confidence. In 1702, he was sworn lord privy-seal; and in the same year was appointed one of the commissioners to treat of an union between England and Scotland. In 1703, he was created duke of Normandy, and soon after duke of Buckinghamshire. In 1711, he was made steward of her majesty's household, and president of the council. During queen Anne's reign he was but once out of employment; and then he resigned it himself, being attached to what were called the *Tory principles*. Her majesty offered to make him lord chancellor; which post he refused. He was instrumental in the change of the ministry in 1710. A circumstance that reflects the highest honour on him is, the vigour with which he acted in favour of the unhappy Catalans, who afterward were so inhumanly sacrificed. He was survived by only one legitimate son, (who died at Rome in 1735); but left several natural children. His worst enemies allowed him to have lived always very kindly with his last wife, natural daughter to king James II. the late duchess of Buckingham, a lady who always behaved with a dignity suitable to her high birth and quality. He died in 1721, aged 75 years; and his works speak him one of the most beautiful prose-writers and greatest poets of this age, which is also proved by the testimonies of the finest writers his contemporaries. His writings were splendidly printed in 1723, in two volumes 4to; and have since been reprinted in 1729, in two vols 8vo. The first contains his poems on various subjects: the second, his prose works; which consist of historical memoirs, speeches in parliament, characters, dialogues, critical observations, essays, and letters. It may be proper to observe, that the edition of 1729 is castrated; some particulars relating to the revolution in that of 1723 having given offence.

SHEIK, in the oriental customs, the person who has the care of the mosques in Egypt; his duty is the same as that of the imams at Constantinople. There are more or fewer of these to every mosque, according to its size or revenue. One of these is head over the rest, and answers to a parish-priest with us; and has under him, in large mosques, the readers, and people who cry out to go to prayers; but in small mosques the sheik is obliged to do all this himself. In such it is their business to open the mosque, to cry to prayers, and to begin their short devotions at the head of the congregation, who stand rank and file in great order, and make all their motions together. Every Friday the sheik makes an harangue to his congregation.

SHEIK-BELLET, the name of an officer in the Oriental nations. In Egypt the sheik-bellet is the head of a city, and is appointed by the pacha. The business of this officer is to take care that no innovations be made which may be prejudicial to the Porte, and that they send no orders which may hurt the liberties of the people. But all his authority depends on his credit and interest, not his office: for the government of Egypt is of such a kind, that often the people of the least power by their posts have the greatest influence; and a caia of the janizaries or Arabs, and sometimes one of their meanest officers, an oda-basha, finds means, by his parts and abilities, to govern all things.

Vol. X.

I

Shelds
Shell.

SHEILDS, or SHEALS, South and North, two seaport towns, one in the county of Durham, and the other in Northumberland; neither has market nor fair, but both are remarkable for being the mart where ships take in their loading of coals, and where they make large quantities of salt. They are seated on each side of the mouth of the river Tyne, 10 miles east of Newcastle, and 188 north by west of London. W. Long. 1. 0. N. Lat. 55. 0.

SHEKEL, in Jewish antiquity, an ancient coin worth 2 s. $3\frac{1}{2}$ d. Sterling.

SHELF, among miners, the same with what they otherwise call *fast ground* or *fast country*; being that part of the internal structure of the earth which they find lying even and in an orderly manner, and evidently having retained its primitive form and situation.

SHELL, in natural history, a hard, and, as it were, stony covering, with which certain animals are defended, and thence called *shell-fish*.

The singular regularity, beauty, and delicacy, in the structure of the shells of animals, and the variety and brilliancy in the colouring of many of them, at the same time that they strike the attention of the most incurious observers, have at all times excited philosophers to inquire into and detect, if possible, the causes and manner of their formation. But the attempts of naturalists, ancient and modern, to discover this process, have constantly proved unsuccessful. M. de Reaumur hitherto appears alone to have given a plausible account, at least, of the formation of the shell of the garden-snail in particular, founded on a course of very ingenious experiments, related in the Paris Memoirs*. He there endeavours to show, that this substance is produced merely by the perspirable matter of the animal, condensing and afterwards hardening on its surface, and accordingly taking the figure of its body, which has performed the office of a mould to it; in short, that the shell of a snail, and, as he supposed, of all other animals possessed of shells, was only the product of a viscous transudation from the body of the animal, containing earthy particles united by mere juxtaposition. This hypothesis, however, is liable to very great and insurmountable difficulties, if we apply it to the formation of some of the most common shells: for how, according to this system, it may be asked, can the oyster, for instance, considered simply as a mould, form to itself a covering so much exceeding its own body in dimensions?

M. Herissant, in the memoirs of the academy of sciences for 1766, has discovered the structure of shells to be organical. In the numerous experiments that he made on an immense number, and a very great variety, of animal-shells, he constantly found that they were composed of two distinct substances; one of which is a cretaceous or earthy matter; and the other appeared, from many experiments made upon it, by burning, distillation, and otherwise, to be evidently of an animal-nature. These two substances he dextrously separated from each other by a very easy chemical analysis; by the gentle operation of which they were exhibited distinctly to view, without any material alteration from the action of the solvent, or instrument, employed for that purpose. On an entire shell, or a fragment of one, contained in a glass vessel, he

* See *Memoirs*
de l'Acad.
des sciences,
1766, p. 475.
Eliu. de
Hollande, in
12mo.

400

poured

Shells. poured a sufficient quantity of the nitrous acid, considerably diluted either with water or spirit of wine. After the liquor has dissolved all the earthy part of the shell, (which may be collected, after precipitation by a fixed or volatile alkali), there remains floating in it a soft substance, consisting of innumerable membranes of a retiform appearance, and disposed, in different shells, in a variety of positions, which constitutes the animal-part of it. This, as it has not been affected by the solvent, retains the exact figure of the shell; and, on being viewed through a microscope, exhibits satisfactory proofs of a vascular and organical structure. He shows that this membranous substance is an appendix to the body of the animal, or a continuation of the tendinous fibres that compose the ligaments by which it is fixed to its shell; and that this last owes its hardness to the earthy particles conveyed through the vessels of the animal, which fix themselves into, and incrust, as it were, the meshes formed by the reticular filaments of which this membranous substance is composed. In the shell called *porcelaine*, in particular, the delicacy of these membranes was so great, that he was obliged to put it into spirit of wine, to which he had the patience to add a single drop of spirit of nitre day by day, for the space of two months; left the air generated, or let loose by the action of the acid on the earthy substance, should tear the compages of its fine membranous structure into shatters; as it certainly would have done, in a more hasty and less gentle dissolution. The delicate reticulated film, left after this operation, had all the tenuity of a spider's web; and accordingly he does not attempt to delineate its organisation. In other shells, he employed even five or six months in demonstrating the complicated membranous structure of this animal-substance by this kind of chemical anatomy. In general, however, the process does not require much time.

Of the many singular configurations and appearances of the membranous part of different shells, which are described in this memoir, and are delineated in several well executed plates, we shall mention only, as a specimen, the curious membranous structure observed in the laminæ of mother-of-pearl, and other shells of the same kind, after having been exposed to the operation of the author's solvent. Beside the great variety of fixed or permanent colours with which he found the animal-filaments of these shells to be adorned, it is known that the shell itself presents to the view a succession of rich and changeable colours, the production of which he easily explains from the configurations of their membranes. Nature, he observes, always magnificent in her designs, but singularly frugal in the execution of them, produces these brilliant decorations at a very small expence. The membranous substance above-mentioned is plaited and rumpled, as it were, in such a manner, that its exterior laminæ, incruited with their earthy and semi-transparent matter, form an infinite number of little prisms, placed in all kinds of directions, which refract the rays of light, and produce all the changes of colour observable in these shells.

Fossil Shells. Those found buried at great depths in the earth.

Of these some are found remaining almost entirely in their native state, but others are variously altered by

being impregnated with particles of stone and of other fossils; in the place of others there is found mere stone or spar, or some other native mineral-body, expressing all their lineaments in the greatest nicety, as having been formed wholly from them, the shell having been first deposited in some solid matrix, and thence dissolved by very slow degrees, and this matter left in its place, on the cavities of stone and other solid substances, out of which shells had been dissolved and washed away, being afterwards filled up less slowly with these different substances, whether spar or whatever else: these substances, so filling the cavities, can necessarily be of no other form than that of the shell, to the absence of which the cavity was owing, though all the nicer lineaments may not be so exactly expressed. Besides these, we have also in many places masses of stone formed within various shells; and these having been received into the cavities of the shells while they were perfectly fluid, and having therefore nicely filled all their cavities, must retain the perfect figures of the internal part of the shell, when the shell itself should be worn away or perished from their outside. The various species we find of these are, in many genera, as numerous as the known recent ones; and as we have in our own island not only the shells of our own shores, but those of many other very distant ones, so we have also many species, and those in great numbers, which are in their recent state, the inhabitants of other yet unknown or unsearched seas and shores. The cockles, muscles, oysters, and the other common bivalves of our own seas, are very abundant: but we have also an amazing number of the nautilus kind, particularly of the nautilus græcorum, which though a shell not found living in our own or any neighbouring seas, yet is found buried in all our clay-pits about London and elsewhere; and the most frequent of all fossil shells, in some of our counties, are the conchæ anomæ, which yet we know not of in any part of the world in their recent state. Of this sort also are the cornua ammonis and the gryphitæ, with several of the echinitæ and others.

The exact similitude of the known shells, recent and fossil, in their several kinds, will by no means suffer us to believe, that these, though not yet known to us in their living state, are, as some have idly thought, a sort of *lusus nature*. It is certain, that of the many known shores, very few, not even those of our own island, have been yet carefully searched for the shell-fish that inhabit them; and as we see in the nautilus græcorum an instance of shells being brought from very distant parts of the world to be buried here, we cannot wonder that yet unknown shores, or the unknown bottoms of deep seas, should have furnished us with many unknown shell-fish, which may have been brought with the rest; whether that were at the time of the general deluge, or the effect of any other catastrophe of a like kind, or by whatever other means, to be left in the yet unhardened matter of our stony and clayey strata.

Shells, in gunnery, are hollow iron balls to throw out of mortars or howitzers, with a fuse-hole of about an inch diameter, to load them with powder, and to receive the fuse. The bottom, or part opposite to the fuse, is made thicker than the rest, that the fuse may fall uppermost. But in small elevations this does not always happen, nor indeed is it necessary; for, let the shell

Shell
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Shenstone.

Sheppy,
Sheriff.

shell fall as it will, the fuse sets fire to the powder within, which bursts the shell, and causes great devastation. The shells had much better be of an equal thickness; for then they burst into more pieces.

Message-SHELLS, are nothing more than howitz-shells, in the inside of which a letter or other papers are put: the fuse-hole is stopped up with wood or cork, and the shells are fired out of a royal or howitz, either into a garrison or camp. It is supposed, that the person to whom the letter is sent knows the time, and accordingly appoints a guard to look out for its arrival.

SHELL-FISH. These animals are in general oviparous, very few instances having been found of such as are viviparous. Among the oviparous kinds, anatomists have found that some species are of different sexes in the different individuals of the same species; but others are hermaphrodites, every one being in itself both male and female. In both cases their increase is very numerous, and scarce inferior to that of plants, or of the most fruitful of the insect-class. The eggs are very small, and are hung together in a sort of clusters by means of a glutinous humour, which is always placed about them, and is of the nature of the jelly of frog's spawn. By means of this, they are not only kept together in the parcel, but the whole cluster is fastened to the rocks, shells, or other solid substances; and thus they are preserved from being driven on shore by the waves and left where they cannot succeed.

SHELL-GOLD. See *SHELL GOLD*.

SHELTIE, a small, but strong kind of horse, so called from Shetland, or Zetland, where they are produced.

SHENAN. See *Dying of LEATHER*, (p. 4161. foot-note.)

SHENSTONE (William), an admired English poet, was the eldest son of a plain country gentleman who farmed his own estate in Shropshire. The father, sensible of his son's capacity, placed him in Pembroke college, Oxford; but he could never persuade him to enter into orders. In his private opinions, our author adhered to no particular sect, and hated all religious disputes. Tenderness, in every sense of the word, was his peculiar characteristic; and his friends, domestics, and poor neighbours, daily experienced the effects of his benevolence. This virtue he carried to an excess that seemed to border upon weakness; yet if any of his friends treated him ungenerously, he was not easily reconciled. On such occasions, however, he used to say, "I never will be a revengeful enemy; but I cannot, it is not in my nature, be half a friend." He was no economist; for the generosity of his temper prevented his paying a proper regard to the use of money: he exceeded therefore the bounds of his paternal fortune. But, if we consider the perfect paradise into which he had converted his estate, the hospitality with which he lived, his charities to the indigent, and all out of an estate that did not exceed 300 l. a-year, one should rather wonder that he left any thing behind him, than blame his want of economy: he yet left more than sufficient to pay all his debts; and, by his will, appropriated his whole estate for that purpose. Though he had a high opinion of many among the fair sex, he forbore to marry. A passion he entertained

in his youth was with difficulty surmounted. The lady was the subject of that admirable pastoral, in four parts, which has been so universally and so justly admired, and which, one would have thought, must have softened the proudest and most obdurate heart. His works have been published by Mr Doddsley, in 3 vols 8vo. The first volume contains his poetical works, which are particularly distinguished by an amiable elegance and beautiful simplicity; the second volume contains his prose works; the third his letters, &c.

SHEPPEY, an island at the mouth of the river Medway, about 20 miles in circumference. It is separated from the main land by a narrow channel; and has a fertile soil, which feeds great flocks of sheep. The borough-town of Queenborough is seated thereon; besides which it has several villages.

SHERIFF, an officer, in each county in England, nominated by the king, invested with a judicial and ministerial power, and who takes place of every nobleman in the county during the time of his office.

The sheriff is an officer of very great antiquity in this kingdom, his name being derived from two Saxon words, signifying the *reeve*, *bailiff*, or *officer* of the shire. He is called in Latin *vice-comes*, as being the deputy of the earl or *comes*, to whom the custody of the shire is said to have been committed at the first division of this kingdom into counties. But the earls, in process of time, by reason of their high employments and attendance on the king's person, not being able to transact the business of the county, were delivered of that burden; reserving to themselves the honour, but the labour was laid on the sheriff. So that now the sheriff does all the king's business in the county; and tho' he be still called *vice-comes*, yet he is entirely independent of, and not subject to, the earl; the king, by his letters-patent, committing *custodiam comitatus* to the sheriff, and him alone.

Sheriffs were formerly chosen by the inhabitants of the several counties. In confirmation of which it was ordained by statute 28 Edw. I. c. 8. that the people should have election of sheriffs in every shire where the shrievalty is not of inheritance. For anciently in some counties the sheriffs were hereditary; as we apprehend they were in Scotland till the statute 20 Geo. II. c. 23; and still continue in the county of Westmorland to this day: the city of London having also the inheritance of the shrievalty of Middlesex vested in their body by charter. The reason of these popular elections is assigned in the same statute, c. 23. "that the commons might choose such as would not be a burden to them." and herein appears plainly a strong trace of the democratical part of our constitution; in which form of government it is an indispensable requisite, that the people should choose their own magistrates. This election was in all probability not absolutely vested in the commons, but required the royal approbation. For in the Gothic constitution, the judges of their county-courts (which office is executed by the sheriff) were elected by the people, but confirmed by the king; and the form of their election was thus managed; the people, or *incole territorii*, chose twelve electors, and they nominated three persons, *ex quibus rex unum confirmabat*. But, with us in England, these popular elections, growing tumultuous, were put an end to by the

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statute 9 Edw. II. ft. 2. which enacted, that the sheriffs should from thenceforth be assigned by the chancellor, treasurer, and the judges; as being persons in whom the same trust might with confidence be reposed. By statutes 14 Edw. III. c. 7. 23 Hen. VI. c. 8. and 21 Hen. VIII. c. 20. the chancellor, treasurer, president of the king's council, chief justices, and chief baron, are to make this election; and that on the morrow of All Souls, in the exchequer. And the king's letters-patent, appointing the new sheriffs, used commonly to bear date the sixth day of November. The statute of Cambridge, 12 Ric. II. c. 2. ordains, that the chancellor, treasurer, keeper of the privy seal, steward of the king's house, the king's chamberlain, clerk of the rolls, the justices of the one bench and the other, barons of the exchequer, and all other that shall be called to ordain, name, or make justices of the peace, sheriffs, and other officers of the king, shall be sworn to act indifferently, and to name no man that sueth to be put in office, but such only as they shall judge to be the best and most sufficient. And the custom now is, (and has been at least ever since the time of Fortescue, who was chief justice and chancellor to Henry the sixth), that all the judges, together with the other great officers, meet in the exchequer chamber on the morrow of All Souls yearly, (which day is now altered to the morrow of St Martin by the last act for abbreviating Michaelmas term), and then and there propose three persons to the king, who afterwards appoints one of them to be sheriff. This custom, of the twelve judges proposing three persons, seems borrowed from the Gothic constitution before-mentioned; with this difference, that among the Goths the 12 nominors were first elected by the people themselves. And this usage of ours, at its first introduction, there is reason to believe, was founded upon some statute, tho' not now to be found among our printed laws: first, because it is materially different from the direction of all the statutes beforementioned; which it is hard to conceive that the judges would have countenanced by their concurrence, or that Fortescue would have inserted in his book, unless by the authority of some statute: and also, because a statute is expressly referred to in the record, which Sir Edward Coke tells us he transcribed from the council-book of 3d March, 34 Hen. VI. and which is in substance as follows. The king had of his own authority appointed a man sheriff of Lincolnshire, which office he refused to take upon him: whereupon the opinions of the judges were taken, what should be done in this behalf. And the two chief justices, Sir John Fortescue and Sir John Priot, delivered the unanimous opinion of them all; "that the king did an error when he made a person sheriff, that was not chosen and presented to him according to the statute; that the person refusing was liable to no fine for disobedience, as if he had been one of the three persons chosen according to the tenor of the statute; that they would advise the king to have recourse to the three persons that were chosen according to the statute, or that some other thrifty man be intreated to occupy the office for this year; and that, the next year, to eschew such inconveniences, the order of the statute in this behalf made be observed." But, notwithstanding this unanimous resolution of all the judges of England, thus entered in the council-book, and the

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statute 34 & 35 Hen. VIII. c. 26. § 61. which expressly recognizes this to be the law of the land, some of our writers have affirmed, that the king, by his prerogative, may name whom he pleases to be sheriff, whether chosen by the judges or no. This is grounded on a very particular case in the fifth year of queen Elizabeth, when, by reason of the plague, there was no Michaelmas term kept at Westminster; so that the judges could not meet there in *crasino animarum* to nominate the sheriffs: whereupon the queen named them herself, without such previous assembly, appointing for the most part one of two remaining in the last year's list. And this case, thus circumstanced, is the only authority in our books for the making these extraordinary sheriffs. It is true, the reporter adds, that it was held that the queen by her prerogative might make a sheriff without the election of the judges, *non obstante aliquo statuto in contrarium*: but the doctrine of *non obstante*'s, which sets the prerogative above the laws, was effectually demolished by the bill of rights at the revolution, and abdicated Westminster-hall when king James abdicated the kingdom. However, it must be acknowledged, that the practice of occasionally naming what are called *packet-sheriffs*, by the sole authority of the crown, hath uniformly continued to the reign of his present majesty; in which, it is believed, (if any) instances have occurred.

Sheriffs, by virtue of several old statutes, are to continue in their office no longer than one year; and yet it hath been said that a sheriff may be appointed *durante bene placito*, or during the king's pleasure; and so is the form of the royal writ. Therefore, till a new sheriff be named, his office cannot be determined, unless by his own death, or the demise of the king; in which last case it was usual for the successor to send a new writ to the old sheriff: but now, by statute 1 Ann. ft. 1. c. 8. all officers appointed by the preceding king may hold their offices for six months after the king's demise, unless sooner displaced by the successor. We may farther observe, that by statute 1 Ric. II. c. 11. no man that has served the office of sheriff for one year, can be compelled to serve the same again within three years after.

We shall find it is of the utmost importance to have the sheriff appointed according to law, when we consider his power and duty. These are either as a judge, as the keeper of the king's peace, as a ministerial officer of the superior courts of justice, or as the king's bailiff.

In his judicial capacity he is to hear and determine all causes of 40 shillings value and under, in his county-court; and he has also a judicial power in divers other civil cases. He is likewise to decide the elections of knights of the shire, (subject to the control of the House of Commons), of coroners, and of verderors; to judge of the qualification of voters, and to return such as he shall determine to be duly elected.

As the keepers of the king's peace, both by common law and special commission, he is the first man in the county, and superior in rank to any nobleman therein, during his office. He may apprehend, and commit to prison, all persons who break the peace, or attempt to break it; and may bind any one in a recognizance to keep the king's peace. He may, and

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Sheriff. is bound *ex officio*, to pursue and take all traitors, murderers, felons, and other misdoers, and commit them to gaol for safe custody. He is also to defend his county against any of the king's enemies when they come into the land: and for this purpose, as well as for keeping the peace and pursuing felons, he may command all the people of his county to attend him; which is called the *posse comitatus*, or power of the county: which summons, every person above 15 years old, and under the degree of a peer, is bound to attend upon warning, under pain of fine and imprisonment. But though the sheriff is thus the principal conservator of the peace in his county, yet, by the express directions of the great charter, he, together with the constable, coroner, and certain other officers of the king, are forbidden to hold any pleas of the crown, or, in other words, to try any criminal offence. For it would be highly unbecoming, that the executioners of justice should be also the judges; should impose, as well as levy, fines and amercements; should one day condemn a man to death, and personally execute him the next. Neither may he act as an ordinary justice of the peace during the time of his office: for this would be equally inconsistent, he being in many respects the servant of the justices.

In his ministerial capacity, the sheriff is bound to execute all process issuing from the king's courts of justice. In the commencement of civil causes, he is to serve the writ, to arrest, and to take bail; when the cause comes to trial, he must summon and return the jury; when it is determined, he must see the judgment of the court carried into execution. In criminal matters, he also arrests and imprisons, he returns the jury, he has the custody of the delinquent, and he executes the sentence of the court, though it extend to death itself.

As the king's bailiff, it is his business to preserve the rights of the king within his bailiwick; for so his county is frequently called in the writs: a word introduced by the princes of the Norman line; in imitation of the French, whose territory is divided into bailiwicks, as that of England into counties. He must seize to the king's use all lands devolved to the crown by attainder or escheat; must levy all fines and forfeitures, must seize and keep all waifs, wrecks, estrays, and the like, unless they be granted to some subject; and must also collect the king's rents within his bailiwick, if commanded by process from the exchequer.

To execute these various offices, the sheriff has under him many inferior officers; an under-sheriff, bailiffs, and gaolers, who must neither buy, sell, nor farm their offices, on forfeiture of 500 l.

The under-sheriff usually performs all the duties of the office; a very few only excepted, where the personal presence of the high-sheriff is necessary. But no under-sheriff shall abide in his office above one year; and if he does, by statute 23 Hen. VI. c. 8. he forfeits 200 l. a very large penalty in those early days. And no under-sheriff or sheriff's officer shall practise as an attorney during the time he contigues in such office: for this would be a great inlet to partiality and oppression. But these salutary regulations are shamefully evaded, by practising in the names of other attorneys, and putting in sham deputies by way of nominal under-sheriffs: by reason of which, says Dalton, the under-sheriffs and bailiffs do grow so cunning

in their several places, that they are able to deceive, and it may well be feared that many of them do deceive, both the king, the high-sheriff, and the county.

SHERIFF, in Scotland. See LAW, N^o clviii. 1, 2, 3.
SHERLOCK (William), a learned English divine in the 17th century, was born in 1641, and educated at Eaton school, where he distinguished himself by the vigour of his genius and his application to study. Thence he was removed to Cambridge, where he took his degrees. In 1669, he became rector of the parish of St George, Botolph-lane, in London; and in 1681 was collated to the prebend of Pancras, in the cathedral of St Paul's. He was likewise chosen master of the Temple, and had the rectory of Thersfield in Hertfordshire. After the revolution he was suspended from his preferment, for refusing the oaths to king William and queen Mary; but at last he took them, and publicly justified what he had done. In 1691, he was installed dean of St Paul's. His Vindication of the Doctrine of the Trinity, engaged him in a warm controversy with Dr South and others. Bishop Burnet tells us, he was "a clear, a polite, and a strong writer; but apt to assume too much to himself, and to treat his adversaries with contempt." He died in 1707. His works are very numerous; among these are, 1. A Discourse concerning the Knowledge of Jesus Christ, against Dr Owen. 2. Several pieces against the Papists, the Socinians, and Dissenters. 3. A practical Treatise on Death, which is much admired. 4. A practical Discourse on Providence. 5. A practical Discourse on the future Judgment; and many other works.

SHERLOCK (Dr Thomas), bishop of London, was the son of the preceding Dr William Sherlock, and was born in 1678. He was educated in Catharine-hall, Cambridge, where he took his degrees, and of which he became master: he was made master of the Temple very young, on the resignation of his father; and it is remarkable, that this mastership was held by father and son successively for more than 70 years. He was at the head of the opposition against Dr Hoadley bishop of Bangor; during which contest he published a great number of pieces. He attacked the famous Collins's "Grounds and reasons of the Christian religion," in a course of six sermons preached at the Temple-church, which he intitled "The use and intent of Prophecy in the several ages of the world." In 1728, Dr Sherlock was promoted to the bishopric of Bangor; and was translated to Salisbury in 1734. In 1747, he refused the archbishopric of Canterbury, on account of his ill state of health; but recovering in a good degree, accepted the see of London the following year. On occasion of the earthquakes in 1750, he published an excellent Pastoral Letter to the clergy and inhabitants of London and Westminster: of which it is said there were printed in 4to, 5000; in 8vo, 20,000; and in 12mo, about 30,000; beside pirated editions, of which not less than 50,000 were supposed to have been sold. Under the weak state of body in which he lay for several years, he revised and published 4 volumes of Sermons in 8vo, which are particularly admired for their ingenuity and elegance. He died in 1762, and by report worth 150,000 l. "His learning," says Dr Nicholls, "was very extensive: God had given him a great and an understanding mind, a quick comprehension, and a solid judgment. These advan-

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advantages of nature he improved by much industry and application. His skill in the civil and canon law was very considerable; to which he had added such a knowledge of the common law of England, as few clergymen attain to. This it was that gave him that influence in all causes where the church was concerned; as knowing precisely what it had to claim from its constitutions and canons, and what from the common law of the land." Dr Nicholls then mentions his constant and exemplary piety, his warm and fervent zeal in preaching the duties and maintaining the doctrines of Christianity, and his large and diffusive munificence and charity; particularly by his having given large sums of money to the corporation of clergymen's sons, to several of the hospitals, and to the society for propagating the gospel in foreign parts: also his bequeathing to Catharine-hall in Cambridge, the place of his education, his valuable library of books, and his donations for the founding a librarian's place and a scholarship, to the amount of several thousand pounds.

SHETLAND, the name of certain islands belonging to Scotland, and lying to the northward of Orkney. There are many convincing proofs that these islands were very early inhabited by the Picts, or rather by those nations who were the original possessors of the Orkneys; and at the time of the total destruction of these nations, if any credit be due to tradition, their woods were entirely ruined (A). It is highly probable that the people in Shetland as well as in the Orkneys, flourished under their own princes dependent upon the crown of Norway; yet this seems to have been rather through what they acquired by fishing and commerce, than by the cultivation of their lands. It may also be reasonably presumed, that they grew thinner of inhabitants after they were annexed to the crown of Scotland; and it is likely that they revived again, chiefly by the very great and extensive improvements which the Dutch made in the herring-fishery upon their coasts, and the trade that the crews of their buxles, then very numerous, carried on with the inhabitants, necessarily resulting from their want of provisions and other conveniences, which in those days could not be very considerable.

There are many reasons which may be assigned why these islands, though part of our dominions, have not hitherto been better known to us. They were commonly placed two degrees too far to the north in all the old maps, in order to make them agree with Ptolemy's description of Thule, which he asserted to be in the latitude of 63 degrees; which we find urged by Camden as a reason why Thule must be one of the Shetland isles, to which Speed also agrees, though from their being thus wrong placed he could not find room for them in his maps. Another, and that no light cause, was the many false, fabulous, and impertinent relations published concerning them (B), as if they were countries inhospitable and uninhabitable; and lastly, the indolence, or rather indifference, of the natives, who,

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contenting themselves with those necessities and conveniences procured by their intercourse with other nations, and conceiving themselves neglected by the mother country, have seldom troubled her with their applications.

There are few countries that have gone by more names than these islands; they were called *islandic*, *Hialtlandia*, from *hialt*, the "hilt of a sword;" this might be possibly corrupted into *Hetland*, *Hiltland*, or *Hethland*, though some tell us this signifies a "high land." They have been likewise, and are still in some maps, called *Zetland* and *Zealand*, in reference, as has been supposed, to their situation. By the Danes, and by the natives, they are styled *Yealtaland*; and notwithstanding the oddness of the orthography, this differs very little, if at all, from their manner of pronouncing Zetland, out of which pronunciation grew the modern names of *Shetland* and *Shotland*.

The islands of *Shetland*, as we commonly call them, are well situated for trade. The nearest continent to them is Norway; the port of Bergen lying 44 leagues east, whereas they lie 46 leagues north north-east from Buchanells; east north-east from Sanda, one of the Orkneys, about 16 or 18 leagues; six or seven leagues north-east from Fair Isle; 58 leagues east from the Ferroe isles; and at nearly the same distance north-east from Lewis. The southern promontory of the main land, called *Swinburgh Head*, lies in 50 degrees and 59 minutes of north latitude; and the northern extremity of Uist, the most remote of them all, in the latitude of 61 degrees 15 minutes. The meridian of London passes through this last island, which lies in the longitude of 2 degrees 30 minutes west from Paris, and about 5 degrees 15 minutes east from the meridian of Cape Lizard. According to the old accounts, from which there seems no just reason to vary, there are in all 46 inhabited islands of different sizes, 40 holms, and 30 skerries. It is impossible to speak with precision; but, according to the best computation we have been able to form, the Shetland isles contain near three times as much land as the Orkneys: they are considered also, in this light, equal in size to the island of Madeira; and not inferior to the provinces of Utrecht, Zealand, and all the rest of the Dutch islands taken together.

The principal of the Shetland islands is styled *Main Land*; which extends in length from north to south about 60 miles, and is in some places above 20 broad, in others not more than 2. It is however every where so intersected by arms of the sea, that there is not a single spot therein that is full three English miles from salt-water. The whole coast, a very few places excepted, is a high, rough, inaccessible rock; and within land, the country is mountainous, mossy, and full of morasses. Here and there, however, but more especially towards the coast, there are little parcels of land that are both smooth and fertile. Among the numerous inlets of the sea that pierce both sides of the island, some of which enter several miles, and in the language of the country are styled *vovers*, there are a great many ports, not fewer than

(A) The tradition is, that this was done by the Scots when they destroyed the Picts; but is more probably referred to the Norwegians rooting out the original possessors of Shetland.

(B) They represented the climate as intensely cold; the soil as composed of crags and quagmire, so barren as to be incapable of bearing corn; to supply which, the people, after drying fish-bones, powdered them, then kneaded and baked them for bread. The larger fish-bones were said to be all the fuel they had. Yet, in so dreary a country, and in such miserable circumstances, they were acknowledged to be very long-lived, cheerful, and contented.

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On the west side of the main land there are not fewer than 20 islands of very different sizes, besides holms and skerries: neither are either of these unprofitable, as the former afford vast quantities of fine grass for the feeding of cattle; on the coasts of the latter are caught abundance of fine fish of different sorts; and on both there are immense quantities of fowl. To the south of Scalloway lies the little island of St Ninian, corruptly called *St Ringing's*, in which, though but a mile long and half a mile broad, there is a large well-built church, which shews that it was once fully inhabited. Opposite to the town of Scalloway lie several islands, which, as we have before observed, break the rapidity of the flood, and form safe entrances into the harbour. The biggest of these isles is Trondra; three miles long and two broad. Burra consists of two islands, one called *Houfe*, the other *Kirk Island*; in neither which, it is said, mice can live. To the north of these lies Papa Stour, or the Great Papa; which, though but two miles long and one broad, is esteemed the pleasantest, and, for its size, the best furnished with the necessaries of life of any of these isles. There are

besides this, Pappas, and the little Papa; and to the north of these, Rou Stour, or the Great Rou, eight miles long and two broad, with a good port.

There are also many islands on the east side of the main land; some of which it may not be improper to mention. To the south of Lerwick lies Mousa or the Queen's island, one mile in length, and about a quarter of a mile broad, and is remarkable for having upon it the most complete and entire of those little fortifications called by the natives *brugh*s, but by the Scots commonly *Pià's Houses*, that are still remaining in any of these islands (d). Over-against Lerwick lies Bressay or Brassa isle, five miles from south to north, and two from west to east. This isle for its size is very mountainous, and amongst many hills there are two in it very conspicuous. One of these is on the east side, called *Andrew's Hill*; the other, which is the highest, at the south end, called the *Wart* or *Beacon Hill*. It is in a manner over-run with heath, though there are some considerable parcels of good pasturage and arable lands near the shore. There are also eight fresh-water lochs, abounding with fine trout and eels. It must have been very populous in former times, since there are the ruins of five small forts, and there are still two churches and a chapel. It has likewise a good port called *Aiths Voe*. At a small distance to the east lies another isle, called the *Noss*, two miles long and three quarters of a mile broad: it has a church upon it, is equally fertile and pleasant; and has a large holm belonging to it, in which there are abundance of sea-fowls. Whalley, that is, the isle of whales, which lies to the north of Bressay, and to the east of the main land, is about nine miles in circumference. At six leagues distance from this isle lie the Skerries, on which, in 1664, the Carmalan of Amsterdam, a very rich East India ship, was lost. To the north of Whalley there are many small islands, most of which are inhabited; and though but insignificant at present, yet, if any change of fortune should happen to the Shetland isles, they would probably partake of it, and by being turned to useful purposes, and, in consequence of that, retaining all the posterity of their present inhabitants, come to be thought of more consequence.

But besides these, there are two large and considerable islands belonging to Shetland, with several small ones in their vicinity. The first of these is Yell, which anciently was written *Zeal*, making however, as we have before remarked, no great alteration in the pronunciation. This island, in the opinion of the learned Mr Maule, from its nearness to Norway, seems to have been the first inhabited, and to have given name to all the rest. His opinion has certainly a great degree of probability; for the natives call themselves, and are called

(c) When James Hepburn duke of Orkney fled hither, he was pursued by William Kirkcaldie of Grange, in a ship called the *Unicorn*, which striking thereon, left its name to this rock. This gave the duke an opportunity of escaping, who, after lying many years in prison in Denmark, perished at last miserably in that confinement.

(d) We have an exact description of this *brugh* in Latin, by the learned Mr Maule, of the noble family of Panmure, one of the ablest antiquarians his country ever produced. These *brugh*s in their form are not unlike pigeon-houses: they have a winding stair in the wall of each, which reaches quite to the top. These served as watch-towers and beacons, having heaps of peat on the top, which were kindled to give notice of an enemy's appearance; and therefore all the *brugh*s in an island were in sight one of another. There were cells or apartments underneath for securing their persons or effects; and in some of them subterraneous passages to some creek, wherein their boats lay, in which they might escape. Whoever attentively considers the motives which induced these people to raise such structures, how well calculated they were to answer the ends for which they were built, and for how many ages they have resisted the rage of time, will hesitate at calling those who constructed them barbarians.

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called by all the northern nations, *Talts*, and their language *Taltmoll*. Now in the Islandic, which was the original language of Norway, *joll* signifies a "dark cloud;" and consequently *jelland*, or *jellland*, a "rainy country," which it may be presumed is at least as good an etymology as any that has been hitherto offered. Mr Maule likewise thinks that this was the true Thule. This island lies north-east-by-east from Mainland, and is divided from it by an arm of the sea called *Yell Sound*. In the old descriptions, Yell is said to be 20 miles long and 8 broad. It is very mountainous, and full of moss: but there are pretty considerable pastures, in which they feed a great many sheep; and it also affords plenty of peat. It has eight large voes or harbours, besides many smaller bays, which would not be thought despicable anchoring-places in other countries. It seems to have been populous in ancient times, since there are in it 3 churches, 20 chapels, and many brughs or Pictish forts. There are dependent upon it Hascolea, two miles long and one broad, Samphra, and Bigga; all of them islands very fertile in grass. Besides these, to the south-west lies Fetlar, or Theodore's isle, nine or ten miles in compass, with a church, ten chapels, and many brughs; it has several creeks for small boats, but nothing that can be called a port.

The other of these two larger islands is Unst, which is also the most northern of all the Shetland isles, and at the same time the pleasantest, and not the least fertile amongst them. It lies at a small distance east from Yell, having that large island between it and the main land, being divided from the first mentioned island by an arm of the sea called *Blumel Sound*. Unst is eight miles long, and between three and four broad, and divided into 24 feattalds, 22 of which have each of them a proportion of sea-coast. There is great plenty of heather and peat, with some good pasture and a little of very fertile arable ground. Near the middle of this isle there is a loch three miles in extent, in which there are abundance of trout, eel, and flounders. Here are three churches, 24 chapels, and 11 brughs. There was also a castle at the southern extremity, called *Mowmer*, now in decay. There are two excellent harbours, the one in the south called *Via Bay*, being covered by an island of the same name, equally commodious and capacious, having nine fathom water, and good anchoring ground. The other is on the east side, covered by the isle of Balta, and from thence called *Balta Voe*, very safe and spacious, with eight fathom water. There are besides these, bays and roads less considerable. The number of inhabitants in these islands, that is Unst and its dependencies, may be about 1500, and they have 70 fishing-boats. Via is a very fair island, and produces great plenty of fine and rich grass. The same may be said of Balta, which is also well stocked with rabbits. There are besides these islets four or five holms, which feed sheep and cattle; and the island of Linga, low, flat, covered with moss, but which would be a very convenient place for salt-pans, if the inhabitants were in such a condition as to be capable of carrying on a fishery entirely on their own account.

Between six and seven leagues west from the main land lies the island of Fula or Foula, commonly called by our seamen *Foul Island*, in opposition to that of which

Shetland.

we shall speak. It is about three miles long, narrow, and full of rough, steep, and bare rocks, one of which is so large, and runs up to so great a height, as to be clearly seen from the Orkneys. This, therefore, may be esteemed, with the greatest probability, the Thule of Tacitus, whatever might be the Thule of the Phœnicians and Greeks. It has scarce any pasturage, and very little arable land; but that, though small in size, is however very fertile, out of the produce of which, with fowl and fish, the poor inhabitants subsist. They have nothing that can be called a port; and the only commodities they have, are stock-fish, train-oil, and feathers.

The Fair Isle lies between Orkney and Shetland, 10 or 12 leagues east-north-east from the former; seven, or, as others say, 10 leagues south-west from the latter; and about 18 or 19 leagues south-east from Foula. It is full three miles long, and scarce half a mile broad, very craggy, with three high rocks, which are clearly seen both from Orkney and Shetland. There is in this island also a small quantity of arable land, which is very fruitful and well-manured; they might have considerably more, but they are obliged to reserve this for peat and pasturage. They have, for the size of the island, a great many sheep, and those are very good and very fat; but they have no kind of muir-fowl or other game, but very great plenty of sea and water-fowl, and all kinds of fish upon their coasts. They have a very pretty church, but no minister, being annexed to one of the parishes of Shetland, or served by an itinerant minister, as some late accounts assert. A layman reads the Scriptures every Sunday in the church, the inhabitants being a very religious, harmless, sober, and honest people. They have in effect no port, though they have two that are nominally so; one at the south end, which is full of rocks, where only small boats can lie, and that but indifferently; the other at the north-east end, larger and safer in the summer time, so as to serve commodiously enough for their fishery. Small and insignificant as this island may seem, there is a very remarkable piece of history belonging to it. The duke of Medina Sidonia, when commander in chief of the famous Spanish Armada in 1588, was wrecked on the east coast of this island. The ship broke to pieces, but the duke and about 200 more escaped. They lived there till both themselves and the inhabitants were very near famished; at length the duke and the poor remains of his people were carried over to the main land of Shetland by Andrew Humphry. He continued some time at Quendale, and then embarked on board the same small ship, and was safely conveyed therein to Dunkirk; for which service he rewarded Andrew Humphry with 3000 merks. This island produced to its late proprietor between 50 and 60 pound Sterling *per annum*; and was sold at Edinburgh, on the 20th day of June 1766, for the sum of 10,200 pounds Scots, or about 850 pounds Sterling, to James Stuart of Burgh, Esq;

In respect to climate, the Shetland islands have not much to boast, and yet are very far from being such miserable habitations as some have represented them. The longest day in the island of Unst is 19 hours 15 minutes, and of consequence the shortest day 4 hours and 45 minutes. The spring is very late, the summer very short; the autumn also is of no long duration, dark, foggy,

Shetland. foggy, and rainy; the winter sets in about November, and lasts till April, and sometimes till May. They have frequently in that season storms of thunder, much rain, but little frost or snow. High winds are indeed very frequent and very troublesome, yet they seldom produce any terrible effects. The aurora borealis is as common here as in any of the northern countries. In the winter season the sea swells and rages in such a manner, that for five or six months their ports are inaccessible, and of course the people during that space have no correspondence with the rest of the world (A).

The soil in the interior part of the main land, for the most part, is mountainous, moorish, and boggy, yet not to such a degree as to render the country utterly impassable; for many of the roads here, and in some of the northern isles, are as good as any other natural roads, and the people travel them frequently on all occasions. Near the coasts there are sometimes for miles together flat pleasant spots, very fertile both in pasture and corn. The mountains produce large crops of very nutritive grafs in the summer; and they cut considerable quantities of hay, with which they feed their cattle in the winter. They might with a little attention bring more of their country into cultivation; but the people are so much addicted to their fishery, and feel so little necessity of having recourse to this method for subsistence, that they are content, how strange soever that may seem to us, to let four parts in five of their land remain in a state of nature.

They want not considerable quantities of marle in different islands, though they use but little; hitherto there has been no chalk found; limestone and freestone there are in the southern parts of the main land in great quantities, and also in the neighbouring islands, particularly Fetlar; and considerable quantities of slate, very good in its kind. No mines have been hitherto wrought, though there are in many places visible appearances of several kinds of metal. Some solid pieces of silver, it is said, have been turned up by the plough. In the island of Via, a yellow metal has been met with, which being found difficult to melt, has been neglected. In some of the smaller isles there are strong appearances of iron; but, through the want of proper experiments being made, there is, in this respect at least, hitherto nothing certain. Their meadows are inclosed with dikes, and produce very good grafs. The little corn they grow is chiefly barley, with some oats; and even in the northern extremity of Unst (as we have hinted before) the little land they have is remarkable for its fertility. The hills abound with medicinal herbs; and their kitchen-gardens thrive as well, and produce as good greens and roots, as any in Britain. Of late years, and since this has been attended to, some gentlemen have had even greater success than they expected in the cultivating tulips, roses, and many other flowers. It is true, that tho', as has been before observed, they have no trees, and hardly any shrubs except juniper, yet they have a tradition that their country was formerly overgrown with woods; and it seems to be a confirmation of this, that the roots

of timber-trees have been and are still dug up at a Shetland. great depth; and that in some, and those too inaccessible, places, the rotten tree is still found growing wild. That this defect, viz. the want of wood at present, does not arise entirely from the soil or climate, appears from several late experiments; some gentlemen having raised ash, maple, horse-chestnuts, &c. in their gardens. Though the inhabitants are without either wood or coals, they are very well supplied with fuel, having great plenty of hether and peat. The black cattle in this country are in general of a larger sort than in Orkney, which is owing to their having more extensive pastures; a clear proof that still farther improvements might be made in respect to size. Their horses are small, but strong, stout, and well-shaped, live very hardy, and to a great age. They have likewise a breed of small swine, the flesh of which, when fat, is esteemed very delicious. They have no geats, hares, or foxes; and in general no wild or venomous creatures of any kind, except rats in some few islands. They have no moor-fowl, which is the more remarkable as there are every where immense quantities of hether; but there are many sorts of wild and water fowl, particularly the dunter-geese, clack-geese, solan-geese, swans, ducks, teal, whaps, foils, lyres, kittiwaks, maws, plovers, scarfs, &c. There is likewise the ember-geese, which is said to hatch her egg under her wing. Eagles and hawks, as also ravens, crows, mews, &c. abound here.

All these islands are well watered; for there are every where excellent springs, some of them mineral and medicinal. They have indeed no rivers; but many pleasant rills or rivulets, which they call *burns*, of different sizes; in some of the largest they have admirable trouts, some of which are of 15 and even of 20 pounds weight. They have likewise many fresh-water lakes, well stored with trout and eels, and in most of them there are also large and fine flounders; in some very excellent cod. Their fresh-water lakes, if the country was better peopled, and the common people more at their ease, are certainly capable of great improvements. The sea-coasts of the main land of Shetland, in a straight line, are 55 leagues; and therefore there cannot be a country conceived more proper for establishing an extensive fishery. What the inhabitants have been hitherto able to do, their natural advantages considered, does not deserve that name, notwithstanding they export large quantities of cod, tusk, ling, and hake, inasmuch, that the bounty allowed by acts of parliament amounts from 1400l. to 2000l. annually. They have, besides, codlins, haddock, whiting, turbot, skate, and a variety of other fish. In many of the inlets there are prodigious quantities of excellent oysters, lobsters, muscles, cockles, and other shell-fish. As to amphibious creatures, they have multitudes of otters and seals; add to these, that amber, ambergris, and other spoils of the ocean, are frequently found upon the coasts.

In respect to the inhabitants, they are a stout, well-made, comely people; the lower sort of a swarthy complexion. The gentry are allowed, by all who have

(E) We must by no means suppose the temper and disposition of the people affected by the dearth of the season. Winter, on the contrary, is a kind of carnival in Shetland. All kinds of people eat flesh and live well during this period of relaxation. Gentlemen of family and fortune, of which there are many here, live so hospitably and so politely, that few strangers regret the length of the winter who happen to spend it amongst them.

convered with them, to be most of them polite, shrewd, sensible, lively, active, and intelligent persons; and these, to the number of 100 families, have very handsome, strong, well-built houses, neatly furnished; their tables well served, polished in their manners, and exceedingly hospitable and civil to strangers. Those of an inferior rank are a hardy, robust, and laborious people, who, generally speaking, get their bread by fishing in all weathers in their yaws, which are little bigger than Graveend wherries; live hardily, and in the summer season mostly on fish; their drink, which, in reference to the British dominions, is peculiar to the country, is called *bland*, and is a sort of butter-milk, long kept, and very four. Many live to great ages, though not so long as in former times. In respect, however, to the bulk of the inhabitants, from the poornefs of living, from the nature of it, and from the drinking great quantities of corn-spirits of the very worst sort, multitudes are afflicted with an inveterate scurvy; from which those in better circumstances are entirely free, and enjoy as good health as in any other country in Europe. As they have no great turn to agriculture, and are persuaded that their country is not fit for it, they do not (tho' probably they might) raise corn enough to subsist them for more than two-thirds of the year. But they are much more successful in their pasture-grounds, which are kept well inclosed, in good order, and, together with their commons, supply them plentifully with beef and mutton. They pay their rents generally in butter at Lammass, and in money at Martinmas. As to manufactures, they make a strong coarse cloth for their own use, as also linen. They make likewise of their own wool very fine stockings. They export salted and dried ling, cod, and tulk, some herrings, a considerable quantity of butter and train oil, otter and seal skins, and no inconsiderable quantity of the fine stockings before-mentioned. Their chief trade is to Leith, London, Hamburgh, Spain, and to the Straights. They import timbers, deals, and some of their best oats, from Norway; corn and flour from the Orkneys, and from North Britain; spirits and some other things from Hamburgh; cloths and better sort of linen from Leith; grocery, household furniture, and other necessaries, from London. The superior-duties to the earl of Morton are generally let in farm; and are paid by the people in butter, oil, and money. The remains of the old Norwegian constitution are still visible in the division of their lands; and they have some udalmen or freeholders amongst them. But the Scots laws, customs, manners, dress, and language, prevail; and they have a sheriff, magistrates for the administration of justice, as well as a custom-house, with a proper number of officers. In reference to their ecclesiastical concerns, they have a presbytery, 12 ministers, and an itinerant for Foula, Fair Island, and the Skerries. Each of these ministers has a stipend of between 40 and 50 pounds, besides a house and a glebe free from taxes. The number of souls in these islands may be about 20,000.

SHEW-BREAD, among the Hebrews, the name given to those loaves of bread which the priests placed every sabbath-day upon the golden table in the sanctuary. The shew-bread consisted of 12 loaves, according to the number of the tribes. These were served up hot

on the sabbath-day; and at the same time the stale ones, which had been exposed all the week, were taken away. It was not lawful for any one to eat of these loaves but the priests only: this offering was accompanied with salt and frankincense, which was burnt upon the table at the time they set on fresh loaves.

SHIELD, an ancient weapon of defence, in the form of a light buckler, borne on the arm, to turn off lances, darts, &c.

SHIELD, in heraldry, the escutcheon or field on which the bearings of coats of arms are placed. See **HERALDRY**.

SHIEL DRAKE, in ornithology. See **ANAS**.

SHILLING, an English silver coin. See **MONEY-Table**.

It is observed that there were no shillings or twopenny pieces in England till the year 1504, when they were first coined by Henry VIII.

SHINGLES, in building, small pieces of wood, or quartered oaken boards, sawn to a certain scantling, or, as is more usual, cleft to about an inch thick at one end, and made like wedges, four or five inches broad, and eight or nine inches long.

Shingles are used instead of tiles or slates, especially for churches and steeples; however, this covering is dear; yet, where tiles are very scarce, and a light covering is required, it is preferable to thatch; and where they are made of good oak, cleft, and not sawed, and well seasoned in water and the sun, they make a sure, light, and durable covering.

The building is first to be covered all over with boards, and the shingles nailed upon them.

SHIP, a general name for all large vessels with sails, fit for navigation on the sea; except galleys, which go with oars, and smack-sails.

To whom the world is indebted for the invention of ships, is, like all other things of equal antiquity, uncertain.

A very small portion of art or contrivance was seen in the first ships: they were neither strong nor durable; but consisted only of a few planks laid together, without beauty or ornament, and just so compacted as to keep out the water. In some places they were only the hulks or stocks of trees hollowed, and then consisted only of one piece of timber. Nor was wood alone applied to this use; but any other buoyant materials, as the Egyptian reed papyrus, or leather, of which the primitive ships were frequently composed; the bottom and sides being extended on a frame of thin battens or scantlings, of flexible wood, or begirt with wickers, such as we have frequently beheld amongst the American savages. In this manner they were often navigated upon the rivers of Ethiopia, Egypt, and Sabean Arabia, even in latter times. But in the first of them, we find no mention of any thing but leather or hides sewed together. In a vessel of this kind, Dardanus secured his retreat to the country afterwards called *Troy*, when he was compelled by a terrible deluge to forsake his former habitation of Samothrace. According to Virgil, Charon's infernal boat was of the same composition.

But as the other arts extended their influence, naval architecture likewise began to emerge from the gloom of ignorance and barbarism; and as the ships of those

Ship.

ages were increased in bulk, and better proportioned for commerce, the appearance of those floating citadels of unmutual form, full of living men, flying with seemingly expanded wings over the surface of the untravelled ocean, struck the ignorant people with terror and astonishment: and hence, as we are told by Aristophanes, arose the fable of Perseus flying to the Gorgons, who was actually carried thither in a ship! Hence, in all probability, the famous story of Triptolemus riding on a winged dragon is deduced, only because he sailed from Athens, in the time of a great dearth, to a more plentiful country, to supply the necessities of his people. The fiction of the flying horse Pegasus may be joined with these, who, as several mythologists report, was nothing but a ship with sails, and thence said to be the offspring of Neptune the sovereign of the sea; nor does there appear any other foundation for the stories of griffins, or of ships transformed into birds and fishes, which we so often meet with in the ancient poets. So acceptable to the first ages of the world were inventions of this nature, that whoever made any improvements in navigation or naval architecture, building new ships better fitted for strength or swiftness than those used before, or rendered the old more commodious by additional contrivances, or discovered countries unknown to former travellers, were thought worthy of the greatest honours, and often associated into the number of their deified heroes. Hence we have in astronomy the signs of Aries and Taurus, which were no other than two ships: the former transported Phryxus from Greece to Colchos, and the latter Europa from Phœnicia to Crete. Argo, Pegasus, and Perseus's whale, were likewise new ships of a different sort from the former, which being greatly admired by the barbarous and uninstructed people of those times, were translated amongst the stars, in commemoration of their inventors, and metamorphosed into constellations by the poets of their own and of succeeding ages.

The chief parts, of which ships anciently consisted, were three, viz. the belly, the prow, and the stern: these were again composed of other smaller parts, which shall be briefly described in their order. In the description, we chiefly follow Scheffer, who hath so copiously treated this subject, and with such industry and learning collected whatever is necessary to illustrate it, that very little room is left for enlargement by those who incline to pursue this investigation.

1. In the belly, or middle part of the ship, there was *τρωνίς, carina*, or the "keel," which was composed of wood: it was placed at the bottom of the ship, being designed to cut and glide through the waves, and therefore was not broad, but narrow and sharp; whence it may be perceived that not all ships, but only the *μικραί*, which ships of war were called, whose bellies were freight and of a small circumference, were provided with keels, the rest having usually flat bottoms. Around the outside of the keel were fixed pieces of wood, to prevent it from being damaged when the ship was first lanced into the water, or afterwards struck on any rocks; these were called *χλινεumata*, in Latin *cunei*.

Next to the keel was *φαλλίς*, the "pump-well, or well-room," within which was contained the *αὐτήν*, or

"pump;" through which water was conveyed out of the ship.

After this, there was *δευτέρα τρωνίς*, or the "second keel," somewhat resembling what is now called the *kelson*; it was placed beneath the pump, and called *μυσιον, χαλκιν, κλιτοσταθιον*; by some it is falsely supposed to be the same with *φαλλίς*.

Above the pump was an hollow place, called by Herodotus *κοιλία τῆς νῆος*, by Pollux *κύτος* and *ῥακτα*, because large and capacious, after the form of a belly; by the Latins, *tefudo*. This was formed by crooked ribs, with which it was surrounded, which were pieces of wood rising from the keel upwards, and called by Hefychius *ῥομίς*, and by others *ἰσουλία*, the belly of the ship being contained within them: in Latin, *coffe*; and in English *timbers*. Upon these were placed certain planks, which Aristophanes calls *εντερωνίς*, or *εντερωνία*.

Hence proceed we to the *παλῦρι, latera*, or "sides" of the ship, which encompassed all the former parts on both hands; these were composed of large rafters extended from prow to stern, and called *ῥωμῆς*, and *ζωμιαumata*, because by them the whole fabric was begirt or surrounded.

In both these sides the rowers had their places, called *τοίχη* and *ἰσουλία*, in Latin *fori* and *transstra*, placed above one another: the lowest was called *θαλαμος*, and those that laboured therein *θαλαμιοί*; the middle *ῥογα*, and the men *ῥογιοί*; the uppermost *θρανίον*, whence the rowers were termed *θρανισται*. In these apartments were spaces through which the rowers put their oars: these were sometimes one continued vacuity from one end to the other, called *τρεφίς*; but more usually distinct holes, each of which was designed for a single oar: these were filled *τρικατα*, *τενυσuata*, as also *οὐδαμια*, because not unlike the eyes of living creatures. All of them were by a more general name termed *ἰγκυαia*, from containing the oars; but *ἰγκυστιν* seems to have been another thing, signifying the spaces between the banks of oars on each side, where the passengers appear to have been placed. On the top of all there was a passage or place to walk, called *παράδοξ*, and *παρεμβανος*, as joining to the *θρανίον*, or uppermost bank of oars.

2. *Πρωα*, the "prow or fore-deck," whence it is sometimes called *μυτιον*, and commonly distinguished by other metaphorical titles taken from human faces. In some ships there is mention of two prows, as also two sterns; such was Danaus's ship adorned by Minerva when he fled from Egypt. It was usual to beautify the prow with gold and various sorts of paint and colours: in the primitive times red was most in use; whence Homer's ships were commonly dignified with the titles of *μυτιοσφαιροί*, and *ροινικοσφαιροί*, or "red-faced;" the blue likewise, or sky-colour, was frequently made use of, as bearing a near resemblance to the colour of the sea; whence we find ships called by Homer *κυανοσφαιροί*, by Aristophanes *κυανιμβολοί*. Several other colours were also made use of; nor were they barely varnished over with them, but very often annealed by wax melted in the fire, so as neither the sun winds, nor water, were able to deface them. The art of doing this was called from the wax *κυροσφαιρία*, from the fire *ἰσταντικῆ*, which is described by Vitruvius, and mentioned in Ovid.

*Πισία coloribus efficit
Caruleam matrem coccinea puppis habet.*

The painted ship with mixed was anneal'd
Had Tethys for its deity

In these colours the various forms of gods, animals, plants, &c. were usually drawn, which were likewise often added as ornaments to other parts of the ships, as plainly appears from the Ancient Monuments presented to the world by Bayfus.

The sides of the prow were termed *πτερά*, or "wings," and *πτερία*, according to Scheffer, or rather *πτερνισ*, for since the prow is commonly compared to a human face, it will naturally follow that the sides should be called *cheeks*; these are now called *bow* by our mariners.

3. *Πιρμύς*, the "hind-deck or poop," sometimes called *ουρά*, the "tail," because the hindmost part of the ship: it was of a figure more inclining to round than the prow, the extremity of which was sharp, that it might cut the waters; it was also built higher than the prow, and was the place where the pilot sat to steer: the outer-bending part of it was called *ἐπισπίαν*, answering to our term, *quarter*.

They had various ornaments of sculpture on the prow; as helmets, animals, triumphal wreaths, &c. The stern was more particularly adorned with wings, shields, &c. Sometimes a little mast was erected whereon to hang ribbands of divers colours, which served instead of a flag to distinguish the ship; and a weather-cock, to signify the part from whence the wind blew.

On the extremity of the prow was placed a round piece of wood, called the *στυλός*, from its bending; and sometimes *ὀφθαλμός*, the "eye" of the ship, because fixed in the fore-deck; on this was inscribed the name of the ship, which was usually taken from the figure painted on the flag. Hence comes the frequent mention of ships called *Pégassi*, *Scyllæ*, *bulls*, *rams*, *tigers*, &c. which the poets took the liberty to represent as living creatures that transported their riders from one country to another.

The whole fabric being completed, it was fortified with pitch, and sometimes a mixture of rosin, to secure the wood from the waters; whence it comes that Homer's ships are every where mentioned with the epithet of *μυλωναίαι*, or "black." The first that made use of pitch were the inhabitants of Phæacia, since called *Corfica*: sometimes wax was employed in the same use, whence Ovid,

Carulea ceratas accipit unda rates.

The azure waves receive the waxy ships.

After all, the ship being bedecked with garlands and flowers, the mariners also adorned with crowns, she was launched into the sea with loud acclamations and other expressions of joy; and being purified by a priest with a lighted torch, an egg and brimstone, or after some other manner, was consecrated to the god whose image she bore.

The ships of war of the ancients were distinguished from other kinds of vessels, by various turrets and accessions of building, some to defend their own soldiers, and others to annoy the enemy; and from one another, in latter ages, by several degrees or ranks of oars, the most usual number of which was four or five, which appear not to have been arranged, as some imagine, on the same level in different parts of the ship; nor yet, as others have supposed, directly above

one another's heads; but their seats being placed one behind another, ascended gradually, like stairs. Ptolemy Philopater, urged by a vain-glorious desire of exceeding all the world besides in naval architecture, is said to have farther enlarged the number of banks to 40, and the ship being otherwise in equal proportion, this raised her to such an enormous bulk, that she appeared at a distance like a floating mountain or island; and, upon a nearer view, like a prodigious castle on the ocean. She was 280 cubits long, 38 broad, and 48 high, each cubit being 1 English foot $5\frac{1}{2}$ inches; and carried 400 rowers, 400 sailors, and 3000 soldiers. Another which the same prince made to sail on the Nile, we are told, was half a stadium long. Yet these were nothing in comparison with Hiero's ship, built under the direction of Archimedes; on the structure whereof Moschion wrote a whole volume. There was wood enough employed in it to make 50 galleys: it had all the variety of apartments of a palace; such as banqueting-rooms, galleries, gardens, fish-ponds, stables, mills, baths, and a temple to Venus: it was encompassed with an iron rampart, eight towers, with walls and bulwarks, furnished with machines of war, particularly one which threw a stone of 300 pounds, or a dart 12 cubits long, the space of half a mile, with many other particulars related by Athenæus. But these, and all such monstrous fabrics, served only for show and ostentation; being rendered by their vast bulk unwieldy and unfit for service. Athenæus informs us, the common names they were known by, were *Cyclades*, or *Elna*, i. e. "islands, or mountains," to which they seemed nearly equal in bigness; consisting, as some report, of as many materials as would have composed 50 trimens, or ships of three banks.

A modern ship is undoubtedly the noblest machine that ever was invented; and consists of so many parts, that it would require a whole volume to describe it minutely. However, we shall endeavour to satisfy the reader more fully on this head, as it is an article of the utmost importance.

The plans, elevations, and sections, used in the construction of a ship; the principal pieces of which she is composed; and the qualities requisite to answer the several purposes of navigation, are described, or referred to, in *SHIP-BUILDING*, Part I.; and the application of this theory to practice, is treated in Part II.

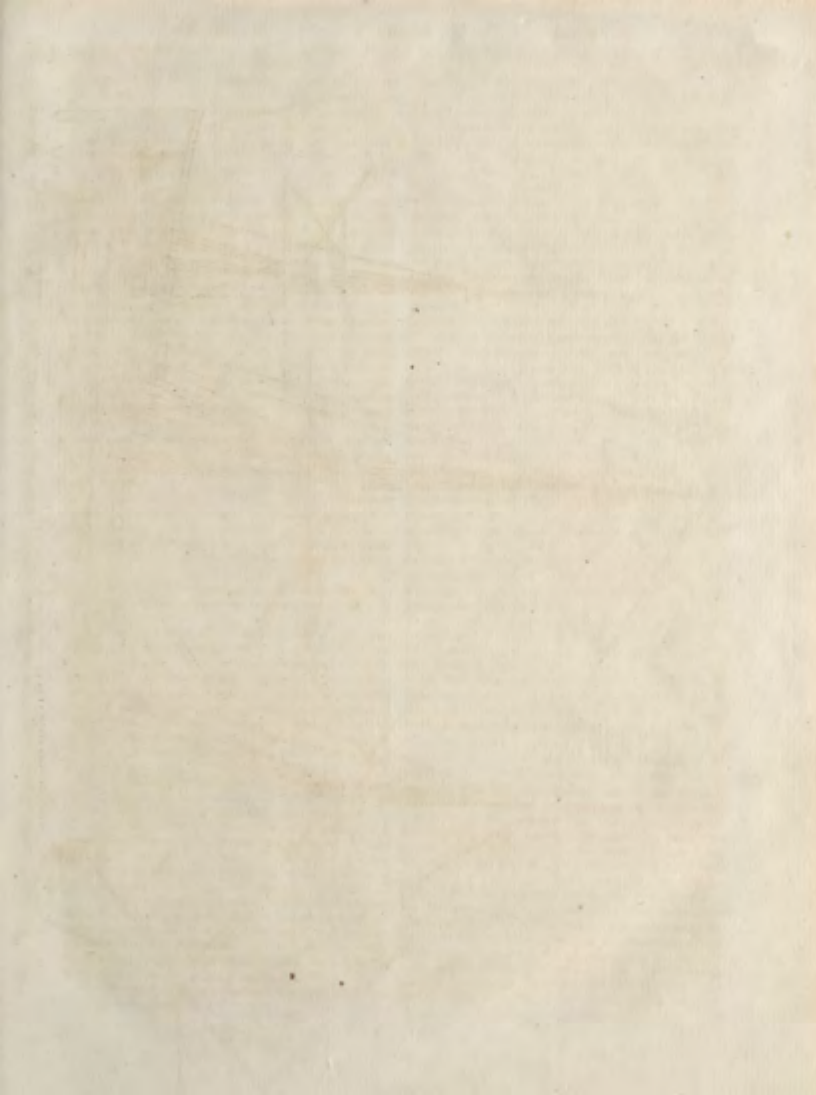
The machinery and furniture with which she is equipped, are variously diffused throughout this work. See *MAST*, *SAIL*, *YARD*, *RIGGING*, *ANCHOR*, &c.

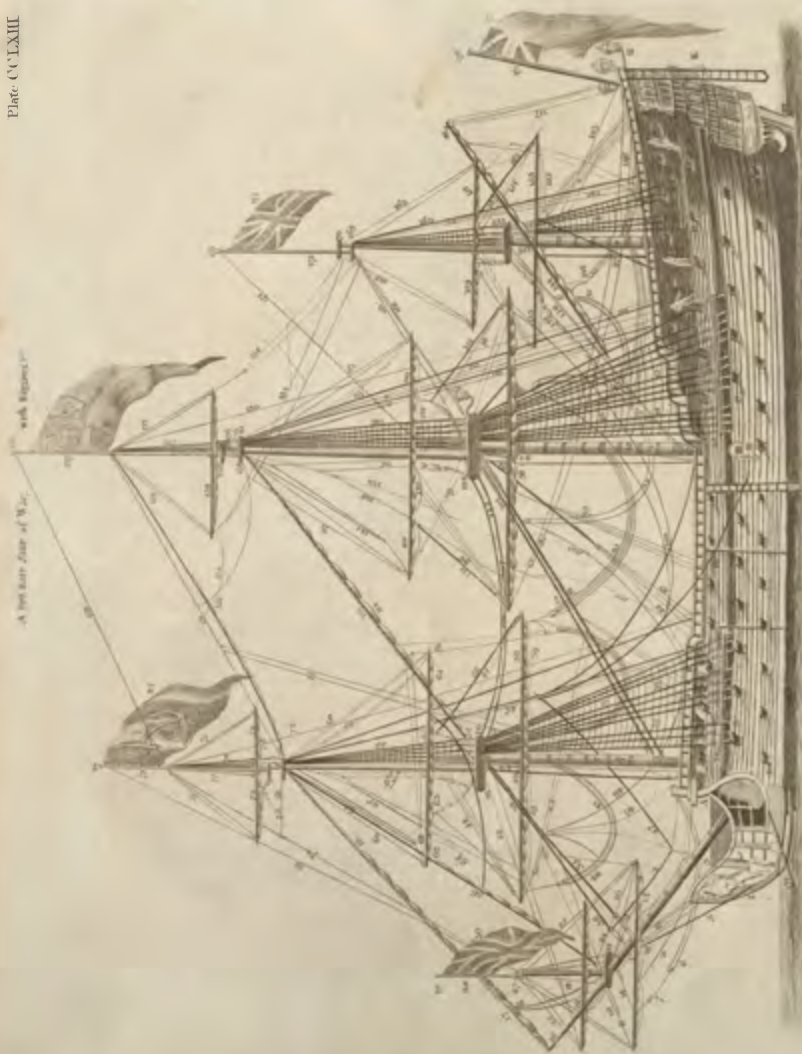
The qualities by which she is enabled to encounter a tempestuous sea, are treated in the article *BALLAST* and *TRIM*; and her several movements therein, are explained under *NAVIGATION*, *DRIFT*, *SAILING*, *TACKING*, *LEEWAY*, *PITCHING*, and *ROLLING*.

Considered as a moveable fortress, or citadel, her military operations are described in *NAVAL TACTICS*.

To give a collective illustration of the subject, we have exhibited, in Plate CCLXIII. a representation of a first-rate ship of war, with all her masts, yards, and rigging erect, and the several sails furled to their respective yards and stays; and, in Plate CCLXIV. a section of the same, shewing the inside thereof.

EXPLA.





EXPLANATION of Plate CCLXIII.

Parts of the hull. A, the cat-head; B, the fore-chains; C, the main-chains; D, the mizzen chains; E, the entering port; F, the hawse holes; G, the poop lanterns; H, the ches-tree; I, the head; K, the stern.

L, The bowsprit. 1, 2, Yard and fail. 3, Gammoneing. 4, Horfe. 5, Bob stay. 6, Sprit-fail sheets. 7, Pendants. 8, Braces and pendants. 9, Halliards. 10, Lifts. 11, Clew-lines. 12, Sprit-fail horfes. 13, Bunt-lines. 14, Standing lifts. 15, Sprit-fail top. 16, Flying jib boom. 17, Flying jib stay and fail. 18, Halliards. 19, Sheets. 20, Horfes.

M, The sprit-fail top-mast. 21, Shrouds. 22, 23, Yard and fail. 24, Sheet. 25, Lifts. 26, Braces and pendants. 27, Cap. 28, Jack-staff. 29, Truck. 30, Jack flag.

N, The fore-mast. 31, Runner and tackle. 32, 33, Shrouds. 34, Laniards. 35, Stay and laniard. 36, Preventer-stay and laniard. 37, Woodling the mast. 38, Yard and fail. 39, Horfes. 40, Top. 41, Crow-foot. 42, Jeers. 43, Yard tackles. 44, Lifts. 45, Braces and pendants. 46, Sheets. 47, Fore tackles. 48, Bow-lines and bridles. 49, Fore bunt-lines. 50, Fore lee-line. 51, Fore top rope. 52, Puttock shrouds.

O, The fore top-mast. 53, 54, Shrouds and laniards. 55, Yard and fail. 56, Stay and fail. 57, Runner. 58, Back stays. 59, Halliards. 60, Lifts. 61, Braces and pendants. 62, Horfes. 63, Clew-lines. 64, Bow-lines and bridles. 65, Reef-tackles. 66, Sheets. 67, Bunt-lines. 68, Crofs-trees. 69, Cap.

P, The fore top-gallant mast. 70, 71, Shrouds and laniards. 72, Yard and fail. 73, Back stays. 74, Stay. 75, Lifts. 76, Clew-lines. 77, Braces and pendants. 78, Bow-lines and bridles. 79, Flag staff. 80, Truck. 81, Flag-staff stay. 82, Flag of lord high-admiral.

Q, The main mast. 83, 84, Shrouds. 85, Laniards. 86, Runner and tackle. 87, Pendant of the gornet. 88, Guy of ditto. 89, Sail of ditto. 90, Stay. 91, Preventer-stay. 92, Stay tackle. 93, Woodling the mast. 94, Jeers. 95, Yard tackles. 96, Lifts. 97, Braces and pendants. 98, Horfes. 99, Sheets. 100, Tacks. 101, Bow-lines and bridles. 102, Crow-foot. 103, Top rope. 104, Top. 105, Bunt-lines. 106, Lee-line. 107, Yard and fail.

R, The main top-mast. 108, 109, Shrouds and laniards. 110, Yard and fail. 111, Puttock shrouds. 112, Back-stays. 113, Stay. 114, Stay fail and stay halliards. 115, Runnets. 116, Halliards. 117, Lifts. 118, Clew-lines. 119, Braces and pendants. 120, Horfes. 121, Sheets. 122, Bow-lines and bridles. 123, Bunt-lines. 124, Reef-tackles. 125, Crofs trees. 126, Cap.

S, The main top-gallant mast. 127, 128, Shrouds and laniards. 129, Yard and fail. 130, Back stays. 131, Stay. 132, Stay-fail and halliards. 133, Lifts. 134, Braces and pendants. 135, Bow-lines and bridles. 136, Clew-lines. 137, Flag staff. 138, Truck. 139, Flag-staff stay. 140, Flag standard.

T, The mizen mast. 141, 142, Shrouds and laniards. 143, Pendants and burtons. 144, Yard and

fail. 145, Crow foot. 146, Sheet. 147, Pendant-lines. 148, Peck brails. 149, Stay-fail. 150, Stay. 151, Derric and spann. 152, Top. 153, Crofs jack yard. 154, Crofs jack lifts. 155, Crofs jack braces. 156, Crofs jack slings.

V, The mizen top-mast. 157, 158, Shrouds and laniards. 159, Yard and fail. 160, Back stays. 161, Stay. 162, Halliards. 163, Lifts. 164, Braces and pendants. 165, Bow-lines and bridles. 166, Sheets. 167, Clew-lines. 168, Stay-fail. 169, Crofs trees. 170, Cap. 171, Flag staff. 172, Flag staff stay. 173, Truck. 174, Flag union. 175, Ensign staff. 176, Truck. 177, Ensign. 178, Poop ladder. 179, Bower cable.

Thus have we pointed out the external parts; masts, rigging, &c. an account of all which may be seen under their respective articles Mast, MULL, ROPE, RUDDER, &c.

EXPLANATION of Plate CCLXIV.

Which represents the section of a first-rate man of war, showing its various timbers and apartments.

A is the head; containing, 1, The stem. 2, The knee of the head, or cut water. 3, The lower and upper cheek. 4, The tail-board. 5, The figure. 6, The gratings. 7, The brackets. 8, The false stem. 9, The breast hooks. 10, The haufe hole. 11, The bulk head, forward. 12, The cat-head. 13, The cat-book. 14, Necessary seats. 15, The mauger within board. 16, The bowsprit.

B, Upon the forecable. 17, The gratings. 18, The partners of the fore mast. 19, The gun wale. 20, The belfry. 21, The funnel for the smoke. 22, The gangway going off the forecable. 23, The forecable guns.

C, In the forecable. 24, The door of the bulk head, forward. 25, The officers cabins. 26, The stair-case. 27, The fore top-fail sheet bits. 28, The beams. 29, The car lines.

D, The middle gun-deck, forward. 30, The fore-jeer bits. 31, The oven and furnace of copper. 32, The captain's cook-room. 33, The ladder, or way up into the forecable.

E, The lower gun-deck, forward. 34, The knees fore and aft. 35, The spirketings, or the first streak next to each deck; the next under the beams being called *clamps*. 36, The beams of the middle gun-deck fore and aft. 37, The car-lines of the middle gun-deck, fore and aft. 38, The fore bits. 39, The after, or main bits. 40, The hatchway to the gunner's and boatwain's store-rooms. 41, The jeer capston.

F, The orlop. 42, 43, 44, The gunner's, boatwain's, and carpenter's store-rooms. 45, The beams of the lower gun-deck. 46, 47, The pillars and the riders, fore and aft. 48, The bulk-head of the store-rooms.

G, The hold. 49, 50, 51, The foot-hook rider, the floor-rider, and the standard, fore and aft. 52, The pillars. 53, The step of the fore mast. 54, The kelson, or false keel, and dead rising. 55, The dead wood.

H, A-midships in the hold. 56, The floor timbers. 57, The keel. 58, The well. 59, The chain pump. 60, The step of the main mast. 61, 62, Beams and car-lines of the orlop, fore and aft.

Ship.

Ship.

I, The orlop a-midships. 63, The cable tire. 64, The main hatchway.

K, The lower gun-deck a-midships. 65, The ladder leading up to the middle gun-deck. 66, The lower tire or ports.

L, The middle gun-deck a-midships. 67, The middle tire ports. 68, The entering port. 69, The main jeer bits. 70, Twisted pillars or stantions. 71, The capitan. 72, The gratings. 73, The ladder leading to the upper deck.

M, The upper gun-deck a-midships. 74, The main top-sail sheet bits. 75, The upper partners of the main mast. 76, The gallows on which spare top-masts, &c. are laid. 77, The fore sheet blocks. 78, The reunets. 79, The gun wale. 80, The upper gratings. 81, The drift brackets. 82, The pifs dale. 83, The capitan pall.

N, Aboard the main mast. 84, The gang-way off the quarter-deck. 85, The bulkhead of the coach. 86, The stair-case down to the middle gun-deck. 87, The beams of the upper deck. 88, The gratings about the main-mast. 89, The coach, or council-chamber. 90, The stair-case up to the quarter-deck.

O, The quarter-deck. 91, The beams. 92, The car-lines. 93, The partners of the mizen mast. 94, The gangway up to the poop. 95, The bulk-head of the cuddy.

P, The poop. 96, The trumpeter's cabin. 97, The taffarel.

Q, The captain-lieutenant's cabin.

R, The cuddy, usually divided for the master and secretary's officers.

S, The state-room, out of which is made the bed-chamber, and other conveniences for the commander in chief. 98, The entrance into the gallery. 99, The bulk-head of the great cabin. 100, The stern-lights and after galleries.

T, The ward-room, allotted for the lieutenants and land-officers. 101, The lower gallery. 102, The steerage and bulk-head of the ward-room. 103, The whip-staff, commanding the tiller. 104, The after stair-case down to the lower gun-deck.

V, Several officers cabins aboard the main mast, where the soldiers generally keep guard.

W, The gun-room. 105, The tiller commanding the rudder. 106, The rudder. 107, The stern-post. 108, The tiller-transom. 109, The several transoms, viz. 1, 2, 3, 4, 5. 110, The gun-room ports, or stern-chafe. 111, The bread-room scuttle, out of the gun-room. 112, The main capitan. 113, The pall of the capitan. 114, The partner. 115, The bulk-head of the bread-room.

X, The bread-room. Y, The steward's room, where all provisions are weighed and served out. Z, The cock-pit, where are subdivisions for the purser, the surgeon, and his mates.

AA, The platform, or orlop, where provision is made for the wounded in time of service. 116, The hold aboard the main-mast. 117, The step of the mizen mast. 118, The kelson, or false keel. 119, The dead-wood, or rising.

Different Kinds of Ships. All ships at first were of the same form, whatever uses they were designed for; but the various ends of navigation, some of which were

better answered by one form, some by another, soon gave occasion to build and fit out ships, not only different in bigness, but also in their construction and rigging: and as trade gave occasion to the fitting out large fleets of different kinds of merchant-ships; so ships of war became necessary to preserve them to their just proprietors.

Ships of War, are vessels properly equipped with artillery, ammunition, and all the necessary martial weapons and instruments for attack or defence. They are distinguished from each other by their several ranks or classes. See *RATE*.

Ship of the Line, is usually applied to all men of war mounting 60 guns and upwards. Of late, however, our fifty-gun ships have been formed sufficiently strong to carry the same metal as those of 60; and accordingly may fall into the line in cases of necessity. See *NAVAL TACTICS*, Sect. II.

Armed Ship. See *ARMED SHIP*.

Hospital Ship, a vessel fitted up to attend on a fleet of men of war, and receive their sick or wounded; for which purpose her decks should be high, and her ports sufficiently large. Her cables ought also to run upon the upper deck, to the end that the beds or cradles may be more commodiously placed between decks, and admit a free passage of the air, to disperse that which is offensive or corrupted.

Merchant Ship, a vessel employed in commerce, to carry commodities of various sorts from one port to another.

Merchant ships are estimated by their burden; that is, by the number of tons they bear, each ton reckoned at 2000 lb. weight; this estimate being made by gauging the hold, which is the proper place of loading.—The largest merchant-ships are those employed by the different European companies of merchants who trade to the East Indies. They are in general somewhat larger than our forty-gun ships: they are mounted with twenty cannon on their upper-deck, which are nine-pounders, and six on their quarter-deck, which are six-pounders.

Private Ship of War. See *PRIVATEER*.

Store-Ship, a vessel employed to carry artillery or naval stores for the use of a fleet, fortress, or garrison.

Transport Ship, is generally used to conduct troops from one place to another.

Besides those mentioned above, there are other forms; the principal of which we have collected into one point of view in Plate CCLXXV. so that the reader who is unacquainted with marine affairs may the more easily perceive their distinguishing characters, which are also more particularly described under their respective articles.

In the different kinds of ships referred to above, and distinguished from each other by their size or figure, we have only considered those which are most common in European nations, where the marine art has received the greatest improvements. So far is apparently consistent with the views of utility. To give a circumstantial account of the various species of ships employed in different nations, besides being an almost endless task, would be of little service except to gratify an useless curiosity.

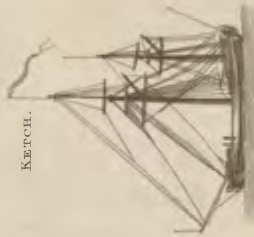
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8 ROW.



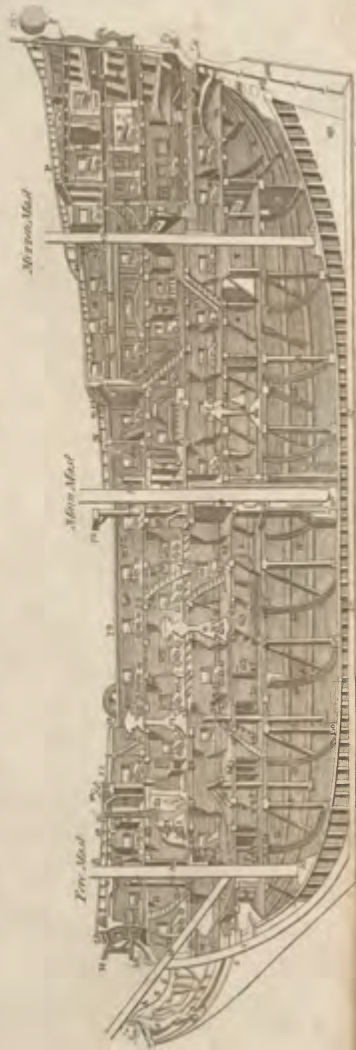
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24 ROW.



Fig. 1. The Section of a First Rate Ship of War, Shewing its various Timbers and Apartments





A BILANDER .



A SCHOONER .



A DOGGER .



GALLEY under SAIL .



A ZEBEC .



A GALLIOT .



SEA SERPENT

GALLEY Rowing .





Ship.

To SHIP, is either used actively; as, to embark any person, or put any thing aboard ship: Or passively, to receive any thing into a ship; as, We shipped a heavy sea at three o'clock in the morning.

Ship.

To SHIP, also implies to fix any thing in its place; as, to ship the oars, i. e. to fix them in their rowlocks. To ship the swivel-guns, is to fix them in their sockets, &c.

SHIP-BUILDING.

SHIP-BUILDING may be defined, The manner of constructing ships, or the work itself; as distinguished from **NAVAL ARCHITECTURE**, which may be considered as the theory or art of delineating ships on

a plane. The latter was referred to this place, that we might avoid the impropriety of giving the theory and practice under different articles.

PART I. ART OF DELINEATING SHIPS ON A PLANE.

ALL edifices, whether civil or military, are known to be erected in consequence of certain established plans, which have been previously altered or improved till they have arrived at the desired point of perfection. The construction of ships appears also to require at least as much correctness and precision as the buildings which are founded upon *terra firma*: it is therefore absolutely necessary that the mechanical skill of the shipwright should be assisted by plans and sections, which have been drawn with all possible exactness, examined by proper calculations, and submitted to the most accurate scrutiny.

Naval architecture may be distinguished into three principal parts.

First, To give the ship such an exterior form as may be most suitable to the service for which she is designed.

Secondly, To give the various pieces of a ship their proper figures; to assemble and unite them into a firm compact frame, so that by their combination and disposition they may form a solid fabric, sufficient to answer all the purposes for which it is intended. And,

Thirdly, To provide convenient accommodations for the officers and crew, as well as suitable apartments for the cargo, furniture, provisions, artillery, and ammunition.

The exterior figure of a ship may be divided into the bottom and upper works.

The bottom, or quick-work, contains what is termed the *hold*, and which is under water when the ship is laden. The upper works, called also the *dead-work*, comprehend all that part which is usually above the water when the ship is laden.

The figure of the bottom is therefore determined by the qualities which are necessary for the vessel, and conformable to the service for which she is proposed.

The limits of our design will not admit of a minute description and enumeration of all the pieces of timber which enter into the construction of a ship, nor of a particular description of their assemblage and union, or the manner in which they reciprocally contribute to the solidity of those floating citadels. It nevertheless appears necessary to give a general idea of the use, figure, and station of the principal pieces, to those who are entirely unacquainted with the subject. As our definitions will be greatly illustrated by the proper figures, we have annexed to this article a plate, which comprehends some of the most material draughts, as

well as a representation of the principal pieces employed in naval architecture.

It is usual among shipwrights to delineate three several draughts.

First, The whole length of the ship is represented according to a side-view, perpendicular to the keel, and is termed the *plane of elevation*, or *sheer-draught*. Plate CCXLVI. fig. 1.

Second, The ship is exhibited according to an end-view, and stripped of her planks, so as to present the outlines of the principal timbers; and this is properly termed the *plane of projection*, or the *vertical plane of the timbers*, (fig. 4.) because it shows the projection of their frames relatively to each other.

Third, It is not sufficient to have the vertical curves of the bottom in different places, for a distinct idea of the horizontal curves is also equally necessary and useful: this is obtained by means of water-lines, traced upon what is called the *horizontal plane*, (fig. 2.) In this draught the curves of the transoms called the *round-ast* is also marked, and sometimes the breadth and thickness of the timbers.

The plane of elevation (fig. 1.) determines the length and depth of the keel; the difference of the draughts of water; the length and projection, or rake, of the stem and stern-post; the position of the mid-ship-frame upon the keel, together with that of the principal frames afore and abaft; the load-water line; the wales; the dimensions and situations of the gunports; the projection of the rails of the head and stern-gallery; with the stations of the masts and channels.

This draught, however, conveys no idea of the vertical curve of the ribs or timbers; for as their projection will be only represented in a plane elevated upon the length of the keel, they will appear in this direction no otherwise than as straight lines. To perceive these curves accurately, they must be regarded in another point of view; which will represent their projection upon a vertical plane, supposed to cut the keel at right angles in the place where the ship is broadest. For as all ships are broader near the middle of their length than towards the extremities, it is evident that the timbers are more extended in proportion. The most capacious of these represents what is called the *midship-frame*; and upon the area of this frame is delineated the projection of all the others.

Thus the plane of projection limits the different breadths of a ship in various points of her length, and exhibits the outline of the timbers respectively to each other.

† See
Pl. CLIX.
fig. 2.

other as they are erected upon the keel. Accordingly, this draught ought to present a variety of sections of the ship in different places of her length, and always perpendicular to the surface of the water; so that the eye of the observer, when placed in what may be properly termed the *axis* of the ship, may perceive the several sections at one glance; that is to say, when looking full on the stem from before the ship †, he shall discover the fore-timbers; and when looking from behind, directly on the stern, he shall perceive the form of the after-timbers. See Plate of STERN, fig. 2. 3. at the article STERN; in both of which figures the sections of the inferior timbers are expressed by curved black lines drawn upon the area of the midship-frame, which is already described to be a plane elevated perpendicularly upon the keel at the extreme breadth of the vessel. See MIDSHIP-FRAME.

To form a just idea of this plane, therefore, we ought to suppose a ship resting upon the stocks, in the same position as when afloat upon the water. Thus a variety of black vertical lines may be drawn at equal distances upon the bottom, which is white, to form different outlines of the ship corresponding to the timbers within. It is to be observed, that the fashion of the inferior timbers must conform to the figure of the midship-frame, which is placed in the fullest part of the ship; and as the planes of all the other timbers diminish in a certain progression as they approach the stem and stern, they are properly delineated on the plane of the midship-frame, which also represents the depth of the keel and length of the midship-beam.

As the two sides of a ship ought to be exactly alike, it is judged sufficient to represent the sections of the fore-part of the ship on the left side, and those in the after-part on the right side, so as to perceive all the sections, as well as before as abaft, upon one plane. See Plate CCLXVI. fig. 4.

However necessary it may be to understand precisely the vertical curves of the bottom, it is no less requisite to have a just idea of those which are horizontal.

The horizontal, or floor-plane, is that upon which the whole frame is erected, and will be more clearly understood by previously describing the water-lines and ribbands of which it is composed.

When a ship floats upon the stream, it is evident that her upper works will be separated from the bottom by the surface of the water, which will accordingly describe an imaginary horizontal line upon the bottom from the stem to the stern-post.

The most elevated of those lines is termed the *load water-line*, which is supposed to be drawn by the surface of the water on the upper part of the bottom, when she is sufficiently laden for a sea-voyage. For if we suppose this surface a rule, and thereby describe a corresponding black line along the vessel's bottom, that line will be distinguished upon the bottom, which is white, and represent what is called the *load water-line*.

If the ship is lightened of any part of her lading, and preserves the same difference in her draught of water at the two ends; or, what is the same thing, if she is lightened so as to preserve the same equilibrium of the keel with regard to the surface of the water, it is evident that she will rise higher out of the water, so that the black line already described will be elevated

above it; and another black line may be delineated upon the bottom, close to the surface of the water, which will exhibit a second water-line parallel to the first, but nearer the keel, in proportion to the number of feet which the ship has risen.

Thus by lightening a ship gradually, and at the same time preserving the direction of her keel, or the angle which the keel makes with the surface of the water, a variety of water-lines may be drawn parallel to each other and to the load water-line. See a farther illustration of these lines in the article WATER-LINE.

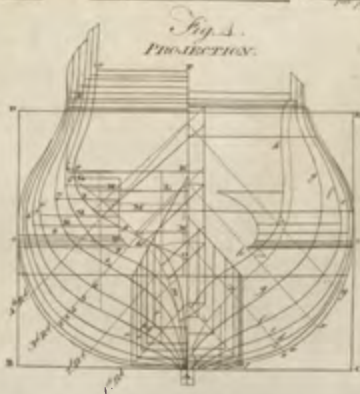
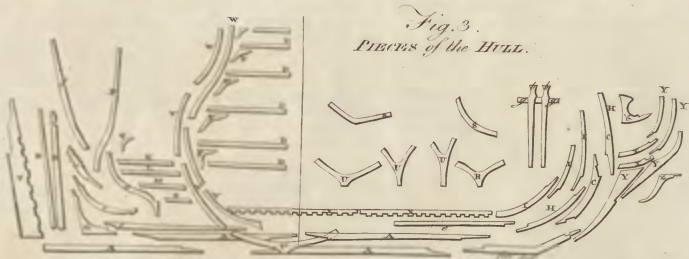
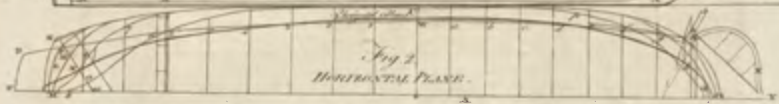
The ribbands are likewise of great utility in ship-building; they are narrow and flexible planks placed on the bottom at different heights, so as to form a sort of mould for stationing the inferior timbers between the principal ones. They differ from the water-lines, inasmuch as the latter have only one curve, which is horizontal; whereas the ribbands, besides their horizontal one, have a vertical curve. To convey a just idea of these curves, which cannot be represented on one draught at their full length, without an oblique section of the ship's length, it will be necessary to have recourse to two planes; that of the elevation, which exhibits their vertical curve; and to the floor-plane, upon which the horizontal curve is expressed. See RIBBAND, and TIMBER.

These different lines are extremely useful in exhibiting the various curves of a ship's bottom, that as they are gradually diminished, their uniformity or irregularity may be discovered by the skilful artist.

The qualities required in a ship ought to determine the figure of the bottom. A ship of war, therefore, should be able to sail swiftly, and carry her lower tier of guns sufficiently out of the water; otherwise a small ship will have the advantage of a large one, inasmuch as the latter cannot open her lower battery in a fresh side-wind without being exposed to extreme danger by receiving a great quantity of water in at her ports between decks. A merchant-ship ought to contain a large cargo of merchant-goods, and be navigated with few hands: And both should be able to carry sail firmly; steer well; drive little to leeward; and sustain the shocks of the sea without being violently strained.

The first thing to be established in the draught of a ship is her length; and as a ship of war, according to her rate, is furnished with a certain number of cannon, which are placed in battery on her decks, it is necessary that a sufficient distance should be left between their ports to work the guns with facility; and particularly to leave space enough between the foremost gun and the stem, and between the aftmost gun and the stern-post on each side, on account of the arching or inward curve of the ship toward her extremities.

When the length of a ship is determined, it is usual to fix her breadth by the dimensions of the midship-beam. On this occasion the shipwrights, for the most part, are conducted by rules founded on their own observation; for having remarked, that some vessels, which by repeated experience have been found to answer all the purposes of navigation, have a certain breadth in proportion to their length, they have inferred that it would be improper to depart from this proportion: but as other ships have been constructed with



with different breadths, which were equally perfect, a variety of different general rules have been adopted by these artists; who are accordingly divided in their opinions about the breadth which ought to be assigned to a ship relatively with her length, whilst each one produces reasons and experience in support of his own standard. Those who would diminish the breadth, allege, 1. That a narrow vessel meets with less resistance in passing through the water: 2dly, That by increasing the length she will drive less to leeward: 3dly, That, according to this principle, the water-lines will be more conveniently formed to divide the fluid: 4thly, That a long and narrow ship will require less sail to advance swiftly; that her masts will be lower, and her rigging lighter; and, by consequence, the seamen less fatigued with managing the sails, &c. Those, on the contrary, who would enlarge the breadth, pretend, 1st, That this form is better fitted to preserve a good battery of guns: 2dly, That there will be more room to work the guns conveniently: 3dly, That, by carrying more sail, the ship will be enabled to run faster; or, that this quality will at least overbalance the advantage which the others have of more easily dividing the fluid: 4thly, That being broader at the load-water line, or place where the surface of the water describes a line round the bottom, they will admit of being very narrow on the floor, particularly towards the extremities: And, 5thly, That a broad vessel will more readily rise upon the waves than a narrow one. From such opposite principles has resulted that variety of standards adopted by different shipwrights.

It has been remarked above, that a ship of war must carry her lower tier of cannon high enough above the water, otherwise a great ship which cannot open her lower battery, when sailing with a fresh side-wind, may be taken by a small one that can make use of her cannon.

A ship should be duly poised, so as not to dive or pitch heavily, but go smooth and easy through the water, rising to the waves when they run high and the ship has reduced her sail to the storm; otherwise they will break aboard, and strain the decks or carry away the boats; the masts are likewise in great danger from the same cause.

A ship should sail well when large and before the wind, but chiefly close-hauled, or with a side-wind, and her sails sharp-trimmed, and then not fall off to the leeward.

Now, the great difficulty lies in uniting so many different qualities in one ship; which seems to be nearly impossible: the whole art, therefore, consists in forming the body in such a manner that none of these qualities should be entirely destroyed, and in giving a preference to that which is chiefly required in the particular service for which the vessel is designed. We shall briefly show the possibility of uniting them all in one ship, that each of them may be easily discerned: when it happens otherwise, the fault must lie in the builder, who has not applied himself to study the fundamental rules and principles of his art.

To make a ship carry a good sail. A flat floor-timber, and somewhat long, or the lower futtock pretty round, a straight upper futtock, the top-timber to throw the breadth out aloft; at any rate, to carry her main breadth as high as the lower decks. Now, if

the rigging be well adapted to such a body, and the upper works lightened as much as possible, so that they all concur to lower the centre of gravity, there will be no room to doubt of her carrying a good sail.

To make a ship steer well, and answer the helm quickly. If the fashion-pieces be well formed, the tuck, or spreading parts under the stern, carried pretty high, the midship-frame well forward, a considerable difference in the draught of water abaft more than before, a great rake forward and none abaft, a snug quarter-deck and fore-castle; all these will make a ship steer well. A ship which sails well will certainly steer well.

To make a ship carry her guns well out of the water. A long floor-timber, and not of great rising; a very full midship-frame, and low tuck, with light upper works.

To make a ship go smoothly through the water without pitching hard. A long keel, a long floor, not to rise too high afore and abaft; but the area or space continued in the fore-body, according to the respective weights they are to carry; all these are necessary to make a ship go smoothly through the water.

To make a ship keep a good wind, and drive little to the leeward. A good length by the keel; not too broad, but pretty deep in the hold, which will occasion her to have a short floor-timber and a great rising. As such a ship will meet with great resistance in the water going over the broadside, and little when going ahead, she will not fall much to the leeward.

Now, some builders imagine it is impossible to make a ship carry her guns well, bear a good sail, and be a prime sailer; because it would require a very full bottom to gain the first two qualities, whereas a sharp ship will answer better for the latter: but when it is considered that a full ship will carry a great deal more sail than a sharp one, a good artist may so form the body, as to have all these three good qualities, and also steer well.

We shall now proceed to describe the principal pieces of which a ship is composed, and to explain the principal draughts used in the construction thereof.

As the several lines exhibited in the planes of elevation, projection, &c. will be rendered more intelligible by a previous account of those pieces, it may not be improper to begin with reciting their names, and giving a summary description of their uses and stations. They are for the most part represented according to the order of their disposition in that part of Plate CCLXVI. which is termed *pieces of the hull*.

A. The pieces which compose the keel, to be securely bolted together, and clinched.

B. The stern-post, which is tenanted into the keel, and connected to it by a knee, G. It supports the rudder, and unites the sides of the ship abaft.

C. The stem, which is composed of two pieces scarfed together: it is an arching piece of timber, into which the ship's sides are united forwards.

D. The beams, which are used to support the decks, and confine the sides to their proper distance.

E. The false post, which serves to augment the breadth of the stern-post, being also tenanted into the keel.

F. The knees which connect the beams to the sides.

Plate
CCLXVII.
fig. 3.

G. The knee of the stern-post, which unites it to the keel.

H. The apron, in two pieces: it is fayed on the inside of the stem, to support the scarf thereof; for which reason the scarf of the former must be at some distance from that of the latter.

I. The stemson, in two pieces, to reinforce the scarf of the apron.

K. The wing-transom: it is fayed across the stem-post, and bolted to the head of it, having its two ends let into the fashion-pieces.

L. The deck-transom, parallel to the wing-transom, and secured in the same manner.

M N. The lower transoms.

O. The fashion-piece on one side; the heel of it is connected with the dead-wood, and the head is secured to the wing-transom.

P. The top-timbers, or upper parts of the fashion-pieces.

Q. The knees, which fashion the transoms to the ship's side.

R. The breast-hooks, in the hold; they are fayed across the stem, to strengthen the fore-part of the ship.

S. The breast-hooks of the deck: they are placed immediately above the former, and used for the same purposes.

T. The rudder, which is joined to the stern-post by hinges, and serves to direct the ship's course.

U. The floor-timbers; they are laid across the keel, to which they are firmly bolted.

V. The lower futtocks, and,

W. The top-timbers, which are all united to the floor-timbers, forming a frame that reaches from the keel to the top of the side.

X. The pieces which compose the kelson: they are scarfed together like the keel pieces, and placed over the middle of the floor-timbers, upon each of which they are scored about an inch and a half, as exhibited by the notches.

Y. The several pieces of the knee of the head; the lower part of which is fayed to the stem; the heel being scarfed to the fore-foot.

Z. The cheeks of the head or knees, which connect the head to the bows on each side.

&. The standard of the head, which fastens it to the stem.

a. The cat-heads, one of which lies on each bow, projecting outwards like the arm of a crane. They are used to draw the anchors up to the top of the side without injuring the bow.

b. The bits, to which the cable is fastened when the ship rides at anchor.

c. The false post, in two pieces, fayed to the fore-part of the stern-post.

d. The side-counter-timbers, which terminate the ship abait within the quarter-gallery.

e e. Two pieces of dead-wood, one afore and another abait, fayed on the keel.

In vessels of war, the general dimensions are established by authority of officers appointed by the government to superintend the building of ships. In the merchant-service, the extreme breadth, length of the keel, depth in the hold, height between decks and in the wale, are agreed on by contract;

and from these dimensions the shipwright is to form a draught suitable to the trade for which the ship is designed. Plate
CCLXVI.
fig. 3.

In projecting the draught of a vessel of war, the first article to be considered is her length. As all ships are much longer above than below, it is also necessary to distinguish the precise part of her height from which her length is taken: this is usually the lower gun-deck, or the load water-line. It has been already observed, that water-lines are described longitudinally on a ship's bottom by the surface of the water in which she floats, and that the line which determines her depth under the water is usually termed the load water-line. In this draught it will be particularly necessary to leave sufficient distance between the ports.

The next object is to establish the breadth by the midship-beam. Although there is great difference of opinion about proportioning the breadth to the length, yet it is most usual to conform to the dimensions of ships of the same rate. After the dimensions of the breadth and length are determined, the depth of the hold must be fixed, which is generally half the breadth: but the form of the body should be considered on this occasion; for a flat floor will require less depth in the hold than a sharp one. The distance between the decks must also be settled.

We may then proceed to fix the length of the keel; by which we shall be enabled to judge of the rake of the stem and stern-post. The rake is known to be the projection of the ship at the height of the stem and stern-post beyond the ends of the keel afore and abaft, or the angle by which the length is increased as the fabric rises. To these we may also add the height of the stem and wing-transom.

After these dimensions are settled, the timbers may be considered which form the sides of the ship. A frame of timbers, which appears to be one continued piece, is composed of one floor-timber, U, whose arms branch outward to both sides of the ship; two or three futtocks, V V; and a top-timber, W. The futtocks are connected to the upper arms of the floor-timbers on each side of the ship, and serve to prolong the timber in a vertical direction: and the top-timbers are placed at the upper part of the futtocks for the same purpose. All these being united, and secured by cross-bars, form a circular inclosure, which is called a frame of timbers. And as a ship is much broader at the middle than at the extremities, the arms of the floor-timber will form a very obtuse angle at the extreme breadth: but this angle decreases in proportion to the distance of the timbers from the midship-frame, so that the foremost and aftermost ones will form a very acute angle. Floor-timbers of the latter sort are usually called *crutches*.

Shipwrights differ extremely in determining the station of the midship-frame; some placing it at the middle of the ship's length, and others further forward. They who place it before the middle allege, that if a ship is full forwards, she will meet with no resistance after she has opened a column of water; and that the water so displaced will easily unite abaft, and by that means force the ship forward; besides having more power on the rudder, in proportion to its distance from the centre of gravity: this also comes nearer the form

form of filles, which should seem the most advantageous for dividing the fluid.

When the rising of the midship-floor-timber is decided, we may then proceed to describe the rising-line of the floor, on the stern-post abaft, and on the stem afore.

The height of the lower-deck is the next thing to be considered: it is determined in the middle by the depth of the hold; and some builders make it no higher than the stem; but they raise it abaft as much above its height in the middle as the load water-mark, or draught of water abaft, exceeds that afore. With regard to the height between decks, it is altogether arbitrary, and must be determined by the rate of the ship and the service she is designed for.

It is also necessary to remember the sheer of the wales, and to give them a proper hanging; because the beauty and stateliness of a ship greatly depend upon their figure and curve, which, if properly drawn, will make her appear airy and graceful on the water.

We come now to consider the upper works, and all that is above water, called the *dead-work*: and here the ship must be narrower, so that all the weight lying above the load water-line will thereby be brought nearer the middle of the breadth, and of course the ship will be less strained by the working of her guns, &c. But although some advantages are acquired by diminishing the breadth, above water, we must be careful not to narrow her too much; as there must be sufficient room left on the upper deck for the guns to recoil. The security of the masts should likewise be remembered, which requires sufficient breadth to spread the shrouds. A deficiency of this sort may indeed be in some measure supplied by enlarging the breadth of the channels.

We come to explain the sheer-draught, or plane of ELEVATION of a sixty-gun ship; wherein we have been attentive to make the same letters refer to the same objects, as in the explanation of the PIECES, as above; at least when the same objects are in both figures.

Fig. 1.

A A. Is the keel, whose upper edge is prolonged by the dotted line *p q*, upon the extremities of which are erected perpendiculars which determine the height of the wing-transom K, and the length of the gun-deck K C.

A B. The stern-post.

A C. The stem.

D D. The quarter-gallery, with its windows.

E F. The quarter-pieces, which limit the stern on each side.

F. The taffarel, or upper piece of the stern.

F G. Profile of the stern, with its galleries.

H. The gun-ports.

I. The channels, with their dead-eyes and chain-plates.

K. The wing-transom.

K G. The counter.

L B. The deck-transom.

M N O. The first, second, and third transoms, of which O k is the third or lowest.

m O L P. The direction of the fashion-piece, having its breadth canted ast towards the stern.

Q R. The main sheeds, for hoisting in the boats clear of the ship's side.

L Q Z. The main-wale, with its sheer afore and abaft.

D K X. The channel-wales, parallel to the main-wale.

S U S. The sheer-rail, parallel to the wales.

T t. The rudder.

A t F. The rake of the stern.

V W V. The waist-rail.

P i i. The drift-rails abaft; and i a, the drift-rails forward.

T U C. The water-line.

X X. The rails of the head.

Y. The knee of the head, or cutwater.

Z Z. The cheeks of the head.

a a. The cat-head.

M ⊕ C. The rising line of the floor.

k u C. The cutting-down line, which limits the thickness of all the floor-timbers, and likewise the height of the dead-wood afore and abaft.

⊕ a U W. The midship-frame.

a, b, c, d, e, f, g, h. The frames or timbers in the fore-body of the ship, i. e. before the midship frame.

1, 2, 3, 4, 5, 6, 7, 8, 9. The timbers in the after-body, or which are erected abaft the midship-frame.

As the eye of a spectator is supposed in the projection to view the ship's side in a line perpendicular to the plane of elevation, it is evident that the convexity will vanish, like that of a cylinder or globe, when viewed at a considerable distance; and that the frames will consequently be represented by straight lines, except the fashion-piece abaft and the knuckle-timber forward.

It has been already observed, that the plane of projection may be defined a vertical delineation of the curves of the timbers upon the plane of the midship-frame, which is perpendicular to that of the elevation. It is necessary to observe here, that the various methods by which these curves are described, are equally mechanical and arbitrary. In the latter sense, they are calculated to make a ship fuller or narrower, according to the service for which she is designed; and in the former they are drawn according to those rules which the artist has been implicitly taught to follow, or which his fancy or judgment has esteemed the most accurate and convenient. They are generally composed of several arches of a circle, reconciled together by moulds framed for that purpose. The radii of those arches, therefore, are of different lengths, according to the breadth of the ship in the place where such arches are swept; and they are expressed on the plane of projection either by horizontal or perpendicular lines: the radii of the breadth-sweeps being always in the former, and the radii of the floor-sweeps in the latter direction. These two arches are joined by a third, which coincides with both, without intersecting either. The curve of the top-timber is either formed by a mould which corresponds to the arch of the breadth-sweep, or by another sweep whose centre and radius are without the plane of projection. The breadth of the ship, at every top-timber, is limited by an horizontal line drawn on the floor-plane, called the *half-breadth of the top-timbers*. The extreme breadth is also determined by another horizontal line on the floor-plane; and the lines of half-breadth are thus mutually transferable, from the projection and floor-planes, to each other.

Plate
CCLXVI.

The necessary data by which the curves of the timbers are delineated, then, are the perpendicular height from the keel; the main, or principal breadth; and the top-timber breadth: for as a ship is much broader near the middle of her length than towards the end, so the is broader in the middle of her height than above and below; and this latter difference of breadth is continued throughout every point of her length. The main breadth of each frame of timbers is therefore the ship's breadth nearly in the middle of her height in that part: and the top-timber breadth is the line of her breadth near the upper ends of each timber. It has been already observed, that as both sides of a ship are alike, the artificers only draw one side, from which both sides of the ship are built: therefore the timbers abaft the midship-frame are exhibited on one side of the plane of projection, and the timbers before it on the other.

Plane of Projection.

Fig. 4.

A, The keel.

BC, The line which expresses the upper edge of the keel, from which the height of each timber and height of its different breadths are measured.

BD, and CE, Perpendiculars raised on the line BC, to limit the ship's extreme breadth and height amid-ships; or, in other words, to limit the breadth and height of the midship-frame.

AF, A perpendicular erected from the middle of the keel to bisect the line of the ship's breadth in two equal parts.

F * g, The half-breadth line of the aftmost top-timber; being the uppermost horizontal line in this figure.

Note, The seven lines parallel to and immediately under this, on the right-side of the line AF, are all top-timber half-breadths, abaft the midship-frame; the lowest of which coincides with the horizontal line DE.

The parallel horizontal lines nearly opposite to these, on the left side of the line AF, represent the top-timber half-breadths in the fore-body, or the half-breadths of the top-timbers before the midship-frame.

G, H, I, Q, R, S, T, The radii of the breadth-sweeps abaft the midship-frame; those of the breadth-sweeps in the fore-body, or before the midship-frame are directly opposite on the right side.

⊕ A, The midship-frame, from the extreme breadth downwards.

1, 2, 3, 4, 5, 6, 7, 8, 9, The outlines of the timbers abaft the midship-frame, in different parts of their height.

a, b, c, d, e, f, g, h, The outlines of the timbers before the midship-frame, in different parts of their height, b being the foremost or knuckle timber.

K i, the wing-transom, whose ends rest upon the fashion-piece.

L, The deck-transom, parallel to and under the wing-transom.

M N O, The lower-transoms, of which O k is the third and lowest.

m k P, The dotted line, which expresses the figure of the fashion-piece, without being canted aft.

P, The upper-part, or top-timber of the fashion-piece.

n, o, p, q, r, s, The radii of the floor-sweeps, abaft

the midship-frame: those before the midship-frame are ^{Plate} all parallel. ^{CCLXVI.}

1st R^d, 2d R^d, 3d R^d, 4th R^d, The diagonal ribbands abaft the midships i, u, x, y. The same ribbands expressed in the fore-body.

It has been remarked above, that the horizontal plane is composed of water-lines and ribbands; it also contains the main and top-timber-breadth lines, or the longitudinal lines by which the main-breadth and top-timber-breadth are limited in every point of the ship's length. The horizontal curve of the transoms and harpins are also represented therein; together with the planes of the principal timbers, the cant of the fashion-piece, the length of the rake afore and abaft, the projection of the cat-heads, and the curve of the upper rail of the head, to which the curves of the lower ones are usually parallel.

HORIZONTAL PLANE.

B A C, The line of the ship's length, passing thro' Fig. 2 the middle of the stem and stern-post.

B, The upper-end of the stern-post.

C, The upper-end of the stem.

B F, The length of the rake abaft.

D W X, The top-timber-breadth line, or the line which limits the breadth of each top-timber.

D F, The breadth of the aftmost timber at the taffarel.

B K, The wing-transom.

B L P, The horizontal curve of the deck-transom.

M M, The horizontal curve, or round aft, of the first transom.

M N, The horizontal curve of the second transom: it is prolonged into a water-line, N 8 7.

k O, The horizontal curve of the third transom, which is also prolonged into another water-line, O n,

U, p, Q.

m O P, The plane of the fashion-piece, as canted aft.

⊕ W U, The plane of the midship-frame.

a, b, c, d, e, f, h, The planes of the timbers before the midship-frame.

1, 2, 3, 4, 5, 6, 7, 8, 9, The planes of the timbers abaft the midship-frame.

X X, The figure of the upper-rail of the head.

C Y, The projection of the knee of the head.

The third horizontal ribband is marked on the plate.

a a, The projection of the cat-head.

Thus we have endeavoured briefly to explain the nature and uses of the principal draughts used in the construction of a ship, which reciprocally correspond with each other in the dimensions of length, breadth, and depth. Thus the plane of elevation is exactly of the same length with the horizontal or floor-plane. The several breadths of the timbers in the fore-planes, and that of the projection, are mutually transferable; and the real height of the timbers in the projection exactly conforms to their height in the elevation. Thus let it be required to transfer the height of the wing-transom from the elevation to the projection:

Extend the compasses from the point K, in the elevation, down to the dotted line prolonged from the upper-edge of the keel, and setting the other foot in the point p, then shall the line K p be the perpendicular

cular height in the wing-transom: transfer this from the middle of the line B A C, in the projection, to the point K in the perpendicular A F, then will A K be the height of the wing-transom in the plane of projection: and thus the height of all the transoms may be laid from the former upon the latter.

Again: Let it be required to transfer the main-breadth of the midship-frame from the projection to the horizontal plane: Set one foot of the compasses in the point \oplus on the perpendicular C E, and extend the other along the main-breadth-sweep \oplus G, till it touches the perpendicular A F parallel to C E: lay this distance upon the horizontal plane from the point u in the line of the ship's length, B A C, along the plane of the midship-frame to the point \oplus ; so shall the line W U be the breadth of the midship-frame on the horizontal plane.

Thus also the top-timber-breadth, or the distance of each top-timber from the middle of the ship's breadth, may be in the same manner transferred, by extending the compasses from the line B A C, in

the horizontal plane, to the top-timber-breadth line, Plate CCLXVI. will give its proper dimensions thereon.

In the same manner the breadths of all the timbers may be laid from the projection to the horizontal plane, and *vice versa*, from that to the projection. Thus the height of each timber may also be transferred from the elevation to the projection, &c.

The principal utility of these draughts, therefore, is to exhibit the various curves of the ship's body, and of the pieces of which it is framed, in different points of view, which are either transverse or longitudinal, and will accordingly prevent them in very different directions. Thus the horizontal curves of the transoms and water-lines are represented on the floor-plane, all of which are nearly straight lines in the elevation and projection; and thus the vertical curves of the timbers are all exhibited on the projection, although they appear as straight lines in the elevation and floor-plane.

PART II. OF CONSTRUCTING SHIPS.

THE pieces by which this complicated machine, a ship, is framed, are joined together in various places, by *scarfing, rabitting, tenanting, and scoring*. See those articles.

During the construction of a ship, she is supported in the dock, or upon a wharf, by a number of solid blocks of timber placed at equal distances from and parallel to each other, as may be seen in the article LANCHING; she is then laid to be on the stocks.

The first piece of timber laid upon the blocks is generally the keel: we say *generally*, because, of late, a different method has been adopted in some of the royal dock-yards, by beginning with the floor-timbers; the artists having found that the keel is often apt to rot during the long period of building a large ship of war. The pieces of the keel are scarfed together, and bolted, forming one entire piece, A A, which constitutes the length of the vessel below. At one extremity of the keel is erected the stem. It is a strong piece of timber incurvated nearly into a circular arch, or, according to the technical term, *compassing*, so as to project outwards at the upper-end, forming what is called the *rake forward*. In small vessels this is framed of one piece; but in large ships it is composed of several pieces scarfed and bolted together, as expressed in the explanation of fig. 3. and in those terms separately. At the other extremity of the keel is elevated the stern-post, which is always of one entire straight piece. The heel of it is let into a mortise in the keel, and having its upper end to hang outwards, making an obtuse angle with the keel, like that of the stem: this projection is called the *rake abaft*. The stern-post, which ought to support the stern, contains the iron-work, or hinges of the rudder, which are called *googings*, and unites the lower-part of the ship's sides abaft. See the connection of those pieces in the *Elevation*, fig. 1.

Towards the upper-end of the stern-post, and at right angles with its length, is fixed the middle of the wing-transom, where it is firmly bolted. Under this

is placed another piece parallel thereto, and called the *deck-transom*, upon which the after-end of the lower-deck is supported. Parallel to the deck-transom, and at a proper distance under it, another piece is fixed to the stern-post, called the *first transom*; all of which serve to connect the stern-post to the fashion-pieces. Two more transoms, called the *second* and *third*, are also placed under these, being likewise attached to the fashion-pieces, into which the extremities of all the transoms are let. The fashion-pieces are formed like the other timbers of the ship, and have their heels resting on the upper-part of the keelson, at the after-extremity of the floor-ribsands.

All these pieces, viz. the transoms, the fashion-pieces, and their top-timbers, being strongly united into one frame, are elevated upon the stern-post; and the whole forms the structure of the stern, upon which the galleries and windows, with their ornaments, are afterwards built.

The stem and stern-post being thus elevated upon the keel, to which they are securely connected by knees and arched pieces of timber bolted to both; and the keel being raised at its two extremities by pieces of dead-wood, the midship floor-timber is placed across the keel, whereto it is bolted through the middle. The floor-timbers before and abaft the midship-frame are then stationed in their proper places upon the keel; after which the keelson, which, like the keel, is composed of several pieces scarfed together, is fixed across the middle of the floor-timbers, to which it is attached by bolts driven through the keel, and clinched on the upper-part of the keelson. The futtocks are then raised upon the floor-timbers, and the hawse-pieces erected upon the cant-timbers in the fore-part of the ship. The top-timbers on each side are next attached to the head of the futtocks, as already explained in Part I. The frames of the principal timbers being thus completed, are supported by ribsands. See RIBSANDS.

The

The ribs of the ship being now stationed, they proceed to fix on the planks, of which the wales are the principal, being much thicker and stronger than the rest; as is represented in the *MIDSHIP-Frame*. The harpins, which may be considered as a continuation of the wales at their fore-ends, are fixed across the hawse-pieces, and surround the fore-part of the ship. The planks that inclose the ship's sides are then brought about the timbers; and the clamps, which are of equal thickness with the wales, fixed opposite to the wales within the ship: these are used to support the ends of the beams, and accordingly stretch from one end of the ship to the other. The thick-stuff, or strong planks of the bottom within-board, are then placed opposite to the several scarfs of the timbers, to reinforce them throughout the ship's length. The planks employed to line the ship, called the *ceiling*, or *foot-waling*, is next fixed in the intervals between the thick-stuff of the hold. The beams are afterwards laid across the ship to support the decks, and are connected to the side by lodging and hanging knees; the former of which are exhibited in their proper stations in Plate LXXXVIII. F. and the hanging ones, together with the breadth, thickness, and position of the keel, floor-timbers, futtocks, top-timbers, wales, clamps, thick-stuff, planks within and without, beams, decks, &c. are seen in the *MIDSHIP-Frame*.

The cable-bits being next erected, the *carlings* (A), and *ledges* (B), which are represented in Pl. LXXXVIII. are disposed between the beams to strengthen the deck. The water-ways are then laid on the ends of the beams throughout the ship's length, and the spiricketing fixed close above them. The upper-deck is then planked, and the string placed under the gunnel or plash-er in the waist. The disposition of those latter pieces on the timbers, viz. the water-ways, spiricketing, upper-deck, string, and gunnel, are also represented in the *MIDSHIP-Frame*.

They proceed next to plank the quarter-deck and fore-castle, and to fix the partners of the masts and capsterns with the coamings of the hatches. The breast-hooks are then bolted across the stem and bow within-board; the step of the fore-mast placed on the keelson; and the riders, exhibited in the *MIDSHIP-Frame*, fayed on the inside of the timbers to reinforce the sides in different places of the ship's length. The pointers, if any, are afterwards fixed across the hold

diagonally to support the beams; and the crotches stationed in the after-hold to unite the half-timbers. The steps of the main-mast and capsterns are next placed; the planks of the lower-decks and orlop laid; the navel-hoods fayed on the hawse-holes; and the knee of the head, or cutwater, connected to the stem. The figure of the head is then erected, and the trail-board and cheeks are fixed on the sides of the knee.

The taffare and quarter-pieces, which terminate the ship abaft, the former above and the latter on each side, are then disposed; and the stern and quarter galleries framed and supported by their brackets. The pumps, with their well, are next fixed in the hold; the limber-boards laid on each side of the keelson; and the garboard strake fixed on the ship's bottom next to the keel without.

The hull being thus fabricated, they proceed to separate the apartments by bulk-heads, or partitions; to frame the port-lids; to fix the cat-heads and ches-trees; to form the hatchways and scuttles, and fit them with proper covers or gratings. They next fix the ladders whereby to mount or descend the different hatchways; and build the manger on the lower-deck, to carry off the water that runs in at the hawse-holes when the ship rides at anchor in a sea. The bread-room and magazines are then lined; and the gunnel, rails, and gangways, fixed on the upper part of the ship. The clats, kevels, and ranges, by which the ropes are fastened, are afterwards bolted or nailed to the sides in different places.

The rudder, being fitted with its irons, is next hung to the stern-post; and the tiller, or bar, by which it is managed, let into a mortise at its upper-end. The scuppers, or leaden tubes, that carry the water off from the decks, are then placed in holes cut through the ship's sides; and the standards, represented in the *MIDSHIP-Frame*, bolted to the beams and sides above the decks to which they belong. The poop-lanterns are last fixed upon their cranes over the stern; and the bilge-ways, or cradles, placed under the bottom, to conduct the ship readily into the water whilst launching.

As the various pieces which have been mentioned above, are explained at large in their proper places, it would have been superfluous to have entered into a more particular description of them here.

S H I

Ship-money.

SHIP-Money, was an imposition charged upon the people, towns, cities, boroughs, and counties of this realm, in the reign of king Charles I. by writs, commonly called *ship-writs*, under the great seal of England, in the years 1635 and 1636, for the providing and furnishing certain ships for the king's service, &c. which was declared to be contrary to the laws and statutes of this realm, the *petition of right* and liberty of the subject, by stat. 17 Car. I. c. 14. See *Blackst. Comment* Vol. IV. p. 30.

SHIP-Shape, according to the fashion of a ship, or in the manner of an expert sailor; as, The mast is not

S H I

rigged ship-shape; Trim your sails ship-shape.

Shipping.

SHIPPING, a multitude of vessels. Thus we say, The harbour is crowded with shipping.

Defending Ships from Lightning. This is effected either by a continued conductor or chain, fixed to the top of the highest mast, and brought from thence into the sea. For the greater security, a chain or conductor may be affixed to each mast. See the articles *ELECTRICITY* and *LIGHTNING*.

Of late it has been observed, that a coating of lamp-black and tar is an effectual security against any stroke of lightning. But this acts not in the way of a conductor,

(A) These are short pieces of timber ranging fore and aft, from one of the deck-beams to another, into which their ends are scored: they are used to sustain and fortify the smaller beams of the ship.

(B) These are certain small pieces of timber placed athwart-ships, under the decks of a ship, in the interval between the beams; as exhibited in the representation of the deck, Plate LXXXVIII.

Shire,
Shirley.

ductor, but as a repellent; being such a strong negative electric, that lightning itself seems unable to pierce it. However, though this would effectually protect the malts, it might otherwise be very dangerous, as the electric matter repelled from the malt might dart down upon the decks, and be productive of incredible mischief. The conductors or chains are therefore preferable, and should always be conveyed into the sea by the shortest way possible.

SHIRE, a Saxon word signifying a division; but a county, *conitatus*, is plainly derived from *comes*, the "count of the Franks;" that is, the earl, or alderman (as the Saxons called him) of the shire, to whom the government of it was intrusted. This he usually exercised by his deputy, still called in Latin *vice-comes*, and in English the *sheriff*, *shrieve*, or *shire-reeve*, signifying the "officer of the shire;" upon whom, by process of time, the civil administration of it is now totally devolved. In some counties there is an intermediate division between the shire and the hundred; as lathes in Kent, and rapes in Suffex, each of them containing about three or four hundreds a-piece. These had formerly their lathes-reeves and rape-reeves, acting in subordination to the shire-reeve. Where a county is divided into three of these intermediate jurisdictions, they are called *trithings*, which were anciently governed by a trithing-reeve. These trithings still subsist in the large county of York, where, by an easy corruption, they are denominated *ridings*; the north, the east; and the west riding.

SHIRLEY (James), an eminent English poet in the 17th century, was born at London about the year 1594. He was educated at Merchant-taylor's school, and thence removed to Oxford. Some time after he went to Cambridge, where, entering into holy orders, he took cure at or near St Albans. In the mean time, growing unsettled in his principles, he changed his religion for that of Rome, left his living, and taught a grammar-school in St Albans. But this employment becoming uneasy to him, he retired to London, lived in Gray's Inn, and became a writer of plays. By this he gained not only a livelihood, but also great respect and encouragement from persons of quality; especially from the queen, wife to king Charles I. who made him her servant. When the rebellion broke out, he was obliged to leave London with his family, (for he had a wife and children); and being invited by his patron, William, earl, afterwards duke, of Newcastle, to follow his fortune in the civil wars, he attended his lordship. On the decline of the king's cause he retired to London; where, among others of his friends, he found Mr Stanley, author of the *Lives of the Philosophers*, who supported him for the present. The acting of plays being prohibited, he returned to his old occupation of teaching school; which he did at White-Friars. At the Restoration, several of his plays were acted with applause. In 1666 he was forced, by the great fire, from his house near Fleet-street, into St Giles's in the Fields; where both he and his wife, being exceedingly afflicted by the loss and terror which the fire had occasioned, died within the space of 24 hours. He was by many considered as one of the most noted dramatic poets of his time; and some thought him even equal to Fletcher. Besides his plays, which are 38 in number, he wrote a volume of poems, and some tracts on grammar.

Shirt
||
Shoe.

SHIRT, a loose garment, commonly of linen, worn next the body.—Some dispute about changing the linen when a person is sick. Clean linen promotes perspiration, and it may be renewed as often as the patient pleases, whether the disorder be of the acute or the chronic kind. Except during a crisis in fevers, whilst the patient is in a sweat, a change of linen, if well dried and warmed, may be daily used.

SHIVERS, in the sea-language, names given to the little rollers, or round wheels of pulleys.

SHOAD, among miners, denotes a train of metalline stones, serving to direct them in the discovery of mines.

SHOAL, in the sea language, denotes a place where the water is shallow.

SHOCK, in electricity. The effect of the explosion of a charged body, that is, the discharge of its electricity on any other body, is called the *electric shock*.

SHOE, a covering for the foot, usually of leather.

Its structure, though the object of a particular art, is too popular to need explaining. See **CORDEWAINER**.

Its history is more obscure. Bened. Baudoin, a shoemaker by profession, has a learned treatise of the ancient shoe, *De solea veterum*; where the origin, matter, form, &c. thereof, are particularly inquired into.—Baudoin maintains, that God, in giving Adam skins of beasts to clothe him, did not leave him to go barefooted, but gave him shoes of the same matter. That after raw skins, men came to make their shoes of rushes, broom, paper, flax, silk, wood, iron, silver, and gold: so different has their matter been.—Nor was their form more stable, with regard either to the shape, colour, or ornaments: they have been square, high, low, long; and quite even, cut, carved, &c.

Pliny, *lib. vii. c. 56*. tells us, that one Tychius of Bæotia was the first who used shoes.—M. Nilant, in his remarks upon Baudoin, observes, that he quotes Xenophon in vain, to show that even in his time they still wore shoes of raw skins. Xenophon relates, that the 10,000 Greeks who had followed the young Cyrus, wanting shoes in their retreat, were forced to cover their feet with raw skins, which occasioned them great inconveniences. Nilant will not even allow that the shoes of the country-people, called *carbatine* and *peroneæ*, were of crude skin, without any preparation.

The patricians among the Romans wore an ivory crescent on their shoes. Heliogabalus had his shoes covered over with a very white linen; in conformity to the priests of the sun, for whom he professed a very high veneration: this kind of shoe was called *stola*, *ada*, or *odo*. Caligula wore shoes enriched with precious stones. The Indians, like the Egyptians, wore shoes made of the bark of the papyrus. The Turks put off their shoes, and leave them at the doors of their mosques.

SHOE of an Anchor, a small block of wood, convex on the back, and having a small hole, sufficient to contain the point of the anchor-fluke, on the fore-side. It is used to prevent the anchor from tearing or wounding the planks on the ship's bow, when ascending or descending; for which purpose the shoe slides up and down along the bow, between the fluke of the anchor and the planks, as being pressed close to the latter by the weight of the former.

To SHOE an Anchor, is to cover the flukes with a broad triangular piece of plank, whose area or superficies.

Shoe.

ficies is much larger than that of the flukes. It is intended to fix the anchor a stronger and surer hold of the bottom in very soft and oozy ground.

Horse-Shoe, a plate of iron, of a certain form, nailed to the feet of horses, to defend and preserve the hoof.

As feet differ, so should shoes accordingly. "The only system of farriers, (Lord Pembroke observes), is to shoe in general with excessive heavy and clumsy ill-shaped shoes, and very many nails, to the total destruction of the foot. The cramps they annex, tend to destroy the bullet; and the shoes made in the shape of a walnut-shell prevent the horse's walking upon the firm basis which God has given him for that end, and thereby oblige him to stumble and fall. They totally pare away also and lay bare the inside of the animal's foot with their detestable butteris, and afterwards put on very long shoes, whereby the foot is hindered from having any pressure at all upon the heels, which pressure otherwise might still perchance, notwithstanding their dreadful cutting, keep the heels properly open, and the foot in good order. The frog should never be cut out; but as it will sometimes become ragged, it must be cleaned every now and then, and the ragged pieces pared off with a knife. In one kind of foot indeed a considerable cutting away must be allowed of, but not of the frog: we mean, that very high feet must be cut down to a proper height; because, if they were not, the frog, though not cut, would still be so far above the ground, as not to have any bearing on it, whereby the great tendon must inevitably be damaged, and consequently the horse would go lame.

"The weight of shoes must greatly depend on the quality and hardness of the iron. If the iron be very good, it will not bend; and in this case the shoes cannot possibly be made too light: care, however, must be taken, that they be of a thickness so as not to bend; for bending would force out the nails, and ruin the hoof. That part of the shoe which is next the horse's heel, must be narrower than any other, (as is seen in the draught, Plate CCLXVII. fig. 1.) that stones may be thereby prevented from getting under it, and sticking there: which otherwise would be the case; because the iron, when it advances inwardly beyond the bearing of the foot, forms a cavity, wherein stones being lodged would remain, and, by pressing against the foot, lame the horse. The part of the shoe which the horse walks upon should be quite flat, and the inside of it likewise; only just space enough being left next the foot, to put in a picker, (which ought to be used every time the horse comes into the stable), and also to prevent the shoe's pressing upon the sole. Four nails on each side hold better than a greater number, and keep the hoof in a far better state. The toe of the horse must be cut short, and nearly square, (the angles only just rounded off), nor must any nails be driven there; this method prevents much stumbling, especially in descents, and serves, by throwing nourishment to the heels, to strengthen them; on them the horse should in some measure walk, and the shoe be made of a proper length accordingly; by this means, narrow heels are prevented, and many other good effects produced. Many people drive a nail at the toe, but it is an absurd practice. Leaving room to drive one there causes the foot to be of an improper length; and moreover, that part of the hoof is naturally so brittle, that even when it is

Shoe

kept well greased, the nail there seldom stays in, but tears out and damages the hoof. That the directions for shoeing a proper length may be the more clear and intelligible, we have annexed (Plate CCLXVII.) a draught of a foot shod a proper length standing on a plain surface, and with it a draught of the right kind of shoe.

"In wet, spongy, and soft ground, where the foot sinks in, the pressure upon the heels is of course greater than on hard ground; and so indeed it should be upon all accounts. The hinder-feet must be treated in the same manner as the fore-ones; and the shoes the same: except in hilly and slippery countries, they may not improperly be turned up a little behind; but turning up the fore-shoes is of no service, and is certain ruin to the fore-legs, especially to the bullets. In descending hills, cramps are apt to throw horses down, by flopping the fore-legs, out of their proper basis and natural bearing, when the hinder ones are rapidly pressed; which unavoidably must be the case, and consequently cannot but push the horse upon his nose. With them on a plain surface, a horse's foot is always thrown forwards on the toe, out of its proper bearing, which is very liable to make the horse stumble. The notion of their utility in going up hills is a false one. In ascending, the toe is the first part of the foot which bears on, takes hold of the ground, and whether the horse draws or carries, consequently the business is done before the part where the cramps are comes to the ground. Ice-nails are preferable to anything to prevent slipping, as also to help horses up hill, the most forward ones taking hold of the ground early, considerably before the heels touch the ground: they must be so made, as to be, when driven in, scarce half an inch above the shoe, and also have four sides ending at the top in a point. They are of great service to prevent slipping on all kinds of places; and by means of them a horse is not thrown out of his proper basis. They must be made of very good iron; if they are not, the heads of them will be perpetually breaking off. From the race-horse to the cart-horse, the same system of shoeing should be observed. The size, thickness, and weight of them only should differ. The shoe of a race-horse must of course be lighter than that of a saddle-horse; that of a saddle-horse lighter than that of a coach or bat horse; and these last more so than a cart, waggon, or artillery horse. At present all shoes in general are too heavy; if the iron is good, shoes need not be so thick as they are now generally made.—The utmost severity ought to be inflicted upon all those who clap shoes on hot: this unpardonable laziness of farriers in making feet thus fit shoes, instead of shoes fitting feet, dries up the hoof, and utterly destroys them. Frequent removals of shoes are detrimental, and tear the foot; but sometimes they are very necessary: this is an inconvenience which half-shoes are liable to; for the end of the shoe, being very short, is apt to work loose into the foot, and consequently must then be moved."

In a late treatise on this subject by Mr Clark of Edinburgh, the common form of shoes, and method of shoeing, are, with great appearance of reason, totally condemned, and a new form and method recommended, which seem founded on rational principles, and to have been confirmed by experience.

Common method. "In preparing the foot for the shoe,

shoe,

Plate CCLXVII.

HORSE SHOE.

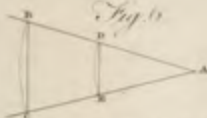
Fig. 1.



Fig. 2.



Fig. 6.



THE SECTOR.

Fig. 7.



Fig. 8.



Fig. 3.



Fig. 4.



Fig. 5.



A. Bell & Co.



Shoeing of
Horses.* See fig. 2.
and 3.
Plate
CCLXVII.

shoe, our author observes, the frog, the sole, and the bars or binders, are pared so much that the blood frequently appears. The shoe by its form (being thick on the inside of the rim, and thin upon the outside †), mult of consequence be made concave or hollow on that side which is placed immediately next the foot, in order to prevent its resting upon the sole. The shoes are generally of an immoderate weight and length, and every means is used to prevent the frog from resting upon the ground, by making the shoe-heels thick, broad, and strong, or raising cramps or caulkers on them.

“ From this form of the shoe, and from this method of treating the hoof, the frog is raised to a considerable height above the ground, the heels are deprived of that substance which was provided by nature to keep the crust extended at a proper wideness, and the foot is fixed as it were in a mould.

“ By the pressure from the weight of the body, and resistance from the outer edges of the shoe, the heels are forced together, and retain that shape impressed upon them, which it is impossible ever afterwards to remove; hence a contraction of the heels, and of course lameness. But farther,

“ The heels, as has been observed, being forced together, the crust presses upon the processes of the coffin and extremities of the nut-bone: The frog is confined, and raised so far from the ground, that it cannot have that support upon it which it ought to have: the circulation of the blood is impeded, and a wasting of the frog, and frequently of the whole foot, ensues. Hence proceed all those diseases of the feet, known by the names of *soured, hoof-bound, narrow-heels, running thrushes, corns, high soles, &c.*

“ I have likewise frequently observed, from this compression of the internal parts of the foot, a swelling of the legs immediately above the hoof, attended with great pain and inflammation, with a discharge of thin, ichorous, fetid matter: from which symptoms, it is often concluded, that the horse is in a bad habit of body, (or what is termed a *grease falling down*), and must therefore undergo a course of medicine, &c.

“ The bad effects of this practice are still more obvious upon the external parts of the hoof. The crust toward the toe, being the only part of the hoof free from compression, enjoys a free circulation of that fluid necessary for its nourishment, and grows broader and longer; from which extraordinary length of toe, the horse stumbles in his going, and cuts his legs. The smaller particles of sand insinuate themselves between the shoe and the heels, which grind them away, and thereby produce lameness. All this is entirely owing to the great spring the heels of the horse must unavoidably have upon the heels of a shoe made in this form.

“ This concave shoe in time wears thin at the toe, and, yielding to the pressure made upon it, is forced wider, and of consequence breaks off all that part of the crust on the outside of the nails. Instances of this kind daily occur, inasmuch that there hardly remains crust sufficient to fix a shoe upon.

“ It is generally thought, that the broader a shoe is, and the more it covers the sole and frog, a horse will travel the better. But, as has been formerly remarked, the broader a shoe is of this form, it must be

made the more concave; and, of consequence, the Shoeing of contracting power upon the heels must be the greater. Horses.

It is likewise to be observed, that, by using strong broad-rimmed concave shoes in the summer-season, when the weather is hot and the roads very dry and hard, if a horse is obliged to ride fast, the shoes, by repeated strokes (or friction) against the ground, acquire a great degree of heat, which is communicated to the internal parts of the foot; and, together with the contraction upon the heels occasioned by the form of the shoe, must certainly cause exquisite pain. This is frequently succeeded by a violent inflammation in the internal parts of the hoof, and is the cause of that disease in the feet so fatal to the very best of our horses, commonly termed a *founder*. This is also the reason why horses, after a journey or a hard ride, are observed to shift their feet so frequently, and to lie down much.

“ If we attend further to the convex surface of this shoe, and the convexity of the pavement upon which horses walk, it will then be evident, that it is impossible for them to keep their feet from slipping in this form of shoe, especially upon declivities of freets.

“ It is also a common practice, especially in this place, to turn up the heels of the shoes into what is called *cramps* or *caulkers*, by which means the weight of the horse is confined to a very narrow surface, viz. the inner round edge of the shoe-rim and the points or caulkers of each heel, which soon wear round and blunt; besides, they for the most part are made by far too thick and long. The consequence is, that it throws the horse forward upon the toes, and is apt to make him slip and stumble. To this cause we must likewise ascribe the frequent and sudden lameness horses are subjected to in the legs, by twisting the ligaments of the joints, tendons, &c.

“ I do not affirm, that caulkers are always hurtful, and ought to be laid aside: On the contrary, I grant, that they, or some such like contrivance, are extremely necessary, and may be used with advantage upon flat shoes where the ground is slippery; but they should be made thinner and sharper than those commonly used, so as to sink into the ground, otherwise they will rather be hurtful than of any advantage.

“ The Chinese are said to account a small foot an ornament in their women, and for that purpose, when young, their feet are confined in small shoes. This no doubt produces the desired effect; but must necessarily be very prejudicial to them in walking, and apt to render them entirely lame.

“ This practice, however, very much resembles our manner of shoeing horses: for, if we looked upon it as an advantage to them to have long feet, with narrow low heels, and supposing we observed no inconvenience to attend it, or bad consequence to follow it, we could not possibly use a more effectual means to bring it about, than by following the method already described.

“ In shoeing a horse, therefore, we should in this, as in every other case, study to follow nature: and certainly that shoe which is made of such a form as to resemble as near as possible the natural tread and shape of the foot, must be preferable to any other.

“ But it is extremely difficult to lay down fixed rules with respect to the proper method to be obser-

Shoeing of
Horses.

ved in treating the hoofs of different horses: it is equally difficult to lay down any certain rule for determining the precise form to be given their shoes. This will be obvious to every judicious practitioner, from the various constructions of their feet, from disease, and from other causes that may occur; so that a great deal must depend upon the discretion and judgment of the operator, in proportioning the shoe to the foot, by imitating the natural tread, to prevent the hoof from contracting a bad shape.

"In order, therefore, to give some general idea of what may be thought most necessary in this matter, I shall endeavour to describe that form of shoe and method of treating the hoofs of horses, which from experience I have found most beneficial.

"*Proper Method.* It is to be remembered, that a horse's shoe ought by no means to rest upon the sole, otherwise it will occasion lameness; therefore it must rest entirely on the crust; and, in order that we may imitate the natural tread of the foot, the shoe must be made flat, (if the height of the sole does not forbid it); it must be of an equal thickness all around the outside of the rim (A); and on that part of it which is to be placed immediately next the foot, a narrow rim or margin is to be formed, not exceeding the breadth of the crust upon which it is to rest, with the nail-holes placed exactly in the middle; and from this narrow rim the shoe is to be made gradually thinner towards its inner edge. See fig. 5.

"The breadth of the shoe is to be regulated by the size of the foot, and the work to which the horse is accustomed: but, in general, it should be made rather broad at the toe, and narrow towards the extremity of each heel, in order to let the frog rest with freedom upon the ground. The necessity of this has been already shown.

"The shoe being thus formed and shaped like the foot, the surface of the crust is to be made smooth, and the shoe fixed on with eight or at most ten nails, the heads of which should be sunk into the holes, so as to be equal with the surface of the shoe. The sole, frog, and bars, as I have already observed, should never be pared, farther than taking off what is ragged from the frog, and any excrescences or inequalities from the sole. And it is very properly remarked by Mr Omer, "That the shoe should be made so as to stand a little wider at the extremity of each heel, than the foot itself: otherwise, as the foot grows in length, the heel of the shoe in a short time gets within the heel of the horse; which pressure often breaks the crust, and produces a temporary lameness, perhaps a corn."

"This method of shoeing horses I have followed long before Mr Omer's treatise on that subject was published; and for these several years past I have endeavoured to introduce it into practice.

"But so much are farriers, grooms, &c. prejudiced in favour of the common method of shoeing and paring out the feet, that it is with difficulty they can even be prevailed upon to make a proper trial of it.

"They cannot be satisfied unless the frog be finely shaped, the sole pared, and the bars cut out, in order to make the heels appear wide (B). This practice gives them a show of wideness for the time; yet that, toge-

ther with the concave form of the shoe, forwards the contraction of the heels, which, when confirmed, renders the animal lame for life.

"In this flat form of shoe, its thickest part is upon the outside of the rim, where it is most exposed to be worn; and being made gradually thinner towards its inner edge, it is therefore much lighter than the common concave shoe: yet it will last equally as long, and with more advantage to the hoof; and as the frog or heel is allowed to rest upon the ground, the foot enjoys the same points of support as in its natural state. It must therefore be much easier for the horse in this way of going, and be a means of making him surer-footed. It is likewise evident, that, from this shoe, the hoof cannot acquire any bad form; when, at the same time, it receives every advantage that possibly could be expected from shoeing. In this respect it may very properly be said, that we make the shoe to the foot, and not the foot to the shoe, as is but too much the case in the concave shoes, where the foot very much resembles that of a cat's fixed into a walnut shell.

"It is to be observed, that the hoofs of young horses, before they are shod, for the most part are wide and open at the heels, and that the crust is sufficiently thick and strong to admit of the nails being fixed very near the extremities of each. But, as I have formerly remarked, from the constant use of concave shoes, the crust of this part of the foot grows thinner and weaker; and when the nails are fixed too far back, especially upon the inside, the horse becomes lame: to avoid this, they are placed more towards the fore-part of the hoof. This causes the heels of the horse to have the greater spring upon the heels of the shoe, which is so very detrimental as to occasion lameness; whereas, by using this flat form of shoe, all these inconveniences are avoided; and if the hoofs of young horses, from the first time that they were shod, were continued to be constantly treated according to the method here recommended, the heels would always retain their natural strength and shape.

"By following this flat method of shoeing, and manner of treating the hoofs, several horses now under my care, that were formerly tender-footed, and frequently lame, while shod with broad concave shoes, are now quite sound, and their hoofs in as good condition as when the first shoes were put upon them: In particular, the horse that wore the broad concave shoes, from which the drawings of fig. 2. and 3. were taken, now goes perfectly sound in the open narrow kind of shoes, as represented fig. 4. 5.

"If farriers considered attentively the design of shoeing horses, and would take pains to make themselves acquainted with the anatomical structure of the foot, they would then be convinced, that this method of treating the hoofs, and that this form of shoe, is preferable to that which is so generally practised.

"It has been alleged, that in this form of shoe horses do not go so well as in that commonly used. This objection will easily be laid aside, by attending to the following particulars. There are but few practitioners that can or will endeavour to make this sort of shoe as it ought to be. The iron, in forming it, does

(A) For a draught-horse about half an-inch thick, and larger in proportion for a saddle-horse.

(B) Wide open heels are looked upon as a mark of a sound good hoof.

Shoeing of does not so easily turn into the circular shape necessary as in the common shoe; and perhaps this is the principal reason why farriers object to it, especially where they work much by the piece. And as many horses that are commonly shod with concave shoes have their soles considerably higher than the crust, if the shoe is not properly formed, or if it is made too flat, it must unavoidably rest upon the sole, and occasion lameness.

"The practice of paring the sole and frog is also so prevalent, and thought to be absolutely necessary, that it is indiscriminately practised, even to excess, on all kinds of feet: And while this method continues to be followed, it cannot be expected that horses can go upon hard ground (on this open hoof) with that freedom they would do if their soles and frogs were allowed to remain in their full natural strength.

"Experience teaches us, that, in very thin-soled shoes, we feel an acute pain from every sharp-pointed stone we happen to tread upon. Horses are sensible of the same thing in their feet, when their soles, &c. are pared too thin. Hence they who are prejudiced against this method, without ever reflecting upon the thin state of the sole, &c. are apt to condemn it, and draw their conclusions more from outward appearances than from any reasoning or knowledge of the structure of the parts. From a due attention likewise to the structure of a horse's foot in a natural state, it will be obvious, that paring away the sole, frog, &c. must be hurtful, and in reality is destroying that substance provided by nature for the defence of the internal parts of the foot: From such practice it must be more liable to accidents from hard bodies, such as sharp stones, nails, glass, &c. From this consideration, we will likewise find, that a narrow piece of iron, adapted to the shape and size of the foot, is the only thing necessary to protect the crust from breaking or wearing away; the sole, &c. requiring no defence if never pared.

"There is one observation I would farther make, which is, that the shoe should be made of good iron, well worked, or what smiths call hammer-hardened, that is, beat all over lightly with a hammer when almost cold. The Spaniards and Portuguese farriers use this practice greatly, inasmuch that many people, who have seen them at work, have reported, that they form their horses' shoes without heating them in the fire as we do. It is well known, that heating of iron till it is red softens it greatly; and when shoes thus softened are put upon horses' feet, they wear away like lead. But when the shoes are well hammered, the iron becomes more compact, firm, and hard; so that a well-hammered shoe, though made considerably lighter, yet will last as long as one that is made heavier; the advantage of which is obvious, as the horse will move his feet with more activity, and be in less danger of cutting his legs.

"The common concave shoes are very faulty in this respect; for, in fitting or shaping them to the foot, they require to be frequently heated, in order to make them bend to the unequal surface which the hoof acquires from the constant use of these shoes: they thereby become soft; and to attempt to harden them by beating or hammering when they are shaped to the foot, would undo the whole. But flat shoes, by making them, when heated, a little narrower than the foot, will, by means of hammering, become wider, and acquire a degree of elasticity and firmness which

it is necessary they should have, but impossible to be given them by any other means whatever; so that any farrier, from practice, will soon be able to judge, from the quality of the iron, how much a shoe, in fitting it to the circumference of the hoof, will stretch by hammering when it is almost cold: this operation, in fitting flat shoes, will be the less difficult, especially when it is considered, that as there are no inequalities on the surface of the hoof (or at least ought not to be) which require to be bended thereto, shoes of this kind only require to be made smooth and flat; hence they will press equally upon the circumference or crust of the hoof, which is the natural tread of a horse."

SHOOTING, in the military art. See **ARTILLERY**, **GUNNERY**, and **PROJECTILES**.

SHOOTING, in sportsmanship, the killing of game by the gun, with or without the help of dogs.

Whether the game be flying, or on a hedge or tree, always endeavour to shoot as near as you possibly can with the wind, and rather sidewise or behind the fowl than in their face; nor shoot at a single bird, if you can compass more within your level. If they be on a tree, hedge, or the ground, seek out for the most convenient shelter you can, of a hedge, bank, tree, &c. that you may be concealed from the sight of the fowl; and being within shot, and having a fair mark, lose no time, but let fly.

If dogs are used, we put them on the hunt by whistling or hying-on (as the term is): it is necessary to observe the motions of spaniels, for there are but few that will not give some intimation when they come on scent; use them to come in at a sharp call, and never suffer them to run after a bird, except it is wounded: observe to let the dogs, whether spaniels or pointers, have the wind as much as possible, (that is, let them hunt against the wind).

In using pointers, when they are observed drawing on a point, and are known to be not quite staunch, call to them to take heed; and if they spring without standing, correct them slightly with a switch, speaking angrily to them, and keep them at a distance the remaining part of the day; unless their after-behaviour deserve encouragement, when it may not be improper to take them into favour.

Shooting flying, is by experience found to be the best and most diverting way of shooting. It is necessary for any gentleman who sports much to have two guns; the barrel of one about two feet nine inches, which will serve very well for the beginning of the season, and for wood-shooting; the other about three feet three inches, for open-shooting after Michaelmas: the birds by that time are grown so shy, that your shots must be at longer distances. But if you intend one gun to serve for all purposes, then a three-foot barrel, or thereabouts, is most proper. You should always have it cocked in readiness; holding your thumb over the cock, lest it should go off when you would not have it.

It is generally accounted the best way to aim at the head, if the game flies over your head; but to aim as it were under the belly, if it flies from you; and it will be best to let the game fly a little past you before you let fly, for by so doing the shot will the better enter the body. Shot delivered from a gun in general lose or decrease half the quantity every ten yards or thereabouts; so that at forty yards there will not be thrown in above a fourth of what would be into the

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same space at twenty yards. From which it appears, that if you take aim a foot before a cross-shot at forty yards, you will be the most likely to meet the bird with the centre-shot; and which is looked upon to fly the strongest, and to be more efficacious at long distances, than the diverging shot: for whether it be the shot striking against each other, or against the air, at first coming out of the muzzle, or whatever be the cause of their diverging, it must in some degree retard their motion. But if there be a brisk wind, it will certainly bend the course of the shot; you must therefore consider whether the wind blows with the bird or against it: if it blow with it, you need little more than to observe the general rule, because the wind helps the bird forward nearly as much as it diverts the shot; but if it fly against the wind, the shot will decline more than the bird is retarded, and therefore you ought to take aim at a greater distance before the bird.

One good pointer in the field at a time, if you have patience to attend him, will be sufficient for two men to shoot with; but if you have an old springing spaniel, that is so well under command that you can always keep him near you, such a dog may be used with your pointer with great advantage; as he will better find birds that are wounded, and also spring such as are near you, which you otherwise might pass. But if you should be fond of hunting many pointers together in a field, as is frequently done, you should not have more than one amongst them, who has been taught to fetch his game, left, by endeavouring to get it from each other, they should tear it.

Partridge-Shooting. The season for this sport begins, by act of parliament, on the 1st of September, and ends the 12th of February; and which, on account of the cleanness, little fatigue, and more certain diversion than any other, by their being found in coverts, and taking short flights, is generally esteemed the gentlest and best sport we have.—In the beginning of the season, they haunt the wheat, barley, oat, pease and bean-stubbles; but the wheat-vech is their favourite: they also lie in turnips, clover-feed, and on fallow-land; and indeed, at times, they are found any where.

The most proper dog for partridge-shooting, is the pointer, a dog extremely well calculated for the sport; as partridges can seldom or ever be seen on the ground, if the stubble, &c. be but three or four inches high: if the pointer be staunch, and have a good nose, he will seldom pass, in common fields, within 40 yards of a covert, without intimating by a point pretty near the exact line they lie in.

Two persons in the field with guns are better than more at partridge shooting, who should with patience pay a due attention to each other.

Observe, after a fire, never to blow through the barrel, but charge again immediately, while the inside of the barrel is hot and dry; by this method of immediate charging, a gun seldom hangs fire, and carries much smarter and better: there is no occasion to wipe either pan or flint while out, (if the flint is good, which, by the bye, it always should be); but on returning home, wipe clean with tow, or linen-rags, both out and inside of the barrel, and also the lock, from the soil of the powder; when it is thus cleaned,

hang it up, and, if it can be so ordered, where a constant winter fire is kept, hanging it at a moderate distance from the fire: the powder-flask should also be kept in the same degree of warmth in winter-time; if the gun has received any rain or wet, let it be wiped thoroughly dry, and stand some time near a fire, to dry any remaining damp, and have a little oil rubbed over it before hanging up.

When your dog points, walk up without any hurry, separating a few yards, one to the right and the other to the left of your dog: if a covert springs, never shoot into the midst of them, but let him on the left single out a bird which flies to the left, and him on the right a bird to the right, that you may not interrupt each other nor both shoot at the same bird, and readily let fly at the first aim. Let each of you mark the fall of his bird, and immediately run to the place; and if the dog does not secure it, or the bird should be only wounded and have run, put him upon the scent; but if your dog understands his business, and will fetch his game, it is better to trust to him, and load again as quick as you can. It will always be of great use, and save much time and trouble, to have a person without a gun to mark the flight of the birds. If a single bird be sprung, let him take the shoot to whose side it flies: the bird being killed, cause your dog to lie by it whilst you load, lest he spring other birds that are near you.

If you trace the birds to a hedge, double the row by walking one on each side, taking your dog on the ditch side: here if you have a spaniel, he will be of great use; as you may make him go along in the ditch, and your pointer on the other side; by which means you will not pass a bird, and one of you will most likely get a good shoot at it. Your own judgment, with very little experience, will best direct where the birds are most likely to be found at different times of the day, according to the grounds you have to hunt in.

Pheasant and Woodcock Shooting. Pheasants and woodcocks generally lie in carrs or woods where there is much cover. Spaniels are therefore the dogs most proper for this kind of shooting. Some pointers indeed, that are bold-spirited and have been a great deal used to this work, will follow a pheasant very well; but from the generality of slow staunch pointers a pheasant will get off so fast, as, when sprung, to be out of the reach of gun-shot; besides, they are not hardy enough to go into thick cover.

The spaniels proper for this work are of a middling size, their legs rather short and very strong: they must be hardy, able to bear great fatigue, disposed to go into cover freely and undaunted, to hunt very briskly, and yet go very slow when upon scent of game. You cannot begin too early with these dogs to teach them to fetch a bird and bring it after you: which will prevent their getting a habit of tearing or breaking the game. One of this kind must be always obliged to lie down whilst you load: and as his business is to spring game, you should never suffer him to go above ten or fifteen yards from you; and therefore take him out with others that are brought under command as soon as he is able to hunt. For to have good spaniels, they must be used a great deal. If you find any difficulty in keeping him to hunt near

you,

Shooting. you, put one of his feet into his collar, and hunt him so for an hour or two. Frequent repetitions of this punishment will bring him to a sense of his duty. One, two, or three brace of spaniels well broken, may be used together; and they will find work enough in a large wood or thick cover. If two persons intend hunting in a wood, it is best for one to go round it on the outside first, whilst the other goes opposite to him a little way into the wood, and afterwards to sink in deeper as you shall find occasion, unless you know the most likely part to find game in; in which case you may hunt the interior part first. Some persons, when they want to hunt a very large wood, approve of taking a brace of high-mettled spaniels that have not been broken, to hunt close, and turn them into the middle of the wood; whilst they with their well-broken spaniels hunt outwards. But unless you have any extensive woods to hunt, such dogs are more likely to hinder than add to your sport; and it will be better to hunt with patience with only such dogs as are under good command, let the woods or cover be ever so large.

1. Pheasant-Shooting begins, by act of parliament, on the 1st of October, and lasts till the 1st of February.

These birds afford very pretty sport, though far more fatiguing and tiresome than partridge-shooting; owing to the bushes, briars, and other disagreeable circumstances of the woods.—In hunting them, keep as near the dogs as possible; and when they spring, one or more, let such only fire at the bird as to whom, in point of rising, it belongs; which rule should be always observed in all sorts of shooting in company. In pheasant-shooting, the trees frequently interfere, therefore forbear firing till you have a clear aim at the bird; which, if it cannot be had, it is better to let him escape for another chance.

2. Woodcock Shooting generally begins towards the latter end of November; they are birds of passage, and come over to us in flights in the night-time, about the full of the moon: the first flight, which is sometimes in October, is commonly very scanty; but they continue coming over, more or less, every moon, till February; consequently it will generally be found they are in greater plenty towards the latter end of the winter; though this is no absolute rule, as they are very irregular with regard to number in their coming over; sometimes the first or second flight being the largest we have through the winter, and the others very trifling; they remain with us generally till the middle or latter end of March.

Their haunts are chiefly in the springs and bogs, in woods and coppices; and in the beginning of the winter, before the leaves are well off, they prefer the out-parts of the woods. For springing them, therefore, spaniels are used, as already mentioned.

A woodcock is a very tender bird; and being a large mark, affords easy, pretty shooting, where a person has got the art of shooting flying tolerably well; but it frequently occurs that the bird rises in a perpendicular line, which is the most difficult shot that is. In this case, an experienced sportsman will find it more advisable to forbear firing (if opportunity will allow) till the bird has arrived at the height of the perpendicular, and flies offward; but as a shot will be often lost

by this delay, the good marksman should never wait it, except he judges the shot will be better.

Snipe-Shooting. The snipe, like the woodcock, is a bird of passage; they begin coming over to us about the middle or latter end of October, and remain with us pretty forward in the spring. They frequent, like the woodcock, the springs, bogs, and marshy places; but with this difference, that the cock seeks these in cover, and the snipe in the open clear parts, as fields and common.

Snipes afford as pretty sport, to a good marksman, as any bird whatsoever; though they are very quick fliers, yet are very tender, and will fall almost at the bare report of the gun.

We spring snipes either with spaniels, or by making a slight sharp kind of noise about the places where we know they haunt: they mostly fly directly against the wind, (if there is any material air stirring), and a shot after them is the best and most sure: the shot and cross shots are rather difficult, as they are a small mark, and fly exceeding quick.—For practice in this, which is very nice, swallow-shooting may be used in summer to advantage.

Of Water-fowl Shooting. In shooting water-fowl, as geese, ducks, widgeons, &c. we use the longest killing gun, and as large shot as the n^o 1 or 2.

The proper dog is the rough, curled, water spaniel, of which the white sort are commonly the best. They should be under the strictest command; be ready at fetching any thing out of the water, without biting it; and catching what is only wounded; should be used, on occasion, to creep quiet and close behind the master's heel.

The fowl may either be shot swimming, or, which is better, taken on the wing; as in the water they are strongly guarded by the close lying of their wings and feathers; therefore, if a person is a good marksman, it will be always best to spring them first.

The best place to throw the shot, if opportunity will allow, is under the wing, as that is by much the tenderest place; and the worse of all is the breast, as the feathers here lie extremely thick and close.

Fen Shooting. In this sport we use in general the n^o 3 shot, which will serve as well for the bittern and curlew, as the plover. One or two steady water or land spaniels may be used; and it will be always best to spring the birds before firing.

Upland Winter Shooting. Our common field-shooting is generally best in frosty weather, and when the ground has a tolerable cover of snow. The most common birds in this sport are, different sorts of wild pigeons, fieldfares, starlings, redwings, &c. In this diversion we use no dog; and the fewer shooters together the better.

The several kinds of pigeons require the n^o 3 shot, as being strong birds; and may be either taken on the wing, or as they perch on a tree; but the rock-pigeons are best, in general, taken on the wing; however, it sometimes happens that a shot at them sitting is more proper; in this discretion must direct.

The *fieldfare* is a very common bird: it seems to delight most in large clove orchards; but in hard weather, in the fields; they frequent the haw bushes, and afford very pretty diversion. Though they are naturally very wild, yet, when a hard frost is set in, there

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is no difficulty in getting within 40 yards of them, at the time they are keenly engaged on their feeding bush: here they will sit 40 or 50 sometimes together. The proper way of managing this kind of shooting is, if possible, to secrete behind a bush, or in a hedge, within shot of one of the bushes they frequent: when a sufficient number (as the person may judge) are together, to fire at them as they sit; what are killed should be taken up, and the shooter replace himself as before: in a quarter of an hour, or less, more will probably be on the bushes; and he may often go on shooting in the same place all the while they are on their feed, which is from a little after sun-rise till 11 or 12 o'clock; and in the afternoon they go on again, about an hour before sun-set; but such sport as this must be expected only where fields are in great plenty.

Starlings afford tolerable diversion in shooting. In winter they, for the most part, go in flocks from 20 to 50; they delight chiefly to be in moist pastures among cattle, and sometimes sit so close together on the ground, that a person may kill 25 or 30 at a shot. Taking these on the ground, or wing, may be left at the discretion of the shooter; but the wing will be best preferred: what are shot, should have their heads immediately pulled off, which, by their bleeding, prevents a bitterness of taste they would otherwise have. Use for these and fieldfares the n^o 4 shot.—In shooting *larks* in flocks, use the n^o 5 shot; and make it a rule always to take them on the wing. Here it will be advisable to have the gun scatter more than common: And in order to do this, put in an equal quantity of shot, supposing the usual charge to be three parts shot to two of powder; but if the gun, in common, carries an equal quantity of each, then it will be necessary to put in only about three parts of shot to four of powder: and in shooting any of the smaller birds in flocks, this rule of charging should be observed.

SHOP-LIFTERS, are those that steal goods privately out of shops; which being to the value of 5s. though no person be in the shop, is felony excluded clergy, by the 10 and 11 W. III. c. 23.

SHORE, a place washed by the sea, or by some large river.

Count Marigli divides the sea-shore into three portions: the first of which is that track of land which the sea just reaches in storms and high tides, but which it never covers; the second part of the shore, is that which is covered in high tides and storms, but is dry at other times; and the third is the descent from this, which is always covered with water. See SEA.

The first part is only a continuation of the continent, and suffers no alteration from the neighbourhood of the sea, except that it is rendered fit for the growth of some plants, and wholly unfit for that of others, by the saline steams and impregnations: and it is scarce to be conceived by any, but those who have observed it, how far on land the effects of the sea reach, so as to make the earth proper for plants which will not grow without this influence; there being several plants frequently found on high hills and dry places, at three, four, and more miles from the sea, which yet would not grow unless in the neighbourhood of it, nor will ever be found elsewhere.

The second part or portion of the shore is much more affected by the sea than the former, being fre-

quently washed and beaten by it. Its productions are rendered salt by the water, and is covered with sand, or with the fragments of shells in form of sand, and in some places with a tartarous matter deposited from the water; the colour of this whole extent of ground is usually dusky and dull, especially where there are rocks and stones, and these covered with a slimy matter.

The third part of the shore is more affected by the sea than either of the others; and is covered with an uniform crust of the true nature of the bottom of the sea, except that plants and animals have their residence in it, and the decayed parts of these alter it a little.

SHORE (Jane), the celebrated concubine of the licentious king Edward IV. was the wife of Mr Matthew Shore, a goldsmith in Lombard-street, London. Kings are seldom unsuccessful in their amorous pursuits; therefore there was nothing wonderful in Mrs Shore's removing from Lombard-street to shine at court as the royal favourite. Historians represent her as extremely beautiful, remarkably cheerful, and of most uncommon generosity. The king, it is said, was no less captivated with her temper than with her person: she never made use of her influence over him to the prejudice of any person; and if ever she importuned him, it was in favour of the unfortunate. After the death of Edward, she attached herself to the lord Hastings; and when Richard III. cut off that nobleman as an obstacle to his ambitious schemes, Jane Shore was arrested as an accomplice, on the ridiculous accusation of witchcraft. This, however, terminated only in a public penance; excepting that Richard rifled her of all her little property: but whatever severity might have been exercised towards her, it appears that she was alive, though sufficiently wretched, under the reign of Henry VIII. when Sir Thomas More saw her poor, old, and shrivelled, without the least trace of her former beauty. Mr Rowe, in his tragedy of Jane Shore, has adopted the popular story related in the old historical ballad, of her perishing by hunger in a ditch where Shoreditch now stands. But Stow assures us that street was so named before her time.

SHORLING and **MORLING**, are words to distinguish fells of sheep; *shorling* being the fells after the fleeces are shorn off the sheep's back; and *morling*, the fells shorn off after they die or are killed. In some parts of England they understand by a *shorling*, a sheep whose face is shorn off; and by a *morling*, a sheep that dies.

SHORT-HAND Writing. See STENOGRAPHY.

SHORT-SIGHTEDNESS, a certain defect in vision, by which objects cannot be distinctly seen unless they are very near the eye. See MEDICINE, n^o 179. and OPTICS, n^o 123.

SHOT, a denomination given to all sorts of balls for fire-arms; those for cannon being of iron, and those for guns, pistols, &c. of lead.

Small Shot, or that used for fowling, should be well sized, and of a moderate bigness: for should it be too great, then it lies thin, and scatters too much; or if too small, then it hath not weight and strength to penetrate far, and the bird is apt to fly away with it. In order, therefore, to have it suitable to the occasion, it not being always to be had every place fit for the purpose, we shall set down the true method of making

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all sorts and sizes under the name of mould-shot. Its principal good properties are to be round and solid.

Take any quantity of lead you think fit, and melt it down in an iron vessel; and as it melts keep it stirring with an iron ladle, skimming off all impurities whatsoever that may arise at the top: when it begins to look of a greenish colour, strew on it as much auripigmentum, or yellow orpiment finely powdered, as will lie on a shilling, to every 12 or 14 pound of lead; then stirring them together, the orpiment will flame.

The ladle should have a notch on one side of the brim, for the easier pouring out the lead; the ladle must remain in the melted lead, that its heat may be agreeable to that of the lead, to prevent inconveniences which otherwise may happen by its being either too hot or too cold: then, to try your lead, drop a little of it into the water, which if the drops prove round, then the temper of heat is right; if otherwise, and the shot have tails, then add more orpiment to increase the heat, till it be found right.

Then take a plate of copper, about the bigness of a trencher, which must be made with a hollowness in the middle, about three inches compass, within which must be bored about 40 holes according to the size of the shot which you intend to cast: the hollow bottom should be thin; but the thicker the brim, the better it will retain the heat. Place this plate on a frame of iron, over a tub or vessel of water, about four inches from the water, and spread burning coals on the plate, to keep the lead melted upon it: then take some lead and pour it gently on the coals on the plate, and it will make its way through the holes into the water, and form itself into shot; do thus till all your lead be run through the holes of the plate, taking care, by keeping your coals alive, that the lead do not cool, and so stop up the holes.

While you are casting in this manner, another person with another ladle may catch some of the shot, placing the ladle four or five inches underneath the plate in the water, by which means you will see if they are defective, and rectify them.

Your chief care is to keep the lead in a just degree of heat, that it be not so cold as to stop up the holes in your plate, nor so hot as to cause the shot to crack: to remedy the heat, you must refrain working till it is of a proper coolness; and to remedy the coolness of your lead and plate, you must blow your fire; observing, that the cooler your lead is, the larger will be your shot; as the hotter it is, the smaller they will be.

After you have done casting, take them out of the water, and dry them over the fire with a gentle heat, stirring them continually that they do not melt; when dry, you are to separate the great shot from the small, by the help of a sieve made for that purpose, according to their several sizes. But those who would have very large shot, make the lead trickle with a stick out of the ladle into the water, without the plate.

If it stop on the plate, and yet the plate be not too cool, give but the plate a little knock, and it will run again; care must be had that none of your implements be greasy, oily, or the like; and when the shot, being separated, are found too large or too small for your purpose, or otherwise imperfect, they will serve again at the next operation.

The sizes of shot for fowling are from N^o 1 to 6, and

smaller, which is called *mustard-seed*, or *dust-shot*; but N^o 5 is small enough for any shooting whatsoever. The N^o 1 may be used for wild-geese; the N^o 2 for ducks, widgeons, and other water-fowl; the N^o 3 for pheasants, partridges after the first month, and all the fowls; the N^o 4 for partridges, woodcocks, &c.; and the N^o 5 for snipes and all the smaller birds.

Grape-Shot. See *GRAPE-Shot*.

Tin-cape Shot, in artillery, is formed by putting a great quantity of small iron shot into a cylindrical tin-box called a *cannister*, that just fits the bore of the gun. Leaden bullets are sometimes used in the same manner; and it must be observed, that whatever number or sizes of the shots are used, they must weigh within their cases nearly as much as the shot of the piece.

Cape Shot, formerly consisted of all kinds of old iron, nails, musket-balls, stones, &c. used as above.

SHOVEL (Sir Cloudefley), a brave English admiral, mealy born in 1650. He went to sea a cabin-boy under Sir Christopher Mynus; and soon becoming an able seaman, distinguished himself by his courage and conduct at Tripoli under Sir John Narborough, whose widow he afterward married. King William knighted, and made him an admiral. He had a great share of the glory in the battles of Bantry bay, La Hogue, Malaga, and at the siege of Barcelona. After the unsuccessful attempt upon Toulon, he was cast away on his return home, upon the rocks of Scilly; being then rear-admiral of England, admiral of the white, commander in chief of the queen's fleet, and one of the council to prince George of Denmark as lord high-admiral of England.

SHOVELER, in ornithology, a species of *ANAS*.

SHOWER, in meteorology, a cloud condensed into RAIN.

SHREWMOUSE. See *SOREX*.

SHREWSBURY, the capital of Shropshire in England. This town, the metropolis of the county, grew up out of the ruins of Uriconium, anciently a city, now a village called *Wroxeter* about four miles from it. The Saxons called it *Scriobber Berig*, from the shrubs that grew about it; and from thence the present name of *Shrewsbury* is supposed to have been formed. It is pleasantly situated upon a hill near the Severn, over which there are two handsome bridges. It was a place of good note in the Saxon times; after which it was granted by William the Conqueror, together with the title of *earl* and most of the county, to Roger de Montgomery, who built a castle upon the north side of it, where the Severn, that encompasses it on all sides, leaves an opening. His son Robert built also a wall across this neck of land, when he revolted from Henry I. We learn from doomday book, that at that time, when a widow of this town married, she paid 20 shillings to the king, and a virgin 10. The abovementioned Roger founded also, and endowed here, a Benedictine monastery, and a collegiate church. When old age came upon him, he quitted the world, and spent the rest of his days as a monk in the abbey, and, when he died, was interred in its church. From the history of this church and monastery, it appears, that ecclesiastical benefices about that time were hereditary. The abbey became so rich afterwards, that the abbot was mitred, and sat in parliament. Besides this abbey, in after-times there were three others, viz.

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Shrewsbury a Franciscan, Dominican, and Augustin, and likewise two collegiate churches; one dedicated to St Chad, and the other to St Mary. In the contest between the empress Maud and Stephen, this town, and its governor William Fitz-Allan, sided with the empress. In Henry III.'s time, a part of it was burnt down by the Welch; and in Richard II.'s reign a parliament was held in it. At a place called *Battlefield*, near this town, Henry Percy the younger, furnished *Hofspur*, was killed in an engagement with Henry IV. against whom he had rebelled. The king afterwards built a chapel upon the spot, and settled two monks-priests to pray for the souls of the slain. Two of Edward IV.'s sons were born here; namely, Richard, styled *duke of York*, whom Perkin Warbeck afterwards personated, and who was murdered in the Tower; and George Plantagenet, who died before his brothers. Here first broke out the sweating-sickness, which carried off great numbers so suddenly, that those who were seized with it either died or recovered in the space of 24 hours. In the beginning of the civil wars king Charles I. came hither, and formed an army, with which he marched towards London; but was met by the parliament's forces at Edgehill. He continued here from the 20th of September to the 12th of October; during which time he was joined by prince Rupert, and many of the gentry and nobility of these parts. This town anciently gave title of *earl* to the Montgomeries, and afterwards to the Talbots, by whom it is still retained. Here is a free grammar-school, with three masters, and several others, well endowed by Edward VI. and queen Elizabeth, and not inferior to many colleges in the universities. It has a good library and chapel, and there are several scholarships appropriated to it in the university of Cambridge. Here are also several hospitals, almshouses, and charity-schools. This town is one of the most flourishing in England, having two great weekly markets, for corn, cattle, and provisions; and another for Welch cottons and flannels, of which great quantities are sold. A great trade is carried on with the Welch, who bring their commodities hither, as to the common mart of both nations. The town is large and well built, and the situation extremely pleasant. There is a very beautiful walk called the *quarry*, between the town-walls and the Severn, delightfully shaded with rows of lime-trees, so that it is not inferior to the Mall in St James's Park. The town is also noted for its gallantry and politeness, being full of gentry, and for whom there are always balls and assemblies once a week all the year round. Here is a fine house and gardens which belonged to the earl of Bradford; and in the neighbourhood, at Wroxeter, the Roman highway, called *Watling-street*, may be seen for several miles, where Roman coins are frequently found. In Shrewsbury are 12 incorporated trading-companies; and the corporation has a power to try even capital causes of itself, except high-treason. Thigh-bones of dead men have been found here a yard long, and teeth three inches round and three long.

SHREWSBURY (earl of). See TALBOT.

SHRIKE, a species of LANIUS.

SHRIMP, in ichthyology. See SQUILLA.

SHRINE, in ecclesiastical history, a case or box to hold the relics of some saint.

SHROPSHIRE, a county of England, bounded on the south by Worcestershire, Herefordshire, and Radnorshire; on the north, by Cheshire; on the east, by Staffordshire; on the west, by Montgomeryshire and Denbighshire, in Wales. Its length is between 30 and 40 miles, its breadth about 30, and its circumference about 134. It is an inland county, of an almost circular form; and contains 890,000 acres, 139,000 inhabitants, and 15 hundreds, in which are 170 parishes and 15 market-towns. It makes a part of three bishoprics, viz. Herefordshire, Coventry and Litchfield, and St Asaph. Some part of it lies on the north, and some on the south side of the Severn. Besides the Severn, it is also watered by the Tifidiane, or Fafidiane, as it is called in Welch, which flows from the mountains of Radnorshire; and by the Tern, which has its rise and name from one of those pools called *tearnes* in Staffordshire. All these abound with fish, especially trouts, pikes, lampreys, graylings, carp, and eels. The air, especially upon the hills, with which the county abounds, is very wholesome. There is as great a diversity of soil, as in most other counties. On the hills, where it is poor, is very good-pasture for sheep; and in the low grounds, where it is very rich, along the Severn in particular, there is plenty of grass for hay and black cattle, with all sorts of corn. No county is better provided with fuel than this, having in it many inexhaustible pits of coal; and also mines of lead and iron. Over most of the coal-pits in this county lies a stratum or layer of blackish porous rock, of which, by grinding and boiling, they make pitch and tar, which are rather better than the common sort for caulking ships, as they do not crack, but always continue close and smooth. Quarries of lime-stone and iron-stone are common enough in the county; and the soil in many places is a reddish clay. As it lies upon the borders of Wales, it was anciently full of castles and walled towns. On the side next that country there was an almost continued line of castles, to guard the county against the inroads and depredations of the Welch. The borders here, as those between England and Scotland, were called *marches*, and there were certain noblemen intitled *barones marchie*, *marchiones de marchia Wallie*, "lords marchers, or marquisses of the marches of Wales," who were vested with a sort of palatine jurisdiction, held courts of justice to determine controversies, and enjoyed many privileges and immunities, the better to enable and encourage them to protect the county against the incursions of the Welch, and to maintain order amongst the borderers; but they often abused their power, and were the greatest of tyrants.

As to the ecclesiastical government of the county, the far greater part, namely, all that belongs to the bishoprics of Hereford, and of Litchfield and Coventry, is under the jurisdiction and visitation of the arch-deacon of Shrewsbury or Salop, and is divided into several deaneries.

The Oxford circuit includes in it this county, which sends 12 members to parliament, viz. two for the shire, and two for each of the following towns, Shrewsbury, Ludlow, Wenlock, and Bishop's Castle.

SHROVE-TUESDAY, is the Tuesday after Quinquagesima Sunday, or the day immediately preceding the first Lent; being so called from the Saxon word

ſhrive,

Shrive, which signifies to *confess*, as having been employed by the people in the time of Popery in confessing their sins in order to receive the sacrament, and thereby qualify themselves for a more religious observation of Lent.

SHROUDS, (*serud* Sax.) a range of large ropes extending from the mast-heads to the right and left side of the ship, to support the masts and enable them to carry sail, &c.

The shrouds as well as the sails are determined from the masts to which they belong. Thus they are the main, fore, and mizen shrouds; the main-top-mast, fore-top-mast, or mizen top-mast-shrouds; and the main-top-gallant, fore-top-gallant, or mizen-top-gallant shrouds.—The number of shrouds by which a mast is sustained, as well as the size of rope of which they are formed, is always in proportion to the size of the mast and the weight of the sail it is intended to carry. See **MAST** and **SAIL**.

SHRUB, in botany, a plant which rises with a woody durable stem, to a height superior to that of under-shrubs, inferior to that of trees.

SHUTTLE, in the manufactures, an instrument much used by weavers, in the middle of which is an eye or cavity, wherein is inclosed the spool with the wool.

SIALOGOGUES, medicines which promote the salivary discharge.

SIAM, a kingdom of Asia in the East Indies, bounded on the north by Laos; on the east, by Cam-bays and Keo; on the south, by a gulph of the same name; and on the west, by the peninsula of Malacca. It is about 550 miles in length from north to south, and 250 in breadth where it is broadest. In the rainy season the rice-fields and meadows are overflowed in such a manner as to render them very fruitful. The city of Siam stands on an island made by the river, in a low country, and is as fruitful as any spot of ground in the world; for it produces rice, several kinds of pulse, many fruits and roots, with wild and tame cattle, and the river abounds in many sorts of excellent fish. The city is about ten miles in circumference; and there are many canals from the river, which cross the town several ways. The walls are high and thick, and are constructed of brick and stone; but the houses, though large, are low, and built on stakes driven into the ground, about ten or twelve feet high. The king has three palaces; and there are many large temples, well adorned and decorated with gilded images. The women in Siam are the only merchants in buying goods, and generally maintain their husbands with their traffic. The Europeans while at Siam accommodate themselves with temporary wives; for the women are very fond of foreigners, and they agree with each other in the preference of their nearest friends and relations, and then it is a lawful marriage for the time agreed upon. These wives are very obliging, and take the whole management of the household-affairs into their own hands. They buy provisions, dress the victuals, and take care of the cloaths, washing and mending them. If their husbands have any goods to sell, they set up a shop, and dispose of them by retail, which is of more advantage than selling them by wholesale. If the husband leaves the kingdom, and is willing to continue the marriage, he leaves her about

6 s. 8 d. a month to live upon in his absence, otherwise she may take another husband at the year's end. And here it must be noted, that women are never the worse esteemed for having been married to foreigners.

The natives of both sexes go bare-headed, and cut their hair so as to leave it two inches long, and then they gum it, and comb it upwards; so that it looks rather like bristles than hair, and makes their heads seem very large. They are well shaped, and have a large forehead, with a little nose, and a handsome mouth, with plump lips, and black sparkling eyes. The lappits of their ears are thick, and the men have but little hair on their chins. The men are of an olive complexion; but the women are of a straw-colour, and very prolific. Even the courtiers have nothing but a cloth which reaches from the waist to the middle of the thigh, and a sort of a waistcoat made of muslin, with a cap upon their head covered with muslin, and terminating in a point. The cloth that the men wrap about their middles is brought round between their legs, and turned into their girdles behind: but that of the women hangs down a little below their knees; and they cover their breasts with another cloth, throwing the ends over their shoulder; the rest of their bodies is quite naked, nor have they any covering on their heads: this must be understood of the better sort; for the common people of both sexes go quite naked, except a covering for those parts which decency requires them to hide. They however adorn themselves with rings, bracelets, and pendants. The general doctrine of this country is the transmigration of the soul.

SIBERIA, a very large country of Asia, extending along all the northern part of the continent from the northern confines of Tartary quite to the Frozen Sea.

At what time this country was first inhabited, or by whom it was peopled, we are entirely ignorant. The Russians, from whom we have received our knowledge, knew nothing of it before the middle of the 16th century. In the reign of John Basilowitz I. indeed, an incursion had been made into Siberia, and some Tartar tribes subdued: but these conquests were not permanent; and we hear of no further communication between Russia and Siberia till the time of John Basilowitz II. It was opened again at that time by means of one Anika Strogonoff, a Russian merchant who had established some salt-works at a town in the government of Archangel. This man carried on a trade with the inhabitants of the north-west parts of Siberia, who brought every year to the town above-mentioned, large quantities of the finest furs. Thus he acquired a very considerable fortune in a short time; when at last the czar, perceiving the advantages which would accrue to his subjects from having a regular intercourse with Siberia, determined to enlarge the communication which was already opened. With this view he sent into Siberia a body of troops, who crossed the Yugorian mountains which form part of the north-eastern boundary of Europe. They seem, however, not to have passed the Irtysh, or to have penetrated further than the western branch of the river Obi. Some Tartar tribes were laid under contribution, and a chief named *Yediger* consented to pay an annual tribute of a thousand fables. But this produced no lasting advantage to Russia; for, soon after, Yediger

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was defeated and taken prisoner by Kutchum Khan, a descendant of the Great Jenghiz Khan: and thus the allegiance of this country to Russia was dissolved.

For some time we hear of no further attempts made by the Russians on Siberia; but in 1577 the foundation of a permanent conquest was laid by one Yermac Temofeeff, a Cossack of the Don. This man was at first the head of a party of banditti who infested the Russians in the province of Casan; but being defeated by the troops of the czar, he retired with 6000 of his followers into the interior parts of that province. Continuing his course still eastward, he came to Orel, the most easterly of all the Russian settlements. Here he took up his winter-quarters: but his restless genius did not suffer him to continue for any length of time in a state of inactivity; and from the intelligence he procured concerning the situation of the neighbouring Tartars of Siberia, he turned his arms toward that quarter.

Siberia was at that time partly divided among a number of separate princes, and partly inhabited by the various tribes of independent Tartars. Of the former Kutchum Khan was the most powerful sovereign. His dominions consisted of that tract of country which now forms the south-western part of the province of Tobolsk; and stretched from the banks of the Irtilsh and Oby to those of the Tobol and Tura. His principal residence was at Sibir, a small fortress upon the river Irtilsh, not far from the present town of Tobolsk, and of which some ruins are still to be seen. After a course of unremitted fatigue, and a series of victories which almost exceed belief, but of which we have not room to give the detail, our intrepid adventurer dispossessed this prince of his dominions, and seated himself on the throne of Sibir. The number of his followers, however, being greatly reduced, and perceiving he could not depend on the affection of his new subjects, he had recourse to the czar of Muscovy, and made a tender of his new acquisitions to that monarch, upon condition of receiving immediate and effectual support. This proposal was received with the greatest satisfaction by the czar; who granted him a pardon for all former offences, and sent him the required succours. Yermac, however, being soon after drowned in an unsuccessful excursion, the Russians began to lose their footing in the country. But fresh reinforcements being seasonably sent, they not only recovered their ground, but pushed their conquests far and wide; wherever they appeared, the Tartars were either reduced or exterminated. New towns were built, and colonies were planted on all sides. Before a century had well elapsed, all that vast tract of country now called *Siberia*, which stretches from the confines of Europe to the Eastern Ocean, and from the Frozen Sea to the present frontiers of China, was annexed to the Russian dominions.

For an account of the climate, soil, and produce, &c. of this vast region, see the articles *КАМТЧАТКА* and *TARTARY*.

SIBYLS, in pagan antiquity, certain women said to have been endowed with a prophetic spirit, and to have delivered oracles for showing the fates and revolutions of kingdoms, &c. The most eminent of the ten Sibyls mentioned by the ancient writers was she whom the Romans called the *Cumæan* or *Erythræan*

Sibyl, from her being born at Erythræ in Ionia, and removed from thence to Cumæ in Italy, where she delivered all her oracles from a cave dug out of the main rock, according to Virgil, *Æneid* III. 441, &c.

There is still preserved, in eight books of Greek verses, a collection of verses pretended to have been delivered by the Sibyls: but the generality of critics look upon them as spurious; and it is the opinion of Prideaux that the story of the books of the Sibyls fold to Tarquin was a state-trick or fetch of politics.

SICILY, a large island of the Mediterranean sea, lying near the coast of Italy, between 12° and 16° E. Long. and between 37° and 39° N. Lat. being about 170 miles long and 100 broad. It is divided from Italy by the straits of Messina, reaching from the Tower of Faro, which is the most northerly part of the island, to the *Capo dell' armi*, or the Cape of Arms, the most southern part of Calabria. These straits, by the Latins called *Fretum Siculum*, by the Italians *Il Faro di Messina*, and by us the *Fare of Messina*, are between 12 and 15 miles over in the broadest places, and in the narrowest about a mile and an half; inasmuch that when Messina was taken by the Carthaginians, many of the inhabitants are said to have saved themselves by swimming to the opposite coasts of Italy. Hence has arisen an opinion that the island of Sicily was originally joined to the continent, but afterwards separated by an earthquake or some other natural cause. This separation, however, is reckoned by the most judicious among the ancients to be fabulous; and they content themselves with speaking of it as a thing said to have happened.

Anciently this island was called *Sicania*, *Sicilia*, and *Trinacria* or *Triquetra*; the two former it had from the Sicani and Siculi, who peopled a considerable part of the country; the two latter from its triangular figure. Its first inhabitants, according to the most respectable ancient authors, were the Cyclopes and Lætrigones, who are said to have settled in the countries adjoining to Mount Ætna; but of their origin we know nothing, except what is related by the poets. After them came the Sicani, who called themselves the original inhabitants of the country; but several ancient historians inform us that they came from a country in Spain watered by the river Siconus. Diodorus, however, is of opinion, that the Sicani were the most ancient inhabitants of this island. He tells us that they were in possession of the whole, and applied themselves to cultivate and improve the ground in the neighbourhood of Ætna, which was the most fruitful part of the island: they built several small towns and villages on the hills to secure themselves against thieves and robbers; and were governed, not by one prince, but each city and district by its own king. Thus they lived till Ætna began to throw out flames, and forced them to retire to the western parts of the island, which they continued to inhabit in the time of Thucydides. Some Trojans, after the destruction of their city, landed in the island, settled among the Sicani, and built the cities of Eryx and Egesta, uniting themselves with them, and taking the general name of Elymi or Elymæi. They were afterwards joined by some Phœnicians, who settled here on their return from the siege of Troy.

After the Sicani had for many ages enjoyed an undisturbed

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disturbed possession of the whole of Sicily, or such parts of it as they chose to inhabit, they were visited by the Siculi, who were the ancient inhabitants of Aufonia properly so called; but being driven out from thence by the Opici, they took refuge in the island of Sicily. Not being contented with the narrow bounds allowed them by the Sicani, they began to encroach upon their neighbours; upon which a war ensuing, the Sicani were utterly defeated, and confined to a corner of the island, the name of which was now changed from *Sicania* into that of *Sicilia*.

About 300 years after the arrival of the Siculi, the island first began to be known to the Greeks, who established various colonies, and built many cities in different parts of the island; and it is only from the time of their arrival that we have any history of the island. The first of the Greeks that came into Sicily were the Chalcidians of Eubœa, under the conduct of Thucles, who built Naxos, and a famous altar of Apollo, which, as Thucydides tells us, was still standing in his time without the city. The year after, which was, according to Dionysius Halicarnassensis, the third of the 17th Olympiad, Archias the Corinthian, one of the Heraclidæ, laid the foundations of Syracuse. Seven years after, a new colony of Chalcidians founded Leontini and Catania, after having driven out the Siculi, who inhabited that tract. About the same time Lamis, with a colony from Megara, a city of Achaia, settled on the river Panticius, at a place called *Trotilum*, where his adventurers lived some time in common with the Chalcidians of Leontini; but, being driven from thence by the Leontines, he built the city of Thapfus, where he died. Upon his death, the colony left Thapfus; and, under the conduct of Hyblon king of the Siculi, founded Megara Hyblea, where they resided 245 years, till they were driven out by Gelon tyrant of Syracuse. During their abode at Megara, they sent one Pamilus, who was come from Megara in Achaia, their original city, to build Selinus. This city was founded about 100 years after the foundation of Megara. Antiphemus and Entimus, the former a Rhodian, the other a Cretan, led each a colony of their countrymen, and jointly built the city of Gela on a river of the same name, establishing in their new settlement the Doric customs, about 45 years after the founding of Syracuse. The inhabitants of Gela founded Agrigentum 108 years after their arrival in Sicily, and introduced the same customs there. A few years after, Zancle was built by the pirates of Cumæ in Italy; but chiefly peopled by the Chalcidians, Samians, and Ionians, who chose rather to seek new settlements than live under the Persian yoke. Some time after, Anaxales, tyrant of Rhegium, drove out the ancient proprietors; and, dividing his lands amongst his followers, called the city *Messana* or *Messene*, which was the name of his native city in Peloponnesus. The city of Himera was founded by the Zancleans under the direction of Euclides, Simus, and Sacon; but peopled by the Chalcidians and some Syracusan exiles, who had been driven out by the contrary faction.

The Syracusians built Acra, Chastanœ, and Camarina; the first 70 years, the second 90, and the third 135, after the foundation of their own city. This is the account which Thucydides, a most judicious and exact writer, gives us of the various nations,

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whether Greeks or Barbarians, who settled in Sicily. Strabo counts among the ancient inhabitants of Sicily the Morgetes, who being driven out of Italy by the Oenotrians, settled in that part of the island where the ancient city of Morgantium stood. The Campani, who assumed the name of *Mamertini*, that is, *invincible warriors*, and the Carthaginians, who settled very early in Sicily, ought likewise to be counted among the ancient inhabitants of the island.

The island of Sicily continued to be divided between the Greeks and Carthaginians till the wars of the latter with the Romans, when the whole island was reduced to a province of that republic about the year 198 B. C. The free cities in the island before this time, besides Syracuse, were Leontini, Agrigentum, Gela, Messana, Himera, Catania, Ætna, Apollonia, Selinus, Taurominium, Agyris, and Centuripe. These underwent the same vicissitudes as SYRACUSE; being sometimes governed by their own laws, and at other times enslaved by domestic tyrants, till finally subdued by the Romans.

During the time of its subjection to the Romans, Sicily was not treated as the other conquered countries, but suffered to enjoy its ancient rights and privileges. This distinction it well deserved, since the Sicilians were the first of foreign nations that had entered into an alliance with Rome, and the first conquest that the republic made out of Italy. This island was afterwards a kind of pass for their troops into Africa; and Rome would not so easily have reduced the formidable power of Carthage, had not Sicily served as a magazine for supplying her armies with provisions, and been a secure retreat for her fleets. Hence Scipio Africanus, after having taken and destroyed Carthage, thought himself obliged to adorn the cities of Sicily with some of the richest spoils he had brought from Africa, that the Sicilians might have among them some monuments of those victories to which they had greatly contributed.

About the time of the sedition of the Gracchi, a most dangerous insurrection of the Sicilian slaves took place on the following occasion. The best estates in that country were in the hands of some rich men of the natives, and of the Roman knights (those opulent publicans), who, finding their account more in employing slaves than husbandmen of free condition to cultivate the farms, had transported such multitudes of slaves thither, that the island swarmed with them. The ill treatment these wretches suffered from their masters, who scarce allowed them necessary food or raiment, put them upon seeking by rapine what was needful for the support of life. They frequently went out in gangs, plundered villages, and exercised all kinds of violence. The several prætors, successively sent from Rome into the island, had, out of fear of the masters to whom the slaves belonged, neglected doing any thing effectual to remedy these disorders: for the Roman knights were a powerful body, whom it was dangerous to disoblige. Impunity naturally increased the mischief; the slaves grew daily more licentious; and their going out in bands to rob, gave them an opportunity of forming plots to deliver themselves from the yoke of servitude.

It happened that one Antigones, a Cicilian, had a Syrian slave named *Eunus*, a man of spirit, and who

had a particular talent for imposing on the multitude. He pretended to have, by dreams and sensible apparitions, intercourse with the gods. By breathing flames out of his mouth, and by a variety of other juggling tricks, he got at length into such vogue as to pass for an oracle. Whole crowds came to him to be told their fortunes. As to himself, he constantly published that his destiny was to be a king. His master, diverted with this whim, used frequently, when at table, to question him concerning his future royalty, and the manner in which he would treat each of the guests then present. According to his different answers, some insulted him, others sent him meat from the table, craving his future protection when he should be upon his throne. The jest proved serious in the event, as we shall presently see, and Eunus did not forget the different treatment he had met with from his master's guests.

Among those who repaired to this prophet for advice, there came at length the slaves of one Damophilus of Enna, a man of brutal character, and who had a wife no less inhuman. Cruelly treated by both, the slaves had formed a plot to murder both. However, before they proceeded to action, they thought it advisable to ask the oracle of the country, Whether the gods would prosper them in an enterprise they were meditating? Eunus answered, That whatever was their project, it was agreeable to the gods, and would infallibly succeed, provided they did not defer the execution. The slaves, thereupon, to the number of 400, armed with forks and scythes and other rustic weapons, assembled themselves in all haste, put Eunus at their head, and straight marched to Enna; where, being joined by the slaves of the town, they massacred the inhabitants, without regard to age or sex, and plundered the houses. As for Damophilus, Eunus, to try him in form, erected, in the public theatre, a court of judicature, where he himself presided. Some of those slaves, whom the prisoner had treated barbarously, made themselves the accusers; and the multitude was judge. Damophilus pleaded earnestly for himself, and moved many to compassion; but Hermias and Zeuxis, two slaves, more spirited with revenge, and more audacious than the rest, approaching the accused, one of them, without farther ceremony, ran him thro' with a sword, and the other cut off his head with an ax. And now Eunus was elected king, not for his valour or skill in martial affairs, but on account of his pretended inspirations. He began his reign by putting to death all the prisoners, except such as could make arms, and those of his master's acquaintance who had used him civilly. He also gave up Damophilus's wife, Megallis, into the hands of her women-slaves, who, when they had whipped and otherwise tormented her as much as they pleased, threw her headlong down a precipice: but as for her daughter, who had always disapproved the barbarity of her parents, and showed great compassion to the slaves, they treated her with all imaginable respect and tenderness, and conveyed her safely to Catana, where they delivered her into the care of some of her relations. Eunus with his own hands flew Pytho and Antigones, the two masters he had successfully served. After which, putting the regal circle on his head, and assuming the other ornaments of sovereignty, he took the name of *Antiochus*, and called his

followers *Syriani*. His next affair was to establish a form of government among his subjects. He chose out some of the ablest men to be his council; and gave the command of his troops to an Achæan, an old soldier, who by his bravery and experience was qualified to command a better army. In three days, his followers increasing to more than 6000 men, he commenced his military expeditions. It was in the year of Rome 615 that this tumult began, Didius being then prætor of Sicily. In 616, Manlius, who succeeded him, was defeated by the rebels, and his camp plundered. The like misfortune happened to P. Cornelius Lentulus in 617; and in 618, when Calpurnius Piso was prætor, Eunus had still the advantage over the Romans. Three prætors thus vanquished successively by the slaves, struck a terror throughout the whole island. Eunus's army grew daily more numerous. Cleon, a Sicilian slave, had taken it into his head to imitate him; and, having got together 5000 slaves, had pillaged Agrigentum and the territory about it. It was hoped at first, that these two leaders would be competitors for dominion, and destroy one another; but, contrary to all mens expectations, they joined forces, and Cleon served as general under Eunus.

The Roman affairs were in this bad situation, when the prætor Plautius Hypsæus, in the year 619, came into Sicily, to restore them. Far from succeeding, he suffered a total defeat by the rebels; whose army, after this victory, augmented to near 200,000 men; they ravaged the whole country, and took many cities.

The example of the slaves in Sicily infected those in Italy and Greece, and occasioned insurrections there. These, however, were easily quelled. Calpurnius Piso, one of the consuls for the year 620, having first restored discipline, that was much relaxed among the troops, overthrew the slaves before Messana, to which they had laid siege: 8000 of them perished in the action, and the prisoners were all crucified. Notwithstanding this victory, the war continued, till Rupilius, one of the consuls of the year 621, had the command of the Roman forces. After his arrival in the island, he successfully laid siege to Tauromenium and Enna, the strongest places in the possession of the slaves. Both were betrayed into his hands. Twenty thousand of the rebels are said to have been cut off. Eunus, with 600 of his guards, escaped from Enna, and took refuge in a steep rocky place. Being there invested by the Romans, and having no hope to escape, they slew one another, to avoid a more painful death. King Eunus hid himself in a cave, whence he was quickly dragged out, together with his cook, his baker, the man that used to rub him when he bathed, and a buffoon whose business had been to divert him at his meals. Rupilius sent him in chains to Morgantia, where, consumed with vermin, he miserably ended his days in prison.

The tranquillity established on this occasion, lasted not long. The Romans, finding themselves in great danger from the Cimbri and Teutones, applied for succours to the eastern nations; and among the rest to Nicomedes king of Bithynia. That monarch, however, excused himself; alleging, that a great number of his subjects had been forcibly carried away into slavery, by those who farmed the revenues of the republic.

public in the east. The complaint appearing to the senate to be well-grounded, they passed a decree, that no freemen of the Roman allies should in any province be treated as slaves; and that the proconsuls and prætors should take care that all such as had been injuriously forced into slavery should be set free. In obedience to this decree, Licinius Nerva, prætor in Sicily, gave liberty in a few days to above 800 slaves. The chief men of the island, foreseeing how much they should be losers by the execution of this decree, addressed themselves to the prætor, and begged of him to manumit no more of the slaves. Licinius, either prevailed upon by bribes, or desiring to ingratiate himself with the rich, would no longer listen to the complaints of such of the slaves as, having been forced into slavery, had recourse to him for redress. On the contrary, he gave them rough language, and sent them home to their masters. The slaves hereupon had recourse to arms. About 200 of them having posted themselves upon a rock, fortified it, and defended themselves for some time against all the efforts of Licinius. At length he sent for one C. Titinius, who had been some years before condemned to death; but having escaped from punishment, now practised robbery. To this man Licinius promised pardon and protection, if by his means the slaves should be reduced. Titinius, with a body of his associates, went over to the rebels, as if to spirit them against their enemies. Being well received by them, and for his bravery declared their general, he soon after betrayed them into the hands of the Romans. This insurrection thus suppressed, was immediately followed by another. In a few days the rebels amounted to 2000 men; and, after a victory which they obtained over a Roman detachment, their number increased to above 6000. They then chose themselves a king, one Salvius, a pretender to the art of divination by inspecting the entrails of animals. After some time spent in plundering the country, Salvius laid siege to Morgantia; and Licinius advanced with a view to relieve the place. But the rebels turned upon him, and, having the advantage of the ground, defeated him. Only 600 men of the Roman army fell in this action, but 4000 were taken prisoners; for Salvius had prudently proclaimed quarter to all who should throw down their arms.

On the report of this victory, such multitudes flocked in to the rebels from all parts, that their army was doubled, and they renewed their attacks upon Morgantia; at the same time promising liberty to the slaves within the town. But their masters making them the same promise in case of victory, the slaves fought so bravely that they forced the rebels to raise the siege. Nevertheless Licinius annulled the promise made to those slaves, who thereupon went over to the enemy.

The contagion of rebellion spread itself to the territories of Ægesta and Lilybæum. Athenio, a Sicilian, a pretender to divination by the stars, got together about 1000 of his fellow-slaves; and he too assumed the title of king. His army increasing to 10,000 able-bodied men, (for he would not, like king Salvius, receive promiscuously all that came to him), he laid siege to Lilybæum, a place that was deemed impregnable. Athenio, after some time, became sensible of his error; and then, that he might quit his enterprise with-

out dishonour, pretended, that the gods had foretold him by the stars, that if the army continued the siege, some sudden misfortune would certainly befall it. A fleet from Mauritania, with succours sent by king Bocchus to the Romans, happened to arrive at Lilybæum just at the time when Athenio began to decamp; and those Africans landed soon enough to fall upon the rear of the rebel army, which suffered a considerable loss: but this loss was more than compensated to Athenio by the increase of credit which his astrological prediction gained him.

In the mean time Salvius, who had assumed the name of Tryphon, a name formerly borne by one of the kings of Syria, chose Triocala for his place of residence. There he built a palace; fortified the castle, which was before very strong; and enlarged the town. From hence he sent as king, a command to Athenio to come and join him with the forces he had collected. Contrary to all men's expectations, Athenio obeyed, and marched to Triocala with 3000 men; the remainder of his army he had dispersed over the country to pillage it, and to engage as many of the slaves as they could to take part with him. The two generals for some time lived amicably together; but at length Tryphon, suspecting Athenio of a design to supplant him, caused him to be seized and put under confinement.

The next year, 650, Licinius Lucullus, who succeeded Licinius Nerva in the prætorship of Sicily, landed in the island with 17,000 men. On the news of their arrival, Tryphon released Athenio, and marched with him at the head of 40,000 men to meet Lucullus. The battle was long doubtful. Athenio fought with great bravery; but having received three wounds, by two of which his legs were lamed, he at length fell among the dead. Hereupon the slaves lost courage, and took to their heels. Twenty thousand of them were slain; the rest, by favour of the night, escaped with their king to Triocala. Athenio, tho' grievously wounded, was not killed; in the dark, he made a shift to creep away and join his companions. The rebels, much disheartened by their loss, held a council to deliberate upon the state of their affairs. Some proposed submission to their masters at discretion; but the prevailing opinion was to fight it out to the last. Lucullus gave them time to recover themselves; for it was nine days after the battle before he invested Triocala; and then the rebels made so resolute a defence, that they obliged him to quit the enterprise. Nor did the Roman general take any further measures to crush the rebellion: his only care was to enrich himself at the expence of his province. Of this, at his return to Rome, he was accused before the people, and found guilty.

The prætor Servilius, who, in 651, succeeded Lucullus, had no success against the rebels. Tryphon was now dead: His successor Ahenio, always brave and enterprising, forced the Roman camp, took towns, and ravaged the country at pleasure.

In 652, the fifth consulship of Marius, the senate thought proper to commission his colleague Aquilius to conduct that war, in which three prætors had been foiled. This new general applied himself chiefly to cut off the enemies' provisions; nor does he seem to have offered them battle till the next year, when their number was considerably diminished.

Sicily.

He then entirely defeated them in a general engagement, wherein, it is said, he fought hand to hand with Athenio, and killed him, after being wounded by him in the head. About 10,000 of the rebels escaped to their strong holds, where Aquilius afterwards destroyed them chiefly by famine. A thousand still remained under a leader named *Satyrus*, and these surrendered themselves. The proconsul promised them pardon; but when he had transported them to Rome, he condemned them to fight with wild beasts. This they refused to do; and chose rather to fall by the hands of one another: *Satyrus* alone remaining, he ran upon his own sword, and was the last that perished on account of this rebellion, which had lasted four years. We are told, that in this and the former servile war in Sicily a million of slaves were destroyed.

In A. D. 439, when the western empire began to fall, Sicily shared the same fate with the rest of the provinces, whose sufferings indeed had begun long before. At this time the Vandals, under their king *Genferic*, made a descent on the island, and ravaged all the open country, but were unable to take the city of Palermo, to which they laid siege; however, they returned to Africa with a very considerable booty.—In 475 *Genferic* was attended with better success; reducing not only the island of Sicily, but all those between Italy and Africa. The next year Sicily was ceded by him to *Odoacer*, (who at this time totally subverted the Roman empire in the west), on condition that he should hold the island of him, and pay him a yearly tribute; for securing which he kept the strong castle of Lilybæum. In the year 550 the whole island was reduced by *Totila* the Goth: however, it was next year given up to the emperor of Constantinople, who kept possession of it till 857, when the Arabs made a descent upon it; and five years after, according to some historians, made themselves masters of the whole. They appear to have kept possession of the island till the year 1040, when the Greeks, assisted by the Normans, took it from them. The history of Sicily from that time is related under the article NAPLES, n° 20—28.

The island has since continued in the hands of the royal family of Spain; and having been reunited to the kingdom of Naples, the king of Spain's eldest son is now king of Sicily as well as of Naples. See SPAIN.

Sicily is separated, as we have already observed, from Italy, by a narrow strait called the *Fare of Messina*. This strait is still remarkable for the rapidity of its currents, and the irregular ebbing and flowing of the sea, which sometimes rushes in with such violence as to endanger ships riding at anchor. Anciently it was much more remarkable for the *Scylla* and *Charybdis*, one a rock, and the other a whirlpool, between which it was very dangerous to steer, and concerning which so many fables have been related by the ancients. *Scylla* is a rock on the Italian side, opposite to *Cap Plores*, which runs out into the sea on the Sicilian side. Mr *Brydone* informs us, that the navigation of the straits is not even yet performed without danger. He informs us, that the noise of the current which sets through the straits may be heard for several miles, like the roaring of some large impetuous river confined between narrow banks. In

many places the water rose into whirlpools and eddies, which are dangerous to shipping. The current set exactly for the rock of *Scylla*, and would certainly have carried any thing thrown into it against that point. Our author, however, is by no means of opinion that the strait is so dangerous as the ancients have represented it; though he thinks that the strait is now probably much wider than formerly, which may have diminished the danger. There are many small rocks, which show their heads near the base of the large ones. These are probably the dogs, described by the ancient poets as howling round *Scylla* *. The rock is near 200 feet high, and has a kind of castle or fort built on its summit with a town called *Scylla* or *Sciglis*, containing 300 or 400 inhabitants on its south side, which gives the title of prince to a *Calabrese* family.

* See
Scylla

Charybdis is now so much diminished, that it seems almost reduced to nothing in comparison of what it was; though even yet it is not to be passed without danger. See CHARYBDIS.

In the straits, Mr *Brydone* informs us, a most surprising phenomenon is to be observed. In the heat of summer, after the sea and air have been much agitated, there appear in the heavens over the straits a great variety of singular forms, some at rest, and others moving with great velocity. These forms, in proportion as the light increases, seem to become more aerial, till at last, some time before sun-rise, they totally disappear. The Sicilians represent this as the most beautiful sight in nature. *Leonti*, one of their best and latest writers, says, that the heavens appear crowded with a variety of objects, such as palaces, woods, gardens, &c. besides the figures of men and other animals that appear in motion among them. Some treatises have been written concerning this phenomenon; but nothing satisfactory has been delivered concerning its cause.

Though Sicily lies in a warm climate, the air is healthful, being refreshed with sea-breezes on every side. Anciently its fertility was such, that it was styled the granary or store-house of Italy; nor has it yet lost its glory in this respect, producing, in great abundance, corn, wine, oil, fruits, sugar, honey, wax, saffron, and silk. Here are also some mines of gold, silver, iron, and other metals; with several kinds of minerals, as alum, vitriol, saltpetre, and mineral salt. The mountains yield also emeralds, jasper, agate, porphyry, and lapis lazuli. A good deal of coral is found upon the coast, and plenty of excellent fish; among which are the pefce spada, or sword-fish, and tunnies.

Of these commodities, particularly silk, raw or manufactured, great quantities used to be exported from *Messina*, the great sea-port and emporium of the kingdom; where a consul from almost every nation in Europe resided, to manage and protect the trade of his nation. But that city is now no more; having been totally destroyed by the late earthquake and eruption of *Ætna*, (Feb. 5. 7. 8. 1783), when a vast number of inferior towns and villages, together with the *Lipari* islands adjacent, are said to have shared the same fate, and most of their inhabitants, including many of the first eminence, to have perished.

Here are several rivers and good springs; but few of

Sicily
Sidereo-
lum.

of the rivers are navigable, having but a short course, and descending precipitately from the mountains. The chief are the Cantera, the Jarretta, and the Salfo; of which, the two former run from west to east, and the third from north to south.

Of the mountains in this island the most noted is Mount *Ætna*, now called *Monte Gibello*, or *Mongibello*, a volcano whose eruptions have often proved fatal to the neighbouring country. See *Ætna*.

While Sicily was immediately subject to Spain, it was governed by a viceroy sent thither, who received from thence a revenue of above 4,000,000 crowns; but since it hath, jointly with Naples, been erected into a kingdom, under the name of the Two Sicilies, the face of affairs, as well as form of government, is said to be much altered, though, it is to be feared, not much in favour of the inhabitants. The nobility are so numerous in this island, that Labit says it is paved with noblemen; there being no less than 60 dukedoms, 56 marquises, and upwards of 100 earldoms, besides a great number of baronies. This people, with respect to their character, are far from appearing in a favourable light; being represented as a perverse race, who must be kept under with a high hand, according to an old proverb, *Insulani plerumque, Siculi autem omnium pessimi*. They are a mixture of Italians and Spaniards; but speak chiefly Spanish, and follow the Spanish fashions, particularly in wearing black. The established religion of the island is the Roman-Catholic. The Jews are now allowed to settle here, and make open profession of their religion; which was not the case while the island was immediately subject to Spain. The number of churches, convents, and religious foundations here, is very great, and they are well endowed. There is a sovereign tribunal, which judges in all ecclesiastical affairs, and admits of no appeal to the pope. The island is commonly divided into three parts or provinces, viz. Val di Demoni, Val di Noto, and Val Mazara.

SICINNIUS (Dentatus), a tribune of the people, lived a little after the expulsion of the kings from Rome. He was in 120 battles and skirmishes, besides single combats, in all of which he came off conqueror. He served under nine generals, all of whom triumphed by his means. In these battles he received 45 wounds in the fore-part of his body, and not one in his back. The senate made him great presents, and he was honoured with the name of the Roman Achilles.

SIDERIAL YEAR. See *ASTRONOMY*, n° 290.

SIDERIA, in natural history, the name of a genus of crystals, used to express those altered in their figure by particles of iron. These are of a rhomboidal figure, and composed only of six planes. Of this genus there are four known species. 1. A colourless, pellucid, and thin one; found in considerable quantities in the iron ores of the forest of Dean in Gloucestershire, and in other the like places. 2. A dull, thick, and brown one; not uncommon in the same places with the former. And, 3. A black and very glossy kind, a fossil of great beauty; found in the same place with the others, as also in Leicestershire and Suffex.

SIDEROXYLUM, IRON-WOOD; a genus of the monogynia order, belonging to the pentandria class of

plants. There are four species; the inerme, the oppositifolium, the lycioides, and the tenax.

The wood of these trees being very close and solid, has given occasion for this name being applied to them, it being so heavy as to sink in water; and the title of iron-wood having been applied to the wood by the inhabitants of the countries where it grows, has occasioned the botanists to constitute a genus by this name. But as the characters of the plants have not been so well examined as could be wished, occasioned by their seldom flowering in Europe, it is very probable, that the plants which have been ranged under this genus do not properly belong to it; for Dr Plukenet has figured a plant under the title of *ebenus Jamaicensis*, whose characters are very different from those assigned to this genus: and the Jamaica iron-wood is totally different from both in its characters, for this has male and female flowers on different trees; the male flowers have no petals.

These plants are natives of warm countries; so cannot be preserved in this country unless they are placed, the two former in a warm stove, the others in a green-house. They are propagated by seeds, when these can be procured from abroad.

SIDNEY (Sir Philip), the eldest son of Sir Henry Sidney, and Mary the daughter of John Dudley duke of Northumberland, was born in the year 1554 at Penshurst in Kent. From a grammar-school at Shrewsbury he was sent to Christ-church, Cambridge, where he continued till the age of 18, and then set out upon his travels. Immediately on his arrival in France, Charles IX. made him one of his gentlemen of the bed-chamber; but he had hardly entered upon his office, before the horrid massacre of the Protestants began. He saved his life by taking refuge in the house of Sir Francis Walsingham the English ambassador. Not choosing to continue longer at the court of an infernal assassin, he travelled to Francfort, where he became acquainted with the learned Hubert Languet, whose future epistles to Sir Philip Sidney have been so much admired. In 1573, he set out for Vienna, whence he proceeded to Hungary, and thence to Italy, where he continued till the latter end of summer 1574. Returning thro' Germany and Flanders, he arrived in England in May 1575.

Our young traveller was at this time only in the 11th year of his age; nevertheless, the queen was so charmed with his abilities and address, that in 1576 she sent him ambassador to congratulate the emperor Rodolph II. on his accession, charging him at the same time with several important negotiations with other German princes.

In 1579, he wrote a private letter to the queen, dissuading her from the marriage then in agitation with the duke of Anjou; which letter seems to have been taken by her majesty in good part. In the following year Mr Sidney had a quarrel with the earl of Oxford in a tennis-court; which probably would have ended in a duel, had not the queen interfered. However, Sidney was disgusted, retired from court, and amused himself with writing his *Arcadia*. Whilst he was thus employed, the Spaniards having taken possession of the kingdom of Portugal on the death of the late king Don Antonio, the competitor for that crown earnestly solicited Mr Sidney's aid.

Sidney.

Sidney.

In 1581, we find our young hero again at court, principally engaged in jousts and tournaments, which were celebrated for the entertainment of the duke of Anjou, then in England; whom he accompanied, with several of the first nobility, to Antwerp. In 1583, the prince Palatine being installed knight of the garter, Mr Sidney was appointed to possess the stall in his name, and received the honour of knighthood on that occasion. In 1585, he projected an expedition to America, in conjunction with Sir Francis Drake; but when he was at Plymouth ready to sail, he received an express from the queen, brought by a peer of the realm, commanding him to return to court.

Soon after this disappointment, he was made governor of Flushing, and general of horse under his uncle the earl of Leicester, who at that time commanded the queen's troops in the Low Countries. In this service, his courage, prudence, and sagacity, were so eminently conspicuous, that his fame became universal; so universal, that the republic of Poland would probably have elected him their king, had not queen Elizabeth refused her assistance. On the 22d of September 1586, in a luckless hour, the gallant Sidney was sent out with a party to intercept a convoy marching towards Zutphen. The morning being hazy, they fell into an ambuscade of the enemy, and Sir Philip having just mounted his second horse, received a shot in the thigh, which broke the bone to pieces. He was carried to Arnhem, and on the 17th of October expired. Thus fell the amiable, the virtuous, the accomplished, the brave, Sir Philip Sidney, in the 32d year of his age; a polite scholar, the patron of learning and genius, and the object of universal panegyric. His body was brought to England, and buried with great pomp, at the queen's expense, in St Paul's cathedral. The funeral procession was so uncommonly magnificent, as to be deemed a subject worthy the pencil of Lant, an eminent designer. It was afterwards engraved on 34 plates by Theodore de Brie, a native of Liege.

SIDNEY (Algernon), was second son of Robert earl of Leicester. During the civil wars, he adhered to the interest of parliament, in whose army he was a colonel; and was nominated one of the king's judges, though he did not sit among them. He was a zealous republican; and consequently a violent enemy to Cromwel, after he had made himself protector. In 1659 he was appointed by the council of state to go with Sir Robert Honeywood, and Bulstrode Whitelocke, Esq; commissioners to the Sound, to mediate a peace between the kings of Sweden and Denmark. At the restoration, colonel Sidney would not personally accept of the oblivion and indemnity then generally granted to the whole nation, but continued abroad till 1677, when he obtained from the king a particular pardon, upon repeated promises of constant quiet and obedience for the future. In 1683, however, he was accused of being concerned in the Rye-house plot; and after the lord Russell had been examined, he was next brought before the king and council. He said that he would make the best defence he could, if they had any proof against him; but he would not fortify their evidence by any thing he should say; so that the examination was very short. He was arraigned for high-treason before the lord chief justice Jeffreys at the king's bench, tried, found guilty, and beheaded in

1683. He wrote *Discourses on Government*, which have been often printed, and are esteemed decisive authorities in politics; inasmuch, that some have declared them an ample recompence for the loss of Cicero's six books *De Republica*. It is certain they abound with strong sense and good learning; and show their author to have been very consummate in the knowledge of human nature and civil polity.

SIDON, (anc. geog.), a city of Phœnicia in Asia, famous in Scripture for its riches, arising from the extensive commerce carried on by its inhabitants. Heavy judgments were denounced against the Sidonians on account of their wickedness, which were accomplished in the time of Ochus king of Persia: for that monarch having come against them with an army on account of their rebellion, the city was betrayed by its king; upon which the wretched inhabitants were seized with such despair, that they set fire to their houses, and 40,000, with their wives and children, perished in the flames.

SIEGE, in the art of war, is to surround a fortified place with an army, and approach it by passages made in the ground, so as to be covered against the fire of the place.

SIEGEN, a town of Germany in Wetteravia, with a castle and the title of a principality, which it gives to a branch of the house of Nassau. It is seated on a river of the same name, in E. Long. 8. 5. N. Lat. 50. 43.

SIENNA, a large, ancient, and celebrated city of Tuscany in Italy; capital of the Siennese, with an archbishop's see, a famous university, and a citadel. It is about four miles in circumference, and surrounded with an old wall. The metropolitan church is much esteemed by travellers; and though it is a Gothic structure, the architecture is admirable. It is built with black and white marble, and the pavement is of mosaic work. The town is adorned with a great number of palaces, fountains, and superb churches, as also a magnificent hospital. The great area is round, and the houses about it are of the same height, supported by piazzas, under which people may walk in all weathers; in the middle is a basin, which they can fill with water at any time, and represent a sea-fight with small vessels. The Italian language is taught here with such purity, that a great many foreigners frequent it on that account. It is seated on three eminences, in a fertile soil; in E. Long. 11. 26. N. Lat. 43. 20.

SIENNESE, a duchy in Italy; bounded on the north by the Florentino, on the south by the Mediterranean sea and the duchy of Castro, on the east by the Perugino and Orvietano, and on the west by the Florentino and the Tuscan sea; being about 55 miles in length, and as much in breadth. The soil is pretty fertile, especially in mulberry-trees, which feed a great number of silk-worms; and there are several mineral springs. Sienna is the capital town.

SIERRA MORENA, mountains of Andalusia in Spain.

SIFANTO, or SIPHANTO, an island of the Archipelago, to the west of Paros, to the north-east of Milo, and to the south-west of Serphanto. The air is so good here, that many of the inhabitants live to the age of 120; and their water, fruits, wild fowl, and poultry

Sidon
Sifanto.

poultry, are excellent, but more especially the grapes. It abounds with marble and granite, and is one of the most fertile and best cultivated of these islands. The inhabitants employ themselves in cultivating olive-trees and capers; and they have very good silk. They trade in figs, onions, wax, honey, and straw-hats; and may be about 8000 in all. E. Long. 25. 15. N. Lat. 38. 0.

SIEUR, a title of respect among the French, like that of *master* among us. It is much used by lawyers, as also by superiors in their letters to inferiors.

SIGETH, a town of Lower Hungary, and capital of a county of the same name. It is seated in a morass, and has a triple wall, with ditches full of water; and is defended by a citadel, being one of the strongest places in Hungary. It now belongs to the house of Austria, and was retaken from the Turks in 1669, after it had been blocked up two years. In some maps it is called *Zigat*. E. Long. 18. 30. N. Lat. 46. 35.

SIGHT, or **VISION**. See **ANATOMY**, n° 406. and *Index* subjoined to **OPTICS**.

Imperfection of SIGHT with regard to Colours.—Under the article **COLOURS**, is given an instance of a strange deficiency of sight in some people who could not distinguish between the different colours. In the *Phil. Transf.* Vol. LXVIII. p. 611. we have an account of a gentleman who could not distinguish a claret colour from black. These imperfections are totally unaccountable from any thing we yet know concerning the nature of this sense.

SIGN, in general, the mark or character of something absent or invisible. See **CHARACTER**.

Among physicians, the term *sign* denotes some appearance in the human body which serves to indicate or point out the condition of the patient with regard to health or disease.

SIGN, in algebra. See **ALGEBRA**, sect. i.

SIGN, in astronomy, a constellation containing a 12th part of the zodiac. See **ASTRONOMY**, n° 110. 135.

SIGNALS, certain alarms or notices used to communicate intelligence to a distant object at sea.

Signals are made by firing artillery, and displaying colours, lanterns, or fire-works; and these are combined by multiplication and repetition. Thus, like the words of a language, they become arbitrary expressions, to which we have previously annexed particular ideas: and hence they are the general sources of intelligence throughout a naval armament, &c.

Signals ought to be distinct, with simplicity. They are simple when every instruction is expressed by a particular token, in order to avoid any mistakes arising from the double purport of one signal. They are distinct when issued without precipitation, when sufficient time is allowed to observe and obey them, and when they are exposed in a conspicuous place, so as to be readily perceived at a distance.

All signals may be reduced into three different kinds, viz. those which are made by the sound of particular instruments, as the trumpet, horn, or fife; to which may be added, striking the bell or beating the drum. Those which are made by displaying pendants, ensigns, and flags of different colours; or by lowering or altering the position of the sails; and, finally, those which are executed by rockets of different kinds; by

firing cannon or small arms; by artificial fire-works; and by lanterns.

Firing of great guns will serve equally in the day or night, or in a fog, to make or confirm signals, or to raise the attention of the hearers to a future order. This method, however, is attended with some inconveniences, and should not be used indiscriminately. Too great a repetition of the cannon is apt to introduce mistakes and confusion, as well as to discover the track of the squadron. The report and flight of the rockets is liable to the same objection, when at a short distance from the enemy.

It is then, by the combination of signals, previously known, that the admiral conveys orders to his fleet; every squadron, every division, and every ship of which has its particular signal. The instruction may therefore occasionally be given to the whole fleet, or to any of its squadrons; to any division of those squadrons, or to any ship of those divisions.

Hence the signal of command may at the same time be displayed for three divisions, and for three ships of each division; or for three ships in each squadron, and for only nine ships in the whole fleet. For, the general signal of the fleet being shown, if a particular pendant be also thrown out from some particular place on the same mast with the general signal, it will communicate intelligence to nine ships that wear the same pendant.

The preparatory signal given by the admiral to the whole or any part of his fleet, is immediately answered by those to whom it is directed; by showing the same signal, to testify that they are ready to put his orders in execution. Having observed their answer, he will show the signal which is to direct their operations: as, To chase, to form the line, to begin the engagement, to board, to double upon the enemy, to rally or return to action, to discontinue the fight, to retreat and save themselves. The dexterity of working the ships in a fleet depends on the precise moment of executing these orders, and on the general harmony of their movements; a circumstance which evinces the utility of a signal of preparation.

As the extent of the line of battle, and the fire and smoke of the action, or other circumstances in navigation, will frequently prevent the admiral's signals from being seen throughout the fleet, they are always repeated by the officers next in command; by ships appointed to repeat signals; and, finally, by the ship or ships for which they are intended.

The ships that repeat the signals, besides the chiefs of squadrons or divisions, are usually frigates lying to windward or to leeward of the line. They should be extremely vigilant to observe and repeat the signals, whether they are to transmit the orders of the commander in chief, or his seconds, to any part of the fleet; or to report the fortunate or distressful situation of any part thereof. By this means all the ships from the van to the rear will, unless disabled, be ready at a moment's warning to put the admiral's designs in execution.

To preserve order in the repetition of signals, and to favour their communication, without embarrassment, from the commander in chief to the ship for which they are calculated, the commanders of the squadrons repeat after the admiral; the chiefs of the divisions, ac-

Signals
Silene.

cording to their order of the line, after the commanders of the squadrons; and the particular ships after the chiefs of the divisions; and those in return, after the particular ships, *vice versa*, when the object is to convey any intelligence from the latter to the admiral.

Besides the signals above-mentioned, there are others for different ranks of officers; as for captains, lieutenants, masters, &c. or for any of those officers of a peculiar ship.

SIGNALS by the Drum, made use of, in the exercise of the army, instead of the word of command, viz.

SIGNALS.	Operations.
<i>A short roll,</i> -	To caution.
<i>A flam,</i> -	To perform any distinct thing.
<i>To arms,</i> -	To form the line or battalion.
<i>The march,</i> -	To advance, except when intended for a salute.
<i>The quick march,</i> -	To advance quick.
<i>The point of war,</i> -	To march and charge.
<i>The retreat,</i> -	To retreat.
<i>Drum ceasing,</i> -	To halt.
<i>Two short rolls,</i> -	To perform the flank-firing.
<i>The dragon march,</i> -	To open the battalion.
<i>The grenadier march,</i> -	To form the column.
<i>The troop,</i> -	To double divisions.
<i>The long roll,</i> -	To form the square.
<i>The grenadier march,</i> -	To reduce the square to the column.
<i>The preparative,</i> -	To make ready and fire.
<i>The general,</i> -	To cease firing.
<i>Two long rolls,</i> -	To bring or lodge the colours.

SIGNATURE, a signing of a person's name at the bottom of an act or deed wrote by his own hand.

SIGNATURE, in printing, is a letter put at the bottom of the first page at least, in each sheet, as a direction to the binder in folding, gathering, and collating them. The signatures consist of the capital letters of the alphabet, which change in every sheet: if there be more sheets than letters in the alphabet, to the capital letter is added a small one of the same sort, as A a, B b; which are repeated as often as necessary. In large volumes it is easy to distinguish the number of alphabets, after the first three or four, by placing a figure before the signature, as 5 B, 6 B, &c.

SIGNET, one of the king's seals, made use of in sealing his private letters, and all grants that pass by bill signed under his majesty's hand: it is always in the custody of the secretaries of state.

SIGNET, in Scots law. See Law, N° clvii. 16.

SILENE, *viscosus campion*; a genus of the trigynia order, belonging to the decandria class of plants. The principal species are, Lobel's catch-fly, dwarf lychnis, Spanish campion, Portugal campion, nodding or mountain campion, Persian campion, shrubby Sicilian campion, &c. The two first are annuals, the two next biennials, and the last three perennial in root. They all flower here in summer from May till August, in the different sorts, each flower having five petals; and several of the sorts produce ripe seeds, particularly the annuals and biennials, by which all the sorts may be raised, and the perennials also by parting the roots, &c. They are all hardy herbaceous plants, and in general have very viscid or clammy stalks, particularly just below the joints, to which flies often stick fast; hence the name *catch-fly*, *viscosus*

campion, &c. They will all prosper in any of the garden-compartments.

SILESLIA, a duchy of Germany, bounded on the east by Poland; on the west, by Moravia, Bohemia, Lusatia, and the county of Glatz; on the south, by a chain of mountains, and a thicket of considerable extent, which separates it from Hungary; and to the north, by the mark of Brandenburg. From north-west to south-east it is about 225 miles, and about 100 where broadest: but it is much contracted at both ends. Upon the frontiers of this country, to the west and south, are very high mountains, and some likewise in other parts of it. One of the ridges upon the frontiers is styled the *Riphean Mountains*, another the *Moravian*, another the *Bohemian*, and another the *Hungarian*, *Crapack*, or *Carpathian*. A branch of the Bohemian is called the *Giant Mountains*. The winter on these hilly tracks is more severe, sets in sooner, and lasts longer, than in the low lands. The inhabitants use a kind of skits when the snow is deep, as they do in Carniola. Little or no grain is raised in the mountains and some sandy tracks; but the rest of the country is abundantly fruitful, not only in grain, but fruits, roots, pasture, flax, hops, madder, tobacco, and hemp, yielding also some wine, with considerable quantities of silk and honey. In many places are great woods of pines, fir, beech, larch, and other trees, affording tar, pitch, rosin, turpentine, lamp-black, and timber for all uses. In this country also is found marble of several sorts, some precious stones, limestone, millstone, pit-coal, turf, vitriol, some silver ore, copper, lead, iron, and mineral springs. Great numbers of black cattle and horses are brought hither from Poland and Hungary for sale, those bred in the country not being sufficient; but of sheep, goats, game, and venison, they have great plenty. As for wild-beasts, here are lynxes, foxes, weasels, otters, and beavers. The rivers, lakes, and ponds, yield fish of several sorts, particularly sturgeons several ells in length, and salmon. Besides a number of smaller streams to water this country, there is the Oder, which traverses it almost from one end to the other; and the Vistula, which, after a pretty long course through it, enters Poland. The number of the cities and market-towns is said to be about 200, the county of Glatz included, and that of the villages 5000. The inhabitants, who are computed to be about a million and an half, are a mixture of Germans, Poles, and Moravians. The language generally spoken is German; but in some places the vulgar tongue is a dialect of the Sclavonic. The states consist of the princes and dukes, and those called *state-lords*, with the nobility, who are immediately subject to the sovereign, and the representatives of the chief cities; but since the country fell under the dominion of the king of Prussia, no surtentage or diets have been held. The king, however, when he took possession of the country, confirmed all the other privileges of the inhabitants. With respect to religion, not only Protestants, but Papists, Jews, and Greeks, enjoy full liberty of conscience. The greatest part of Silesia lies in the diocese of Breslau, but some part of it in the Polish dioceses of Posen and Cracow. The bishop of Breslau stands immediately under the pope with regard to spirituals; but all ecclesiastical benefices, not excepting the see of Breslau, is in the king's gift. Besides Latin schools, col.

Silesia.

colleges, and seminaries, at Breslau is an university, and at Lignitz an academy for martial exercises. The principal manufactures here are woollens, linsens, and cottons of several sorts, with hats, glass-ware, gunpowder, and iron manufactures. Of these there is a considerable exportation. Accounts are generally kept in rix-dollars, silver groschens, and deucaten. With respect to its revolutions and present government, it was long a part of the kingdom of Poland; afterwards it had several dukes and petty princes for its sovereigns, who by degrees became subject to the kings of Bohemia, until at last king Charles IV. incorporated the whole duchy with Bohemia; and thus it continued in the possession of the house of Austria, until the present king of Prussia, taking advantage of the troubles that ensued upon the death of the emperor Charles VI. and pretending a kind of claim, wrested a great part of it, together with the county of Glatz, from his daughter and heiress Maria Theresa, the late empress-dowager; so that now only a small part of it is possessed by the house of Austria, and connected with the empire, the rest being governed by the king of Prussia, without acknowledging any sort of dependence on the crown of Bohemia or the empire. For the administration of justice in all civil, criminal, and feudal cases, and such as relate to the revenue, the king of Prussia has established three supreme judicatories, to which an appeal lies from all the inferior ones, and from which, when the sum exceeds 500 rix-dollars, causes may be moved to Berlin. The Lutheran churches and schools are under the inspection of the upper-consistories, and those of the Papists under that of the bishop's court at Breslau; but from both an appeal lies to the tribunal at Berlin. As to the revenue, the excise here is levied only in the walled towns, being on the same footing as in the mark of Brandenburg; but in the rest of the country the contributions are fixed, and the same both in peace and war. The several branches of the revenue are under the management of the war and domain offices of Breslau and Glogau. The whole revenue arising to the king of Prussia from Silesia and the county of Glatz amounts to about four millions of rix-dollars *per annum*.

Silesia is divided into Upper and Lower, and each of these again into principalities and lordships; of some of which both the property and jurisdiction belong immediately to the sovereign, but of others to his subjects and vassals. In regard to the character of the people, the boors are accounted very dull and silly; but of those of a higher rank, many have distinguished themselves by their wit and learning; as well as by their military and political talents. However, in general, like their neighbours the Germans and Bohemians, they have more of Mars than Mercury in their composition; and their parts are more solid than shining.

SILESIA BARTH, in the materia medica, a fine astringent bole. It is very heavy, of a firm compact texture, and in colour of a brownish yellow. It breaks easily between the fingers, and does not stain the hands; is naturally of a smooth surface, is readily diffusible in water, and melts freely into a butter-like substance in the mouth. It leaves no grittiness between the teeth, and does not ferment with acid menstrua. It is found in the perpendicular fissures of rocks near the gold-mines at Strigonium in Hungary, and is sup-

posed to be impregnated with the sulphur of that metal. It is a good astringent, and better than most of the boles in use.

SILIUS (Italicus Caius), an ancient Roman poet, and author of an epic poem in 17 books, which contains an history of the second Punic war, so famous in history for having decided the empire of the world in favour of the Romans. He was born in the reign of Tiberius, and is supposed to have derived the name of *Italicus* from the place of his birth; but whether he was born at Italica in Spain, or at Cornifium in Italy, which, according to Strabo, had the name of *Italica* given it during the Social war, is a point which cannot be known: though, if his birth had happened at either of these places, the grammarians will tell us, that he should have been called *Italicensis*, and not *Italicus*. When he came to Rome, he applied himself to the bar; and, by a close imitation of Cicero, succeeded so well, that he became a celebrated advocate and most accomplished orator. His merit and character recommended him to the highest offices in the republic, even to the consulship, of which he was possessed when Nero died. He is said to have been aiding and assisting in accusing persons of high rank and fortune, whom that wicked emperor had devoted to destruction: but he retrieved his character afterwards by a long and uniform course of virtuous behaviour. Vespasian sent him as proconsul into Asia, where he behaved with clean hands and unblemished reputation. After having thus spent the best part of his life in the service of his country, he bid adieu to public affairs, resolving to consecrate the remainder to a polite retirement and the muses. He had several fine villas in the country: one at Tusculum, celebrated for having been Cicero's; and a farm near Naples said to have been Virgil's, and at which was his tomb, which Silivius often visited. Thus Martial compliments him on both these accounts:

*Silius hoc magni celebrat monumenta Maronis,
Tugera sacandi qui Ciceronis habet.
Hæredem Dominumque sui tumulique larigæ
Non alium mallet nec Mara nec Cicero.*

Epigr. 49. Lib. 25.

Of Tully's feat my Silivius is possess'd,
And his the tomb where Virgil's ashes rest.
Could those great shades return to choose their heir,
-The present owner they would both prefer.

In these retirements he applied himself to poetry: led not so much by any great force of genius, which would certainly not have suffered him to stay till life was in the wane and his imagination growing cold, as by his exceeding great love of Virgil, to whose memory he paid the highest veneration. He has imitated him in his poem; and though he falls infinitely short of him, yet he has discovered a great and universal genius, which would enable him to succeed in some degree in whatever he undertook.

Since we know little of Silivius Italicus but what we learn from an epistle of the younger Pliny, we cannot do better than subjoin part of that epistle, as we find it translated by Mr Melmoth; since it will not only confirm all that has been said, but let the reader into some farther particulars concerning him.

"I am just now informed, that Silivius Italicus has starved himself to death, at his villa near Naples. Having been afflicted with an imposthume, which was deemed incurable, he grew weary of life under such un-

Silius,
Silk.

easy circumstances, and therefore put an end to it with the most determined courage. He had been extremely fortunate through the whole course of his days, excepting only the loss of his younger son; however, that was made up to him in the satisfaction of seeing his eldest, who is of a more amiable character, attain the consular dignity, and of leaving him in a very flourishing situation. He suffered a little in his reputation in the time of Nero, having been suspected of forwardly joining in some of the informations which were carried on in the reign of that prince; but he made use of his interest in Vitellius with great discretion and humanity. He acquired much honour by his administration of the government of Asia; and by his approved behaviour after his retirement from business, cleared his character from that stain which his former intrigues had thrown upon it. He lived among the nobility of Rome without power, and consequently without envy. Though he frequently was confined to his bed, and always to his chamber, yet he was highly respected and much visited; not with a view to his wealth, but merely on account of his merit. He employed his time between conversing with men of letters and composing of verses; which he sometimes recited, in order to try the sentiments of the public; but he discovered in them more industry than genius. In the decline of his years he entirely quitted Rome, and lived altogether in Campania, from whence even the accession of the new emperor (Trajan) could not draw him. A circumstance which I mention, as well to the honour of the prince, who was not displeased with that liberty, as of Italicus, who was not afraid to make use of it. He was reproached with being fond of all the elegancies of the fine arts to a degree of excess. He had several villas in the same province; and the last purchase was always the chief favourite, to the neglect of the rest. They were all furnished with large collections of books, statues, and pictures, which he more than enjoyed, he even adored; particularly that of Virgil, of whom he was so passionate an admirer, that he celebrated the anniversary of that poet's birth-day with more solemnity than his own; especially at Naples, where he used to approach his tomb with as much reverence as if it had been a temple. In this tranquillity he lived to the 75th year of his age, with a delicate rather than a sickly constitution. It is remarkable, that as he was the last person upon whom Nero conferred the consular office (that prince being killed during his consulship), so he was the last also that survived of all those who had been raised by him to that dignity. When I consider this, I cannot forbear lamenting the transitory condition of mankind. Is there any thing in nature so short and limited as human life even in its most extended period? Does it not seem to you, my friend, but yesterday that Nero was upon the throne? and yet none of all those who were consuls in his reign now remain!"—

There have been many editions of Silius Italicus. A neat and correct one was published at Leipzig, 1696, in 8vo, with short and useful notes by Cellarius: but the best is that *cum notis integris variorum & Arnoldi Drakenborch. Trajecti. ad Rhen. 1717*, in 4to.

SILK, is properly an animal fluid, hardened by the air; being an extremely soft and glossy thread, spun by the silk-worm. See SILK-WORM.

Silk.

As soon 'as the animal is arrived at the size and strength necessary for beginning his cod, he makes his web; for it is thus they call that slight tissue which is the beginning and ground of this admirable work. This is his first day's employment. On the second he forms his folliculus or ball, and covers himself almost over with silk. The third day he is quite hid; and the following days employs himself in thickening and strengthening his ball: always working from one single end, which he never breaks by his own fault; and which is so fine, and so long, that those who have examined it attentively think they speak within compass, when they affirm, that each ball contains silk enough to reach the length of six English miles.

In ten days time the ball is in its perfection, and is now to be taken down from the branches of the mulberry-tree, where the worms have hung it. But this point requires a deal of attention: for there are some worms more lazy than others; and it is very dangerous waiting till they make themselves a passage, which usually happens about the fifteenth day of the month.

The first, finest, and strongest balls are kept for the grain, the rest are carefully wound; or if it is desired to keep them all, or if there be more than can be well wound at once, they lay them for some time in an oven moderately hot, or else expose them for several days successively to the greatest heats of the sun, in order to kill the insect, which, without this precaution, would not fail to open itself a way to go and use those new wings abroad it has acquired within.

Ordinarily, they only wind the more perfect balls; those that are double, or too weak, or too coarse, are laid aside, not as altogether useless, but that, being improper for winding, they are referred to be drawn out into skeins. The balls are of different colours; the most common are yellow, orange-colour, isabella, and flesh-colour; there are some also of a sea-green, others of a sulphur colour, and others white; but there is no necessity for separating the colours and shades to wind them apart, as all the colours are to be lost in the future scouring and preparing of the silk.

To wind silks from off the balls, two machines are necessary, the one a furnace, with its copper; the other a reel, or frame, to draw the silk. The winder, then, seated near the furnace, throws into the copper of water over the furnace (first heated and boiled to a certain degree, which custom alone can teach) a handful or two of balls, which have been first well purged of all their loose furry substance. She then stirs the whole very briskly about with birchen rods, bound and cut like brushes; and when the heat and agitation have detached the ends of the silks of the pods, which are apt to catch on the rods, she draws them forth; and joining ten or twelve, or even fourteen of them together, she forms them into threads, according to the bigness required to the works they are destined for: eight ends sufficing for ribbands; and velvets, &c. requiring no less than fourteen. The ends, thus joined into two or three threads, are first passed into the holes of three iron rods in the fore-part of the reel, then upon the bobbins or pullies, and at last are drawn out to the reel itself, and there fastened each to

Silk.

an end of an arm or branch of the reel. Thus disposed, the winder, giving motion to the reel, by turning the handle, guides the threads; substitutes new ones, when any of them break, or any of the balls are wound out; strengthens them, where necessary, by adding others; and takes away the balls wound out, or that, having been pierced, are full of water.

In this manner, two persons will spin and reel three pounds of silk in a day; which is done with greater dispatch than is made by the spinning-wheel or distaff. Indeed, all silks cannot be spun and reeled after this manner; either by reason the balls have been perforated by the silk-worms themselves; or because they are double, or too weak to bear the water; or because they are coarse, &c. Of all these together, they make a particular kind of silk, called *floretta*; which being carded, or even spun on the distaff or the wheel, in the condition it comes from the ball, makes a tolerable silk.

As to the balls, after opening them with scissars, and taking out the insects, (which are of some use for the feeding of poultry), they are steeped three or four days in troughs, the water whereof is changed every day to prevent their stinking. When they are well softened by this scouring, and cleared of that gummy matter the worm had lined the inside withal, and which renders it impenetrable to the water, and even to air itself, they boil them half an hour in a lye of ashes, very clear and well strained; and after washing them out in the river, and drying them in the sun, they card and spin them on the wheel, &c. and thus make another kind of *floretta*, somewhat inferior to the former.

As to the spinning and reeling of raw silks off the balls, such as they are brought from Italy and the Levant, the first is chiefly performed on the spinning-wheel; and the latter, either on hand-reels, or on reels mounted on machines, which serve to reel several skeins at the same time.

Dyeing of Silk Black. To the general directions given under the article DYEING, n° 17. we shall here add a particular receipt from Dr Lewis's Commerce of Arts. "The silk," says he, "washed as above directed *, is steeped in a decoction of one-third its weight of Aleppo or blue galls, or half its weight of the weaker white galls of Sicily and Romania, and afterwards washed with water; every 12 ounces are reduced by the cleansing to 9, which ought to be increased by the galling to 11, and no more. The dyeing liquor for 100 lb. of silk is prepared by boiling 20 pounds of galls in a sufficient quantity of water, (about 126 gallons), and adding to this decoction, after being settled and drawn off from the sediment, two pounds and an half of English vitriol, 12 pounds of iron-filings, and 20 pounds of the gum of the cherry or plum tree: that the gum may dissolve the more readily, it is put into a large copper cullender, immersed in the hot liquor, and stirred and worked from time to time with a wooden rod till it is all passed through. This mixture is kept for six or seven days or more, a circumstance supposed to be necessary for its perfection; and being then made as hot as the hand can bear, fresh parcels of the galled silks are dipped in it successively, and kept in about 10 minutes each. All of them, after being aired, are dipped again fe-

veral times, with the addition of more vitriol and iron-filings, till they have acquired the requisite blackness, after which they are well washed in water."

This is the process which Mr Macquer tells us is followed in the manufactories at Tours and Genes; on which Dr Lewis makes the following remarks. Having repeated the process in small, with each of the articles exactly in the proportions above-mentioned, he found that it required 30 dippings, or more, to produce a good colour. With less than half this number the silk appears of a beautiful black when taken out of the liquor; but by washing, it becomes pale, and still more so by drying. The quantity of vitriol used, in all, was about eight times that recommended above to be added at one time, or one-fifth part of the weight of the silk; but the iron-filings put in at first remaining undissolved, it was not thought needful to add any more of this ingredient. The operation being repeated without iron-filings at all, no difference could be perceived between the two colours. Without the gum there was a very considerable difference in the silk as taken out of the dye; that which had been dyed with gum having a fine glossiness which the other wanted: the subsequent washing, however, destroyed that glossiness, so that the gum seemed to be of no service, but rather detriment, by thickening the liquor, and making it penetrate with more difficulty into the silk, in the same manner as it prevents ink from sinking into paper. Some silk dyed in the same manner as woollen cloth *, turned out a rusty black when the silk was put in white, but very good when the silk had been previously dyed blue.

Silk-Worm. This insect consists of 11 rings, and each of these of a great number of other smaller ones, joined to each other; and the head, which terminates these rings, is furnished with two jaws, which work and cut the food, not by a perpendicular but a lateral action. The humours found in the body of this creature, all seem approaching to the nature of the silk which it spins, for on being rubbed in the hands they leave a hard or solid crust behind them. Under the skin there is always found a mucous rosy-coloured membrane, enveloping the animal, and supposed to be the new skin in which it is to appear on throwing off the old one. The heart of this creature reaches from the head to the tail, running the whole length of the body: it is indeed rather a series of many hearts connected together, than one. The motion of systole and diastole is very evident in this whole chain of hearts; and it is an elegant sight to observe the manner of the vital fluids passing from one of them to the other. The stomach of this animal is as long as the heart, reaching, like it, from one end of the body to the other. This large receptacle for food, and the sudden passage of it through the animal, are very good reasons for its great voracity.—In the sides of the belly, all about the ventricle, there are deposited a vast number of vessels which contain the silky juice; these run with various windings and meanders to the mouth, and are so disposed that the creatures can discharge their contents at pleasure at the mouth; and, according to the nature of the juices that they are supplied with, furnish different sorts of silk from them, all the fluid contents of these vessels hardening in the air into that sort of thread that we find the web or balls of this.

Silk.

* See the last article.

Silphium
||
Simeon.

this creature consist of. These creatures never are offended at any stench, of whatever kind; but they always feel a southern wind, and an extremely hot air always make them sick.

SILPHIUM, *BASTARD CHRYSANTHEMUM*; a genus of the polygamia necessaria order, belonging to the syngenesia class of plants. There are six species; all of them herbaceous perennials, rising from three to nine feet high, with compound radiated flowers of a yellow colour. They are all very hardy, and easily propagated by parting their roots in autumn.

SILVER, called *luna* by the chemists, a perfect metal of a shining white colour. See *CHEMISTRY*, n° 140, 195, 238, 363. See also *METALLURGY*, p. 4924, *et seq.*

Shell-SILVER, is prepared of the shreds of silver-leaf or of the leaves themselves, for the use of painters, after the same manner as shell-gold. See *Shell-GOLD*.

SILVERING, the covering of any thing with silver. It is usual to silver metals, wood, paper, &c. which is performed either with fire, oil, or size. Metal-gilders silver by the fire; painter-gilders all the other ways. See *GILDING*.

To silver copper or brass. 1. Cleanse the metal with aquafortis, by washing it lightly, and immediately throwing it into fair water; or by heating it red-hot, and scouring it with salt and tartar and fair water, with a small wire brush. 2. Dissolve some silver in aquafortis, in a broad-bottomed glass vessel, or of glazed earth; then evaporate away the aquafortis over a chaffing-dish of coals. 3. Put five or six times its quantity of water, or as much as will be necessary to dissolve it perfectly, on the remaining dry calx; evaporate this water with the like heat; then put more fresh water, and evaporate again; and, if need be, the third time, making the fire towards the latter end so strong, as to leave the calx perfectly dry, which, if your silver is good, will be of a pure white. 4. Take of this calx, common salt, crystal of tartar, of each a like quantity or bulk, and mixing well the whole composition, put the metal into fair water, and take of the said powder with your wet fingers, and rub it well on, till you find every little cavity of the metal sufficiently silvered over. 5. If you would have it richly done, you must rub on more of the powder, and in the last place wash the silvered metal in fair water, and rub it hard with a dry cloth.

SILVERING of Glasses. See *FOLIATING of Looking-glasses*.

SILURUS, in ichthyology, a genus belonging to the order of pisces abdominales. The head is naked; the mouth set round with hairy filaments; the branchiæ have from 4 to 14 rays; the ray of the pectoral fins, or the first dorsal one, is prickly, and dentated backwards. There are 21 species, most of them natives of the Indian and American seas. Mr Hasselquist mentions one called the *clarias* by Linnaeus, and *scheilan* by the Arabians. If it pricks one with the bone of the breast-fin, it is dangerous; and our author saw the cook of a Swedish merchant-ship die of the poison communicated by the prick of one of these fish.

SIMEON of *DURHAM*, the cotemporary of William of Malmbury, took great pains in collecting the monuments of our history, especially in the north of England, after they had been scattered by the Danes.

From these he composed a history of the kings of England, from A. D. 616 to 1130; with some smaller historical pieces. Simeon both studied and taught the sciences, and particularly the mathematics at Oxford; and became precentor of the church at Durham, where he died, probably soon after the conclusion of his history, which was continued by John, prior of Hexham, to A. D. 1156.

SIMIA, the *MONKEY*; a genus of quadrupeds, belonging to the order of primates. They have four fore-teeth in each jaw, placed near each other: the dog-teeth are solitary and more remote; and the grinders are obtuse. They are a numerous race; but almost all confined to the torrid zone. They fill the woods of Africa, from Senegal to the Cape, and from thence to Æthiopia: they are found in all parts of India, and its islands; in Cochinchina, in the south of China, and in Japan; (and one is met with in Arabia): and they swarm in the forests of South America, from the isthmus of Darien, as far as Paraguay. They are lively, agile, full of frolic, chatter, and grimace. From the structure of their members, they have many actions in common with the human kind. Most of them are fierce and untamable: some are of a milder nature, and will show a degree of attachment; but in general, they are endowed with mischievous intellects; and are filthy, obscene, lascivious, thieving. They inhabit the woods, and live in trees; feeding on fruits, leaves, and insects. In general, they are gregarious, going in vast companies: but the different species never mix with each other, always keeping apart and in different quarters. They leap with vast activity from tree to tree, even when loaded with their young, which cling to them. They are the prey of leopards and others of the feline race; and of serpents, which pursue them to the summit of the trees, and swallow them entire. They are not carnivorous, but for mischief's sake will rob the nests of birds of the eggs and young: in the countries where they most abound, the sagacity of the feathered tribe is more marvellously shown in their contrivances to fix the net beyond the reach of these invaders. See *MOTACILLA*.

The simiæ being more numerous in their species than any other animals, and differing greatly in their appearances, it seemed necessary to methodize and subdivide the genus. Accordingly Mr Ray first distributed them into three classes:

Simiæ, Apes, such as wanted tails.

Cercopithecii, Monkeys, such as had tails.

Papiones, Baboons, those with short tails: to distinguish them from the common monkeys, which have very long ones.

From Ray's method, Linnaeus formed his. M. de Buffon followed the same; but with a subdivision of the long-tailed apes, or the true monkeys, into such which had prehensile tails, and such which had not. Mr Pennant has adopted the same method; but is more definite as to the class of baboons, in which he comprehends all whose tails do not exceed half the length of their bodies, and are carried in an arched direction. According to those divisions, the following are the principal species:

I. Without tails; the true *APES*.

1. The *fatyrus*, orang outang, or great ape, has a flat face, and a deformed resemblance of the human;

Simia.

ears exactly like those of a man; the hair on the head longer than on the body. The body and limbs are covered with reddish and shaggy hair; longest on the back, thinnest on the fore-parts. The face and paws are swarthy; the buttocks covered with hair. They inhabit the interior parts of Africa, the isles of Sumatra, Borneo, and Java. Are solitary, and live in the most desert places. They grow to the height of six feet: have prodigious strength, and will overpower the strongest man. The old ones are shot with arrows, the young alone can be taken alive. They live entirely on fruits and nuts. They will attack and kill the negroes who wander in the woods; will drive away the elephants, and beat them with their fists or pieces of wood; and will throw stones at people that offend them. They sleep in trees; and make a sort of shelter from the inclemency of the weather. They are of a grave appearance and melancholy disposition, and even when young not inclined to frolic. They go erect, and are vally swift and agile. These accounts are chiefly taken from Andrew Battel, an English sailor, who was taken prisoner 1589, and lived many years in the inner parts of Congo; his narrative is plain, and seems very authentic: it is preserved in Purchas's collection.

* *Descript. historique du royaume de Maroc*, p. 51.
Froger * informs us, "that those along the banks of the river Ganges are larger and more mischievous than in any part of Africa: the negroes dread them, and cannot travel alone in the country, without running the hazard of being attacked by these animals, who often present them with a stick, and force them to fight. I have heard the Portuguese say, that they have often seen them hoit up young girls, about seven or eight years old, into trees, and that they could not be wrested from them without a great deal of difficulty. The most part of the negroes imagine them to be a foreign nation come to inhabit their country, and that they do not speak for fear of being compelled to work." When taken young, they are capable of being tamed, and taught to perform many menial offices. Francis Pyrad † relates, "that in the province of Sierra

† *Voyages de François Pyrad*, tom. ii. p. 331.

Leona, there is a species so strong-limbed, and so indolent, that, when properly trained and fed, they work like servants; that they generally walk on the two hind-feet; that they pound any substances in a mortar; that they go to bring water from the river in small pitchers, which they carry full on their heads. But when they arrive at the door, if the pitchers are not soon taken off, they allow them to fall; and when they perceive the pitchers overturned and broken, they weep and lament." Father Jarric, quoted by Nieremberg, says the same thing, nearly in the same terms. With regard to the education of these animals, the testimony of Schoutten ‡ accords with that of Pyrad. "They are taken (he remarks) with snares, taught to walk on their hind-feet, and to use their fore-feet as hands in performing different operations, as rinsing glasses, carrying drink round the company, turning a spit, &c." "I saw at Java, (says Guat) §, a very extraordinary ape. It was a female. She was very tall, and often walked erect on her hind-feet. On these occasions, she concealed with her hands the parts which distinguish the sex. Except the eye-brows, there was

‡ *Enf. Nieremberg. Hist. Nat. peregrin.* lib. ix. cap. 45.
§ *Voyages de Fr. le Guat.* tom. ii. p. 96.

no hair on her face, which pretty much resembled the grotesque female faces I saw among the Hottentots at the Cape. She made her bed very neatly every day, lay upon her side, and covered herself with the bed-cloaths. When her head ached, she bound it up with a handkerchief; and it was amusing to see her thus hooded in bed. I could relate many other little articles which appeared to me extremely singular. But I admired them not so much as the multitude; because as I knew the design of bringing her to Europe to be exhibited as a show, I was inclined to think that she had been taught many of these monkey-tricks, which the people considered as being natural to the animal. She died in our ship, about the latitude of the Cape of Good Hope. The figure of this ape had a very great resemblance to that of man, &c." Gemelli Carreri tells us, that he saw one of these apes, which cried like an infant, walked upon its hind-feet, and carried a mat under its arm to lie down and sleep upon.

An orang-outang which Buffon saw, is described by him as mild, affectionate, and good-natured. Idia was melancholy, his gait grave, his movements measured, his dispositions gentle, and very different from those of other apes. He had neither the impatience of the Barbary ape, the maliciousness of the baboon, nor the extravagance of the monkeys. "It may be alleged, (says our author), that he had the benefit of instruction; but the other apes which I shall compare with him, were educated in the same manner. Signs and words were alone sufficient to make our orang-outang act: but the baboon required a cudgel, and the other apes a whip; for none of them would obey without blows. I have seen this animal present his hand to conduct the people who came to visit him, and walk as gravely along with them as if he had formed a part of the company. I have seen him sit down at table, unfold his towel, wipe his lips, use a spoon or a fork to carry the victuals to his mouth, pour his liquor into a glass, and make it touch that of the person who drank along with him. When invited to take tea, he brought a cup and saucer, placed them on the table, put in sugar, poured out the tea, and allowed it to cool before he drank it. All these actions he performed without any other instigation than the signs or verbal orders of his master, and often of his own accord. He did no injury to any person: he even approached company with circumspection, and presented himself as if he wanted to be caressed. He was very fond of dainties, which every body gave him: And as his breath was diseased, and he was afflicted with a teasing cough, this quantity of sweetmeats undoubtedly contributed to shorten his life. He lived one summer in Paris, and died in London the following winter. He ate almost every thing; but preferred ripe and dried fruits to all other kinds of food. He drank a little wine; but spontaneously left it for milk, tea, or other mild liquors." This was only two feet four inches high, and was a young one. There is great possibility that these animals may vary in size and in colour, some being covered with black, others with reddish hairs.—They are not the satyrs of the ancients; which had tails (A), and were a species of monkey. Linnaeus's

Homio

(A) Ælian gives them tails, *lib.*

Pliny says they have teeth like dogs, *lib. vii. c. 2.* circumstances common to many monkeys. *Ptolemy, lib. vii. c. 2.* speaks of certain islands in the Indian ocean, inhabited by people with.

Simia.

Simia. *homo nocturnus*, an animal of this kind, is unnecessarily separated from his *simia satyrus*.

See plate
CCLXVIII
&c. fig. 1.

To enable the reader to form a judgment of this animal which has so great a resemblance to man, it may not be unacceptable to quote from Buffon the differences and conformities which make him approach or recede from the human species. "He differs from man externally by the flatness of his nose, by the shortness of his front, and by his chin, which is not elevated at the base. His ears are proportionally too large, his eyes too near each other, and the distance between his nose and mouth is too great. These are the only differences between the face of an orang-outang and that of a man. With regard to the body and members, the thighs are proportionally too short, the arms too long, the fingers too small, the palm of the hands too long and narrow, and the feet rather resemble hands than the human foot. The male organs of generation differ not from those of man, except that the prepuce has no frænum. The female organs are extremely similar to those of a woman.

"The orang-outang differs internally from the human species in the number of ribs: man has only 12; but the orang-outang has 13. The vertebrae of the neck are also shorter, the bones of the pelvis narrow, the buttocks flatter, and the orbits of the eyes sunk deeper. He has no spinal process on the first vertebra of the neck. The kidneys are rounder than those of man, and the ureters have a different figure, as well as the bladder and gall-bladder, which are narrower and longer than in the human species. All the other parts of the body, head, and members, both external and internal, so perfectly resemble those of man, that we cannot make the comparison without being astonished that such a similarity in structure and organization should not produce the same effects. The tongue, and all the organs of speech, for example, are the same as in man; and yet the orang-outang enjoys not the faculty of speaking; the brain has the same figure and proportions; and yet he possesses not the power of thinking. Can there be a more evident proof than is exhibited in the orang-outang, that matter alone, though perfectly organized, can produce neither language nor thought, unless it be animated by a superior principle? Man and the orang-outang are the only animals who have buttocks and the callus of the legs, and who, of course, are formed for walking erect; the only animals who have a broad chest, flat shoulders, and vertebrae of the same structure; and the only animals whose brain, heart, lungs, liver, spleen, stomach, and intestines, are perfectly similar, and who have an appendix vermiformis, or blind-gut. In fine, the orang-outang has a greater resemblance to man than even to the baboons or monkeys, not only in all the parts we have mentioned, but in the largeness of the face, the figure of the cranium, of the jaws, of the teeth, and of the other bones of the head and face; in the thickness of the fingers and thumb, the figure of the nails, and the number of vertebrae; and, lastly, in the conformity of the articulations, the magnitude and figure of the rotula, sternum, &c. Hence, as there is a greater similarity between this animal and man, than between those

creatures which resemble him most, as the Barbary ape, the baboon, and monkey, who have all been designated by the general name of *apes*, the Indians are to be excused for associating him with the human species, under the denomination of *orang-outang*, or *wild man*. In fine, if there were a scale by which we could descend from human nature to that of the brutes, and if the essence of this nature consisted entirely in the form of the body, and depended on its organization, the orang-outang would approach nearer to man than any other animal. Placed in the second rank of beings, he would make the other animals feel his superiority, and oblige them to obey him. If the principle of imitation, by which he seems to mimic human actions, were a result of thought, this ape would be still farther removed from the brutes, and have a greater affinity to man. But the interval which separates them is immense. Mind, reflection, and language, depend not on figure or the organization of the body. These are endowments peculiar to man. The orang-outang, though, as we have seen, he has a body, members, senses, a brain, and a tongue, perfectly similar to those of man, neither speaks nor thinks. Though he counterfeits every human movement, he performs no action that is characteristic of man, no action that has the same principle or the same design. With regard to imitation, which appears to be the most striking character of the ape-kind, and which the vulgar have attributed to him as a peculiar talent, before we decide, it is necessary to inquire whether this imitation be spontaneous or forced. Does the ape imitate us from inclination, or because, without any exertion of the will, he feels the capacity of doing it? I appeal to all those who have examined this animal without prejudice; and I am convinced that they will agree with me, that there is nothing voluntary in this imitation. The ape, having arms and hands, uses them as we do, but without thinking of us. The similarity of his members and organs necessarily produces movements, and sometimes successions of movements, which resemble ours. Being endowed with the human structure, the ape must move like man; but the same motions imply not that he acts from imitation. Two bodies which receive the same impulse, two similar pendulums or machines, will move in the same manner; but these bodies or machines can never be said to imitate each other in their motions. The ape and the human body are two machines similarly constructed, and necessarily move nearly in the same manner; but parity is not imitation. The one depends on matter and the other on mind. Imitation presupposes the design of imitating. The ape is incapable of forming this design, which requires a train of thinking: consequently, man, if he inclines, can imitate the ape; but the ape cannot even incline to imitate man."

2. The sylvanus, or pigmy, has a flattish face; ears Fig. 2. like those of a man; body, of the size of a cat; colour above, of an olive brown; beneath, yellowish; nails flat; buttocks naked. Sits upright. Inhabits Africa. This species is not uncommon in our exhibitions of animals; and is very tractable and good-natured. Most probably the Pigmy of the ancients. They abound in

Ethiopia,

with tails like those with which satyrs are painted, whence called the *istes of satyrs*. Kæping, a Swede, pretended to have discovered these *homines caudati*; that they would have trafficked with him, offering him live parrots; that afterwards they killed some of the crew that went on shore, and eat them, &c. &c. *Amer. Acad. vi. 71.*

Simia.

Simia. Ethiopia, one feat of that imaginary nation. They were believed to dwell near the fountains of the Nile: they defended annually to make war on the cranes, *i. e.* to steal their eggs, which the birds may be supposed naturally to defend; whence the fiction of their combats. Strabo judiciously observes, that no person worthy of credit ever ventured to assert that he had ever seen this nation. Aristotle speaks of them only by hearsay: they were said to be mounted on little horses, on goats, on rams, and even on partridges. The Indians, taking advantage of the credulity of people, embalmed this species of ape with spices, and sold them to merchants as true pigmies*: such doubtless, were the diminutive inhabitants mentioned by Mr Grose† to be found in the forests of the Carnatic. They feed on fruits: are very fond of insects, particularly of ants; assembling in troops, and turning over every stone in search of them. If attacked by wild beasts, they take to flight; but if overtaken, will face their pursuers, and, by flinging the subtle sand of the desert in their eyes, often escape.

* *Arist. lib. xvi.*
† *Essai Ind. diet., 365.*

Fig. 3.

3. The gibbon, or long-armed ape, with a flat swarthy face surrounded with grey hairs: hair on the body black and rough: buttocks bare: nails on the hands flat; on the feet, long: arms of a most disproportioned length, reaching quite to the ground when the animal is erect, its natural posture: of a hideous deformity.—Inhabits India, Malacca, and the Molucca isles: a mild and gentle animal: grows to the height of four feet. The great black ape of Mangfi, a province in China, seems to be of this kind.

Fig. 4.

4. The inuus, magot, or Barbary ape, has a long face, not unlike that of a dog: canine teeth, long and strong: ears like the human: nails flat: buttocks bare: colour of the upper part of the body, a dirty greenish brown; belly, of a dull pale yellow: grows to above the length of four feet.—They inhabit many parts of India, Arabia, and all parts of Africa except Egypt, where none of this genus are found. A few are found on the hill of Gibraltar, which breed there: probably from a pair that had escaped from the town; as they are not found in any other part of Spain.—They are very ill-natured, mischievous, and fierce; agreeing with the character of the ancient Cynocephali. They are a very common kind in exhibitions. By force of discipline, are made to play some tricks; otherwise, they are more dull and sullen than the rest of this genus. They assemble in great troops in the open fields in India; and will attack women going to market, and take their provisions from them. The females carry the young in their arms, and will leap from tree to tree with them.—Apes were worshipped in India, and had magnificent temples erected to them. When the Portuguese plundered one in Ceylon, they found in a little golden casket (a) the tooth of an ape; a relic held by the natives in such veneration, that they offered 700,000 ducats to redeem it, but in vain; for it was burnt by the viceroy, to stop the progress of idolatry.

Fig. 5.

5. The tufted ape, a species of most disgusting deformity, described in the Philosophical Transactions, abridged, N° 290. It had a nose and head 14 inches in length: the nose of a deep red, face blue, both na-

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I

ked; black eye-brows; ears like the human: on the top of the head a long upright tuft of hair; on the chin another; two long tusks in the upper jaw: fore-feet exactly resembling hands, and the nails on the fingers flat: the fore-part of the body, and the inside of the legs and arms, naked: the outside covered with mottled brown and olive hair. Length, from the nose to the rump, three feet two inches. It was very fierce and salacious: went on all-fours; but would sit up on its rump, and support itself with a stick: in this attitude, it would hold a cup in its hand, and drink out of it. Its food was fruits.

II. BABOONS. A. With short tails.

6. The sphynx, or great baboon, with hazel irides; Fig. 6. ears small and naked; face canine, and very thick; middle of the face and fore-head naked, and of a bright vermilion colour; tip of the nose of the same, and ending trincated like that of a hog; sides of the nose broadly ribbed, and of a fine violet hue; the opening of the mouth very small; cheeks, throat, and goat-like beard yellow; hair on the fore-head very long, turns back, is black, and forms a kind of pointed crest. Head, arms, and legs, covered with short hair, yellow and black intermixed; the breast with long whitish yellow hairs, the shoulders with long brown hair. Nails flat; feet and hands black; tail four inches long, and very hairy: buttocks bare, red, and filthy; but the space about them is of a most elegant purple colour, which reaches to the inside of the upper part of the thighs.

This was described by Mr Pennant from a stuffed specimen in Sir Ashton Lever's museum. In August 1779, a live animal of this species was shown at Edinburgh, and in October following at Chester, where being seen by Mr Pennant, that inquisitive naturalist has described it in his History of Quadrupeds. "It differed little (he observes) in colour from the above, being in general much darker. Eyes much sunk in the head, and small. On the internal side of each ear was a white line, pointing upwards. The hair on the fore-head turned up like a toupee. Feet black; in other respects resembled the former. In this I had an opportunity of examining the teeth. The cutting teeth were like those of the rest of the genus; but, in the upper and lower jaw, were two canine, or rather tusks, near three inches long, and exceedingly sharp and pointed. This animal was five feet high, of a most tremendous strength in all its parts; was excessively fierce, libidinous, and strong.

Mr Schreber says, that this species lives on succulent fruits, and on nuts; is very fond of eggs, and will put eight at once into its pouches, and, taking them out one by one, break them at the end, and swallow the yolk and white: rejects all flesh-meat, unless it be dressed: would drink quantities of wine or brandy: was less agile than other baboons: very cleanly; for it would immediately fling its excrements out of its but. That which was shown at Chester was particularly fond of cheese. Its voice was a kind of roar, not unlike that of a lion, but low and somewhat inward. It went upon all-fours, and never stood on its hind-legs, unless forced by the keeper; but would frequently sit on its rump in a crouching man-

40 U

ner,

(a) *Linschotten's Voy.* 53. In Amadabat are hospitals for apes and other maimed animals; *Tavernier's Voy.* part II. 48. The same writer says, that they breed in great numbers in India, in the copes of bamboos, which grow on each side the road, p. 94.

Simia.
Baboons.
Fig. 7.

ner, and drop its arms before the belly. Inhabits the hotter parts of Africa."

7. The wood-baboon, with a long dog-like face, covered with a small glossy black skin; hands and feet naked, and black like the face; hair on all parts long, elegantly mottled with black and tawny; nails white. About three feet high when erect; tail not three inches, and very hairy on the upper part.—Inhabits Guiney, where it is called the *man of the wood*.

8. The nemeſtrina, or pig-tail baboon, with a pointed face, which is naked, of a swarthy redness: two sharp canine teeth: ears like the human: hair on the limbs and body brown inclining to ash-colour, palest on the belly; fingers black: nails long and flat: thumbs on the hind-feet very long, connected to the nearest toe by a broad membrane: tail four inches long, slender, exactly like a pig's, and almost naked; the bare spaces on the rump red, and but small: length, from head to tail, 22 inches. Inhabits the isles of Sumatra and Japan: is very docile. In Japan it is taught several tricks, and carried about the country by mountebanks. Kempfer was informed by one of these people, that the baboon he had was 102 years old.

B. Baboons with longer tails.

9. The hamadryas, or dog-faced baboon, with a long, thick, and strong nose, covered with a smooth red skin: ears pointed, and hid in the hair: head great, and flat: hair on the head, and fore-part of the body as far as the waist, very long and shaggy; grey and olive-brind; the sides of the head very full, the hair on the limbs and hind-part of the body very short: limbs strong and thick: hands and feet dusky: the nails on the fore-feet flat; those on the hind like a dog's: buttocks very bare, and covered with a skin of a bloody colour: tail scarce the length of the body, and carried generally erect. They inhabit the hottest parts of Africa and Asia; where they keep in vast troops, and are very fierce and dangerous. They rob gardens. They will run up trees when passengers go by, shake the boughs at them with great fury, and chatter very loud. They are excessively impudent, indecent, lascivious: most detestable animals in their manners as well as appearance. They range the woods in hundreds; which obliges the owners of the coffee-plantations to be continually on their guard against their depredations. One of them was shown in London some years ago: it came from Mokka, in the province of Yeman, in Arabia Felix in the Persian gulph; and was above five feet high. It was very fierce, and untamable; so strong, as easily to mangle its keeper, a stout young man. Its inclinations to women appeared in the most violent manner. A footman, who brought a girl to see it, in order to tease the animal, kissed and hugged her: The beast, enraged at being so tantalized, caught hold of a quart pewter-pot, which he threw with such force and so sure an aim, that, had not the man's hat and wig softened the blow, his skull must have been fractured; but he fortunately escaped with a common broken head.

10. The faunus, silenus, or lion-tailed baboon, with a dog-like face, naked, and of a dusky colour: a very large and full white or hoary beard: large canine teeth: body covered with black hair; belly of a light-colour: tail terminated with a tuft of hair like that of a lion.

Its bulk that of a middling sized dog. It inhabits the East-Indies and the hotter parts of Africa.

III. With tails longer than their bodies, or MONKEYS.

A. Those of the old world, or the continent of Asia and Africa, having within each lower jaw pouches for the reception of their food: buttocks generally naked.

A. Tails straight, not prehensile.

11. The purple-faced monkey, with a great triangular white beard, short, and pointed at the bottom and on each side of the ears, extending in a winged fashion far beyond them; face and hands purple, body black. Inhabit Ceylon. They are very harmless; live in the woods, and feed on leaves and buds of trees; and when taken soon become tame.

12. The fabaz, or green monkey, has a black and flattish face: the side of it bounded by long white hairs, falling backwards, and almost covering the ears, which are black, and like the human: head, limbs, and whole upper part of the body and tail, covered with soft hair, of a yellowish green colour at their ends, cinereous at their roots: under-side of the body and tail, and inner side of the limbs, of a silvery colour: tail very long and slender. Size of a small cat.—Inhabit different parts of Africa: keep in great flocks, and live in the woods: are scarce discernible when among the leaves, except by their breaking the boughs with their gambols: in which they are very agile and silent: even when shot at, do not make the least noise; but will unite in company, knit their brows, and gnash their teeth, as if they meant to attack the enemy: are very common in the Cape Verd islands.

13. The æthiops, mangaby, or white-eyed monkey, Fig. 10. has a long, black, naked, and dog-like face: the upper eye-lids of a pure white: ears black, and like the human: no canine teeth: hairs on the sides of the face beneath the cheeks, longer than the rest: tail long: colour of the whole body tawny and black: flat nails on the thumbs and fore-fingers; blunt claws on the others: hands and feet black.—Shown in London some years ago: place uncertain: that described by M. de Buffon came from Madagascar; was very good-natured; went on all-fours.

14. The aygula, or egret monkey, has a long face, Fig. 12. and an upright sharp-pointed tuft of hair on the top of the head. The hair on the fore-head is black; the tuft, and the upper part of the body, light grey; the belly, white: the eye-brows are large; the beard very small. Size of a small cat. They inhabit Java. They fawn on men, on their own species, and embrace each other. They play with dogs, if they have none of their own species with them. If they see a monkey of another kind, they greet him with a thousand grimaces. When a number of them sleep, they put their heads together. They make a continual noise during night.

15. The Chinese monkey, (*le bonnet Chinois* of Buffon), has a long smooth nose, of a whitish colour: hair on the crown of the head long, lying flat, and parted like that of a man; colour, a pale cinereous brown. Inhabit Ceylon. They keep in great troops; and rob the gardens of fruit, and fields of the corn; to prevent which, the natives are obliged to watch the whole day: yet these animals are so bold, that, when driven from one end of the field, they will immediately enter at the other.

Fig. 11.

Fig. 8.

Fig. 9.

Simia.

MONKEYS

Simia. other, and carry off with them as much as their mouth
MONKEYS. and arms can hold. Bosman, speaking of the thefts
of the monkeys of Guiney, says, that they will take in
each paw one or two stalks of millet, as many under
their arms, and two or three in their mouth; and thus
ludely, hop away on their hind-legs: but, if pursued,
they sling away all, except what is in their mouths,
that it may not impede their flight. They are very
nice in the choice of the millet; examine every stalk;
and if they do not like it, sling it away: so that this
delicacy does more harm to the fields than their thievery.

Fig. 13.

16. Full-bottom monkey, with a short, black, and
naked face; that and the shoulders covered with long,
coarse, flowing hairs like a full-bottomed perriwig; of
a dirty-yellowish colour, mixed with black: body, arms,
and legs, of a fine glossy blackness, covered with short
hairs: hands naked, furnished with only four fingers;
on each foot four very long slender toes: tail very long,
of a snowy whiteness, with a tuft at the end: body
and limbs slender; length above three feet. Inhabits
the forests of Sierra Leone in Guiney; where it is called
the *hey* or *king monkey*. The negroes hold the skin
in high estimation; and use it for pouches, and for cov-
erings to their guns.

B. Monkeys of the new world, or the continent of
America, having neither pouches in their jaws, nor
naked buttocks. Tails of many prehensile, and naked
on the under side for a certain space next their
end.

A. With prehensile tails.

17. Beelzebub, or the preacher, has black shining
eyes; short round ears; and a round beard under the
chin and throat. The hairs on the body are of a shin-
ing black, long, yet lie so close on each other that
the animal appears quite smooth: the feet and end of
the tail are brown; the tail very long, and always
twisted at the end. Size of a fox. Inhabit the woods
of Brasil and Guiana in vast numbers, and make a most
dreadful howling. Sometimes one mounts on a higher
branch, the rest seat themselves beneath: the first be-
gins as if it was to baroque, and sets up so loud and
sharp a howl as may be heard a vast way, and a person
at a distance would think that a hundred joined in the
cry: after a certain space, he gives a signal with his
hand, when the whole assembly joins in chorus; but on
another signal, is silent, and the orator finishes his ad-
dress (c). Their clamour is the most disagreeable and
tremendous that can be conceived; owing to a hollow
and hard bone placed in the throat, which the English
call the *throttle-bone*. These monkeys are very fierce,
untameable, and bite dreadfully. There is a variety
of a ferruginous or reddish bay colour, which the In-
dians call the *king of the monkeys*: it is large, and as
noisy as the former. The natives eat this species, as
well as several other sorts of monkeys, but are parti-
cularly fond of this. Europeans will also eat it, espe-
cially in those parts of America where food is scarce:
when it is scalded in order to get off the hair, it looks
very white; and has a resemblance flocking to huma-

nity, that of a child of two or three years old, when
crying (d). Simia.

MONKEYS.

18. The paniscus, four-fingered, or spider-monkey, Fig. 14.

has a long flat face, of a swarthy flesh-colour: the eyes
are sunk in the head; ears like the human; limbs of a
great length, and uncommonly slender: the hair is
black, long, and rough. There are only four fingers
on the hands, being quite destitute of a thumb; five
toes on the feet. The tail is long; and naked below,
near the end. The body is slender; about a foot and
a half long: the tail near two feet, and so prehensile
as to serve every purpose of a hand.—They inhabit the
neighbourhood of Carthagena, Guiana, Brasil, and
Peru; associate in vast herds; and are scarce ever seen
on the ground. Dampier describes their gambols in
a lively manner: "There was (says he) a great com-
pany dancing from tree to tree over my head, chat-
tering, and making a terrible noise and a great many
grim faces and antic gestures; some broke down dry
sticks and flung them at me, others scattered their urine
and dung about my ears: at last one bigger than the
rest came to a small limb just over my head, and leap-
ing directly at me, made me leap back; but the mon-
key caught hold of the bough with the tip of its tail,
and there continued swinging to and fro, making
mouths at me. The females with their young ones are
much troubled to leap after the males; for they have
commonly two, one she carries under her arm, the other
fits on her back, and claps its two fore-paws about her
neck: are very fullen when taken; and very hard to
be got when shot, for they will cling with their tail
or feet to a bough, as long as any life remains; when
I have shot at one, and broke a leg or arm, I have pit-
ied the poor creature to see it look and handle the
broken limb, and turn it from side to side."—They are
the most active of monkeys, and quite enliven the for-
ests of America. In order to pass from top to top of
lofty trees, whose branches are too distant for a leap,
they will form a chain, by hanging down, linked to
each other by their tails, and swinging in that manner
till the lowest catches hold of a bough of the next tree,
and draws up the rest; and sometimes they pass rivers
by the same expedient. They are sometimes brought
to Europe; but are very tender, and seldom live long
in our climate.

19. The faï, or weeper, with a round and flat face, Fig. 15.

of a reddish brown colour, very deformed: the hair on
the head, and upper part of the body, black, tinged
with brown; beneath and on the limbs, tinged with
red: tail black, and much longer than the head and
body: the young excessively deformed; their hair very
long, and thinly dispersed: in the British Museum are
specimens of old and young. M. de Buffon has a vari-
ety with a white throat. Inhabits Surinam and Bra-
sil: appear as if they were always weeping: of a me-
lancholy disposition; but very full of imitating what
they see done. These probably are the monkeys Dam-
pian saw in the Bay of All Saints, which he says are very
ugly, and smell strongly of musk. They keep in large
com-

(c) A singular account, yet related by Marcgrave and several other writers. Marcgrave is a writer of the first au-
thority, and a most able naturalist, long resident in the Brasils, and speaks from his own knowledge.

(d) *Ulloa's Voy.* I. 113. *Des Marchais*, III. 311. says, they are excellent eating, and that a *joupe aux singes* will
be found as good as any other, as soon as you have conquered the aversion to the *bouilli* of their heads, which look
very like those of little children.

Simia.
||
Simonians.

companies; and make a great chattering, especially in stormy weather; reside much on a species of tree which bears a podded fruit, which they feed on.

a. With straight tails, not prehensile.

Fig. 16.

20. The pithecia, or fox-tailed monkey, with a swarthy face, covered with short white down: forehead and sides of the face with whitish, and pretty long hair: body with long dusky brown hairs; white or yellowish at their tips: hair on the tail very long and bushy; sometimes black, sometimes reddish: belly and lower part of the limbs a reddish white: length from nose to tail, near a foot and a half: tail longer, and like that of a fox: hands and feet black, with claws instead of nails. Inhabits Guiana.

Fig. 17.

21. The iacchus, or striated monkey, with a very round head: about the ears two very long full tufts of white hairs standing out on each side: irides reddish: face a swarthy flesh colour: ears like the human: head black: body ash-coloured, reddish, and dusky; the last forms striated bars across the body: tail full of hair, annulated with ash-colour and black: body seven inches long; tail, near eleven: hands and feet covered with short hairs: fingers like those of a squirrel: nails, or rather claws, sharp. Inhabits Brazil: feeds on vegetables; will also eat fish: makes a weak noise: very restless: often brought over to Europe.

Fig. 18.

22. The mico, or fair monkey, with a small round head: face and ears of the most lively vermilion colour: body covered with most beautiful long hairs of a bright and silvery whiteness, of matchless elegance: tail of a shining dark chestnut: head and body eight inches long; tail twelve. Inhabits the banks of the Amazons; discovered by M. de Condamine.

SIMILE, or **SIMILITUDE**, in rhetoric, a comparison of two things, which though different in other respects, yet agree in some one. The difference between a simile and comparison is said to consist in this, that the simile properly belongs to whatever we call the quality of a thing, and the comparison to the quantity. See **COMPARISON**; and **ORATORY**, n° 84. 118.

SIMILOR, a name given to an alloy of red copper and zinc, made in the best proportions, to imitate silver and gold.

SIMON (Richard), a French critic and divine, of great sense and learning, born at Dieppe in 1638. He made a vast proficiency in the Oriental tongues, for which he had always a particular turn. He was the author and editor of several works; but the most important of his publications was his *Histoire Critique du Vieux Testament*; which appeared in 1678. He died in 1612.

SIMONICAL, is applied to any person guilty of simony. See **SIMONY**.

SIMONIANS, in church-history, a sect of ancient heretics, so called from their founder Simon Magus or the Magician. The heresies of Simon Magus were principally his pretending to be the great power of God, and thinking that the gifts of the Holy Ghost were venal, and to be purchased with money. He is said to have invented the *Æons*, which were so many persons of whom the Godhead was supposed to be compounded. His concubine Helen he called the first intelligence, and mother of all things. Sometimes he called her *Minerva*, and himself *Jupiter*. Simon Magus gained a great many profelytes, who paid himself

and his concubine divine worship. These were the Simonides, earliest heretics, and whom St John, St Peter, and St Paul, in their epistles, so often warn Christians against.

SIMONIDES, the name of several poets celebrated in antiquity; but by the Marbles it appears, that the eldest and most illustrious of them was born in the 55th Olympiad, 538 years B. C. and that he died in his 90th year; which nearly agrees with the chronology of Eusebius. He was a native of Ceos, one of the Cyclades, in the neighbourhood of Attica, and the preceptor of Pindar. Both Plato and Cicero give him the character not only of a good poet and musician, but speak of him as a person of great virtue and wisdom. Such longevity gave him an opportunity of knowing a great number of the first characters in antiquity, with whom he was in some measure connected. It appears in Fabricius, from ancient authority, that Simonides was contemporary and in friendship with Pittacus of Mitylene, Hipparchus tyrant of Athens, Paulanias king of Sparta, Hiero tyrant of Syracuse, with Themistocles, and with Alcibiades king of Thebaly. He is mentioned by Herodotus; and Xenophon, in his Dialogue upon Tyranny, makes him one of the interlocutors with Hiero king of Syracuse. Cicero alleges, what has often been quoted in proof of the modesty and wisdom of Simonides, that when Hiero asked him for a definition of God, the poet required a whole day to meditate on so important a question; at the end of which, upon the prince putting the same question to him a second time, he asked two days respite; and in this manner always doubled the delay each time he was required to answer it; till at length, to avoid offending his patron by more disappointments, he frankly confessed that he found the question so difficult, that the more he meditated upon it, the less was his hope of being able to solve it.

In his old age, perhaps from seeing the respect which money procured to such as had lost the charms of youth and the power of attaching mankind by other means, he became somewhat mercenary and avaricious. He was frequently employed by the victors at the games to write panegyrics and odes in their praise, before his pupil Pindar had exercised his talents in their behalf: but Simonides would never gratify their vanity in this particular till he had first tied them down to a stipulated sum for his trouble; and upon being upbraided for his meanness, he said, that he had two coffers, in one of which he had for many years put his pecuniary rewards; the other was for honours, verbal thanks, and promises; that the first was pretty well filled, but the last remained always empty. And he made no scruple to confess, in his old age, that of all the enjoyments of life, the love of money was the only one of which time had not deprived him.

He was frequently reproached for this vice; however, he always defended himself with good-humour. Upon being asked by Hiero's queen, Whether it was most desirable to be learned or rich? he answered, that it was far better to be rich; for the learned were always dependent on the rich, and waiting at their doors; whereas he never saw rich men at the doors of the learned. When he was accused of being so fond as to sell part of the provisions with which his table was furnished by Hiero, he said he had done it in order "to display to the world the magnificence of that prince

Lapez. *Fig. 1 Orang Outang.**Fig. 3 Long-armed Ape.**Fig. 2 Pigmy.*H. Baboons
*Fig. 6 Great Baboon**Fig. 5 Tufted Ape.**Fig. 4 Barbary Ape.**Fig. 7 Howl Baboon.**Abell's help.*

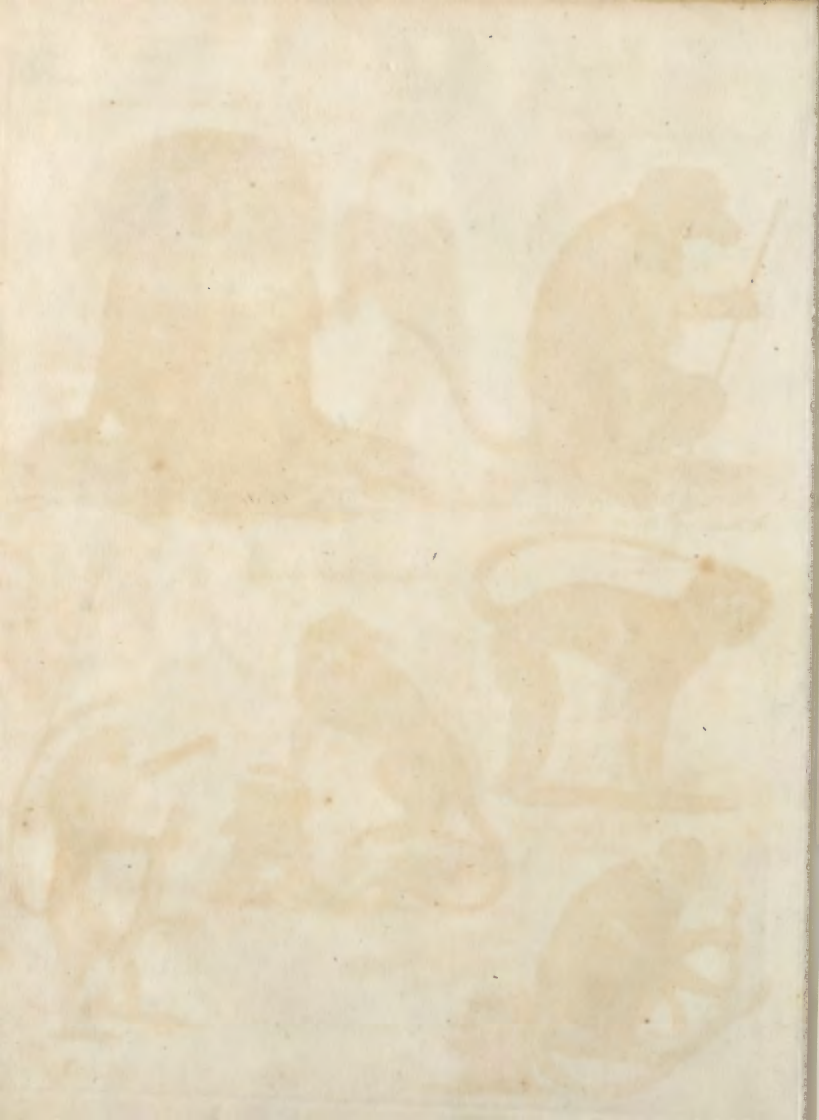
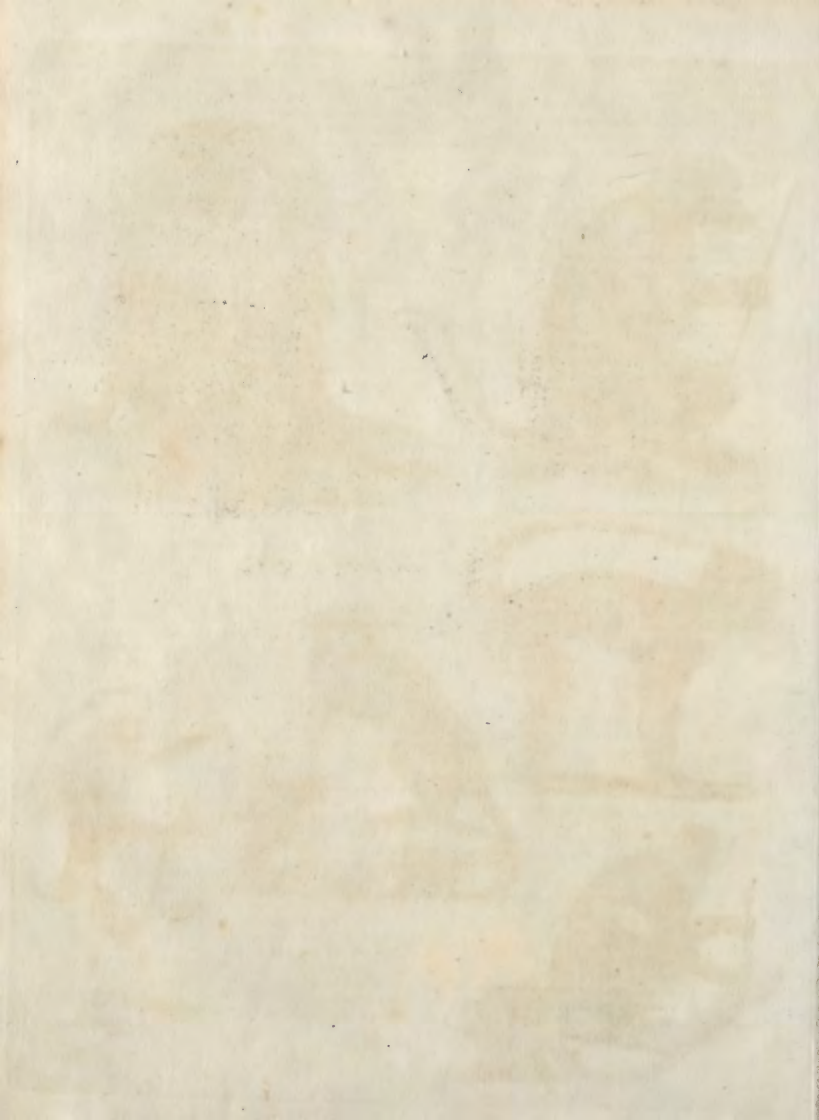


Fig. 8. Dog-faced Baboon.III. Monkeys. *Fig. 10. Hanging Monkey.**Fig. 12. Egret Monkey.**Fig. 13. Bull-bottom Monkey.**Fig. 11. Purple-faced Monkey.**Wall's sculp.*



Simonides,
Simony.

prince and his own frugality." To others he said, that his reason for accumulating wealth was, that "he would rather leave money to his enemies after death, than be troublesome to his friends while living."

He obtained the prize in poetry at the public games when he was four score years of age. According to Suidas, he added four letters to the Greek alphabet; and Pliny assigns to him the eighth string of the lyre; but these claims are disputed by the learned.

Among the numerous poetical productions of which, according to Fabricius, antiquity has made him the author, are many songs of victory and triumph for athletic conquerors at the public games. He is likewise said to have gained there himself the prize in elegiac poetry when *Æschylus* was his competitor.

His poetry was so tender and plaintive, that he acquired the cognomen of *Melicertes*, "sweet as honey;" and the *tearful* eye of his muse was proverbial.

"Simonides (says an elegant modern writer *), and excellent judge of every species of literary merit), was celebrated by the ancients for the sweetness, correctness, and purity of his style, and his irresistible skill in moving the passions. Dionysius places him among those polished writers who excel in a smooth volubility, and flow on, like pteutose and perennial rivers, in a course of even and uninterrupted harmony."

It is to Dionysius that we are indebted for the preservation of the following fragment of this poet. Danaë being by her merciless father inclosed in a chest, and thrown into the sea with her child, when night comes on, and a storm arises which threatens to overturn the chest, she, weeping and embracing the young Perseus, cries out:

Sweet child! what anguish does thy mother know,
Ere cruel grief has taught thy tears to flow!
Amidst the roaring wind's tremendous sound,
Which threats destruction as it howls around;
In balmy sleep thou liest, as at the breast,
Without one bitter thought to break thy rest.—
The glimmering moon in pity hides her light,
And shirks with horror at the ghastly sight.
Diddst thou but know, sweet innocent! our woes,
Not oplate's pow'r thy eye-lids now could close.
Sleep on, sweet babe! ye waves in silence roar;
And hush, O hush to rest my tortur'd soul!

There is a second great poet of the name of Simonides recorded on the Marbles, supposed to have been his grandson, and who gained, in 478 B. C. the prize in the games at Athens.

SIMONY, is the corrupt presentation of any one to an ecclesiastical benefice for money, gift, or reward. It is so called from the resemblance it is said to bear to the sin of Simon Magus, though the purchasing of holy orders seems to approach nearer to his offence. It was by the canon law a very grievous crime: and is so much the more odious, because, as Sir Edward Coke observes, it is ever accompanied with perjury; for the pretence is sworn to have committed no simony. However, it was not an offence punishable in a criminal way at the common law; it being thought sufficient to leave the clerk to ecclesiastical censures. But as these did not affect the simoniacal patron, nor were efficacious enough to repel the notorious practice of the thing, divers acts of parliament have been made to restrain it by means of civil forfeitures; which the modern prevailing usage, with regard to spiritual pre-

ferments, calls aloud to be put in execution. The statute 31 Eliz. c. 6. enacts, that if any patron, for money or any other corrupt consideration or promise, directly or indirectly given, shall present, admit, institute, induct, install, or collate any person to an ecclesiastical benefice or dignity, both the giver and taker shall forfeit two years value of the benefice or dignity; one moiety to the king, and the other to any one who will sue for the same. If persons also corruptly resign or exchange their benefices, both the giver and taker shall in like manner forfeit double the value of the money or other corrupt consideration. And persons who shall corruptly ordain or license any minister, or procure him to be ordained or licensed, (which is the true idea of simony), shall incur a like forfeiture of forty pounds; and the minister himself of ten pounds, besides an incapacity to hold any ecclesiastical preferment for seven years afterwards. Corrupt elections and resignations in colleges, hospitals, and other eleemosynary corporations, are also punished, by the same statute, with forfeiture of the double value, vacating the place or office, and a devolution of the right of election, for that turn, to the crown.

SIMPLE, something not mixed or compounded; in which sense it stands opposed to *compound*.

SIMPLE, in the materia medica, a general name for all herbs or plants, as having each its particular virtue, whereby it becomes a simple remedy.

SIMPLICITY IN WRITING. If we examine the writers whose compositions have stood the test of ages, and obtained that highest honour, "the concurrent approbation of distant times and nations," we shall find that the character of simplicity is the unvarying circumstance which alone hath been able to gain this universal homage from mankind. Among the Greeks, whose writers in general are of the simple kind, the divinest poet, the most commanding orator, the finest historian, and deepest philosopher, are, above the rest, conspicuously eminent in this great quality. The Roman writers rise towards perfection according to that measure of simplicity which they mingle in their works: indeed, they are all inferior to the Greek models. But who will deny that Lucretius, Horace, Virgil, Livy, Terence, Tully, are at once the simplest and best of Roman writers? unless we add the noble annalist who appeared in after-times; who, notwithstanding the political turn of his genius, which sometimes interferes, is admirable in this great quality, and by it far superior to his contemporaries. It is this one circumstance that hath raised the venerable Dante, the father of modern poetry, above the succeeding poets of his country, who could never long maintain the local and temporary honours bestowed upon them; but have fallen under that just neglect which time will ever decree to those who desert a just simplicity for the florid colourings of style, contracted phrases, affected conceits, the mere trappings of composition and Gothic minutie. It is this hath given to Boileau the most lasting wreath in France, and to Shakespeare and Milton in England; especially to the last, whose writings are more unmixt in this respect, and who had formed himself entirely in the simple model of the best Greek writers and of the sacred Scriptures. As it appears from these instances, that simplicity is the only universal characteristic of just writing, so the superior

Simple,
Simplicity.

Simplicity.
|
Simpson.

eminence of the sacred Scriptures in this prime quality hath been generally acknowledged. One of the greatest critics in antiquity, himself conspicuous in the sublime and simple manner, hath borne this testimony to the writings of Moses and St Paul; and by parity of reason we must conclude, that had he been conversant with the other sacred writers, his taste and candour would have allowed them the same encomium.

It hath been often observed, even by writers of no mean rank, that the "Scriptures suffer in their credit by the disadvantage of a literal version, while other ancient writings enjoy the advantage of a free and embellished translation." But in reality those gentlemen's concern is ill-placed and groundless: for the truth is, "that most other writings are impaired by a literal translation; whereas giving only a due regard to the idiom of different languages, the sacred writings, when literally translated, are then in their full perfection."

Now this is an internal proof, that in all other writings there is a mixture of local, relative, exterior ornament, which is often lost in the transference from one language to another. But the internal beauties, which depend not on the particular construction of tongues, no change of tongue can destroy. Hence the Bible-composition preserves its native beauty and strength alike in every language, by the sole energy of unadorned phrase, natural images, weight of sentiment, and great simplicity.

It is in this respect like a rich vein of gold, which, under the severest trials of heat, cold, and moisture, retains its original weight and splendour, without either loss or alloy; while baser metals are corrupted by earth, air, water, fire, and assimilated to the various elements through which they pass.

This circumstance, then, may be justly regarded as sufficient to vindicate the composition of the sacred Scriptures, as it is at once their chief excellence and greatest security. It is their excellence, as it renders them intelligible and useful to all; it is their security, as it prevents their being disguised by the false and capricious ornaments of vain or weak translators. We may safely appeal to experience and fact for the confirmation of these remarks on the superior simplicity, utility, and excellence of the style of the holy Scripture. Is there any book in the world so perfectly adapted to all capacities? that contains such sublime and exalted precepts, conveyed in such an artless and intelligible strain, that can be read with such pleasure and advantage by the lettered sage and the unlettered peasant?

SIMPLOCE. See ORATORY, n° 72.

SIMPSON (Thomas), professor of mathematics at the royal academy at Woolwich, fellow of the Royal Society, and member of the Royal Academy at Stockholm, was born at Market Bosworth in Leicestershire in 1710. His father, a stuff-weaver, taught him only to read English, and brought him up to his own business; but meeting with a scientific pedlar, who likewise practised fortune-telling, young Simpson by his assistance and advice, left off weaving, and professed astrology. As he improved in knowledge, however, he grew disgusted with his pretended art; and renouncing it, was driven to such difficulties for the subsistence of his family, that he came up to London, where he worked as a weaver, and taught mathematics at his

spare hours. As his scholars increased, his abilities became better known, and he published his Treatise on Fluxions by subscription in 1737; in 1740, he published his Treatise on the Nature and Laws of Chance; and Essays in speculative and mixed Mathematics. After these appeared his Doctrine of Annuities and Reversions; Mathematical Dissertations; Treatise on Algebra; Elements of Geometry; Trigonometry, plane and spherical; Select Exercises; and his Doctrine and Application of Fluxions; which he professes to be rather a new work, than a second edition of his former publication on fluxions. In 1743, he obtained the mathematical professorship at Woolwich academy; and soon after was chosen a member of the Royal Society, when the president and council, in consideration of his moderate circumstances, were pleased to excuse his admission-fees, and his giving bonds for the settled future payments. At the academy, he exerted all his abilities in instructing the pupils who were the immediate objects of his duty, as well as others whom the superior officers of the ordnance permitted to be boarded and lodged in his house. In his manner of teaching, he had a peculiar and happy address, a certain dignity and perspicuity, tempered with such a degree of mildness, as engaged the attention, esteem, and friendship, of his scholars. He therefore acquired great applause from his superiors in the discharge of his duty. His application and close confinement, however, injured his health. Exercise and a proper regimen were prescribed to him, but to little purpose; for his spirits sunk gradually, till he became incapable of performing his duty, or even of reading the letters of his friends. At length his physicians advised his native air for his recovery, and he set out in February 1761; but was so fatigued by his journey, that, upon his arrival at Bosworth, he betook himself to his chamber, and grew continually worse till the day of his death, which happened on the 14th of May, in the 51st year of his age.

SIN, a breach or transgression of some divine law or command.

SINAPI, MUSTARD; a genus of the filiquosa order, belonging to the tetradynamia class of plants. The principal species are, 1. The alba, or white mustard, which is generally cultivated as a salad-herb for winter and spring use. This rises with a branched hairy stalk two feet high; the leaves are deeply jagged on their edges and rough. The flowers are disposed in loose spikes at the end of the branches, standing upon horizontal footstalks; they have four yellow petals in form of a cross, which are succeeded by hairy pods that end with long, compressed oblique beaks; the pods generally contain four white seeds.

2. The nigra, or common mustard, which is frequently found growing naturally in many parts of Britain, but is also cultivated in fields for the seed, of which the sauce called *mustard* is made. This rises with a branching stalk four or five feet high; the lower leaves are large, rough, and very like those of turnep; the upper leaves are smaller and less jagged. The flowers are small, yellow, and grow in spiked clusters at the end of the branches; they have four petals placed in form of a cross, and are succeeded by smooth four-cornered pods.

3. The arvensis, grows naturally on arable land in many

Simpson
|
Sinapi.

SINGIN
Singing.

many parts of England. The feed of this is commonly fold under the title of *Durham mustard-feed*; of this there are two varieties, if not distinct species; one with cut, the other has entire leaves. The stalks rise two feet high; the leaves are rough, and in one they are jagged like turnep-leaves; the other are long and entire. The flowers are yellow; the pods are turgid, angular, and have long beaks.

Mustard, by its acrimony and pungency, stimulates the solids, and attenuates viscid juices; and hence stands deservedly recommended for exciting appetite, assisting digestion, promoting the fluid secretions, and for the other purposes of the acrid plants called *antiscorbutic*. It imparts its taste and smell in perfection to aqueous liquors, whilst spirit of wine extracts very little of either: the whole of the pungency arises with water in distillation. By expression it yields a considerable quantity of a soft inipid oil, perfectly void of acrimony: the cake left after the expression is more pungent than the mustard was at first.—By distillation with a violent fire, mustard yields a volatile alkali, empyreumatic oil, and a small quantity of phosphorus.

SINAPISM, in pharmacy, an external medicine, in form of a cataplasm, composed chiefly of mustard-feed pulverized and mixed with the pulp of figs, or with briony, garlic, onion, or the like.

SINCERITY, honesty of intention, freedom from hypocrisy. See *MORAL Philosophy*, n° 157.

SINCIPIUT, in anatomy, the fore-part of the head, reaching from the forehead to the coronal future.

SINE, or *right SINE of an Arch*, in trigonometry, is a right line drawn from one end of that arch, perpendicular to the radius drawn to the other end of the arch; being always equal to half the chord of twice the arch. See *TRIGONOMETRY*, and *GEOMETRY*.

SINECURES, ecclesiastical benefices without cure of souls.

SINEW, denotes properly what we call a *nerve*, tho' in common speech it is rather used for a *tendon*.

SINGING, the action of making divers inflexions of the voice, agreeable to the ear, and correspondent to the notes of a song, or piece of melody. See *MUSICOLOGY*.

The first thing to be done in learning to sing, is to raise a scale of notes by tones and semi-tones to an octave, and descend by the same notes; and then to rise and fall by greater intervals, as a third, fourth, fifth, &c. and to do all this by notes of different pitch. Then these notes are represented by lines and spaces, to which the syllables *fa, sol, la, mi*, are applied, and the pupil taught to name each line and space thereby; whence this practice is called *sol-fa-ing*, the nature, reason, effects, &c. whereof, see under the article *SOLFAGING*.

SINGING of Birds. It is worthy of observation, that the female of no species of birds ever sings: with birds, it is the reverse of what occurs in human kind. Among the feathered tribe, all the cares of life fall to the lot of the tender sex; theirs is the fatigue of incubation; and the principal share in nursing the helpless brood: to alleviate these fatigues, and to support her under them, nature hath given to the male the song, with all the little blandishments and soothing arts;

these he fondly exerts (even after courtship) on some spray contiguous to the nest, during the time his mate is performing her parental duties. But that she should be silent is also another wise provision of nature, for her song would discover her nest; as would a gaudiness of plumage, which, for the same reason, seems to have been denied her.

On the song of birds several curious experiments and observations have been made by the Hon. Daines Barrington. See *Philosophical Transactions*, vol. lxiii.

SINGULAR NUMBER, in grammar, that number of nouns and verbs which stands opposed to plural; and is used when we only speak of a single, or one person or thing. See *GRAMMAR*.

The Latins, French, English, &c. have no numbers but the singular and plural; but the Greeks and Hebrews have likewise a dual number, peculiar to two persons.

SINISTER, something on or towards the left hand. Hence some derive the word *sinister*, à *sinendo*; because the gods, by such auguries, permit us to proceed in our designs.

SINISTER, is ordinarily used among us for unlucky; though, in the sacred rites of divination, the Romans used it in an opposite sense. Thus *avis sinistra*, or a bird on the left hand, was esteemed a happy omen: whence, in the law of the 12 tables, *Ave sinistra populi magister esto*.

SINISTER, in heraldry. The sinister side of an escutcheon is the left-hand side; the sinister chief, the left angle of the chief; the sinister base, the left-hand part of the base.

SINISTER Aspect, among astrologers, is an appearance of two planets happening according to the succession of the signs; as Saturn in Aries, and Mars in the same degree of gemini.

SINISTRI, a sect of ancient heretics, thus called because they held the left hand in abhorrence, and made it a point of religion not to receive any thing therewith.

SINKING FUND, a provision made by parliament, consisting of the surplusage of other funds, intended to be appropriated to the payment of the national debt; on the credit of which very large sums have been borrowed for public uses. See *NATIONAL Debt*, and *REVENUE*.

SINOPICA TERRA, in natural history, the name of a red earth of the ochre kind, called also *rubrica sinopica*, and by some authors *sinapis*. It is a very close, compact, and weighty earth, of a fine glowing purple colour. It is of a pure texture, but not very hard, and of an even but dusty surface. It adheres firmly to the tongue, is perfectly fine and smooth to the touch, does not crumble easily between the fingers, and stains the hands. It melts very slowly in the mouth, is perfectly pure and fine, of an austere astringent taste, and ferments violently with aqua-fortis. It was dug in Cappadocia, and carried for sale to a city in the neighbourhood called *Sinope*, whence it had its name. It is now found in plenty in the New Jerseys in America, and is called by the people there *blood-stone*. Its fine texture and body, with its high florid colour, must make it very valuable to painters; and its astringency promises it to be a powerful medicine.

SINOPE, in heraldry, denotes vert, or green colour.

Singular
Sinople.

Sinvolity. *Sirens.* *Siren.* *Sifon.* *Sifon.*
 lour in armories.—Sinople is used to signify love, youth, beauty, rejoicing, and liberty; whence it is that letters of grace, ambition, legitimation, &c. are always used to be sealed with green wax.

SINUOSITY, a series of bends and turns in arches, or other irregular figures, sometimes jetting out, and sometimes falling in.

SINUS, in anatomy, denotes a cavity in certain bones and other parts, the entrance whereof is very narrow, and the bottom wider and more spacious.

SINUS, in surgery, a little cavity or sacculus, frequently formed by a wound or ulcer, wherein pus is collected.

SIPHON, in hydrostatics. See HYDROSTATICS, n° 20.

SIR, the title of a knight or baronet, which, for distinction's sake, as it is now given indiscriminately to all men, is always prefixed to the knight's Christian name, either in speaking or writing to them.

SIRE, a title of honour in France, now given to the king only as a mark of sovereignty.

SIRENS, in fabulous history, certain celebrated songstresses who were ranked among the demi-gods of antiquity.

Hyginus places their birth among the consequences of the rape of Proserpine. Others make them daughters of the river Achelous and one of the muses. *Ovid Met.* lib. v.

The number of the Sirens was three; and their names were *Parthenope*, *Lygea*, and *Leucosia*. Some make them half women and half fish; others, half women and half birds. There are antique representations of them still subsisting under both these forms.

Pausanias tells us, that the Sirens, by the persuasion of Juno, challenged the Muses to a trial of skill in singing; and these having vanquished them, plucked the golden feathers from the wings of the Sirens, and formed them into crowns, with which they adorned their own heads.

The Argonauts are said to have been diverted from the enchantment of their songs by the superior strains of Orpheus: Ulysses, however, had great difficulty in securing himself from seduction. (See *Odys.* lib. xii.)

Pope, in his notes to the twelfth book of the *Odyssey*, observes, the critics have greatly laboured to explain what was the foundation of this fiction of Sirens. We are told by some, that the Sirens were queens of certain small islands named *Sirensuse*, that lie near Caprea in Italy, and chiefly inhabited the promontory of Minerva, upon the top of which that goddess had a temple, as some affirm, built by Ulysses. Here there was a renowned academy, in the reign of the Sirens, famous for eloquence and the liberal sciences, which gave occasion to the invention of this fable of the sweetness of the voice, and attracting songs of the Sirens. But why then are they fabled to be destroyers, and painted in such dreadful colours? We are told, that at last the students abused their knowledge, to the colouring of wrong, the corruption of manners, and the subversion of government: that is, in the language of poetry, they were feigned to be transformed into monsters, and with their music to have enticed passengers to their ruin, who there consumed their patrimonies, and poisoned their virtues with riot

and effeminacy. The place is now called *Maffa*. Some writers tell us of a certain bay, contracted within winding freights and broken cliffs, which, by the singing of the winds and beating of the waters, returns a delightful harmony, that allures the passenger to approach, who is immediately thrown against the rocks, and swallowed up by the violent eddies. Thus Horace, moralising, calls *idleness* a Siren,

—*Vitanda est improba Siren*
Deledia

But the fable may be applied to all pleasures in general, which, if too eagerly pursued, betray the incautious into ruin; while wise men, like Ulysses, making use of their reason, stop their ears against their insinuations.

All ancient authors agree in telling us, that Sirens inhabited the coast of Sicily. The name, according to Bochart, who derives it from the Phœnician language, implies a songstress. Hence it is probable, says Mr Burney, that in ancient times there may have been excellent singers, but of corrupt morals, on the coast of Sicily, who, by seducing voyagers, gave rise to this fable. And if this conjecture be well founded, he observes, the Muses are not the only pagan divinities who preserved their influence over mankind in modern times; for every age has its Sirens, and every Siren her votaries; when beauty and talents, both powerful in themselves, are united, they become still more attractive.

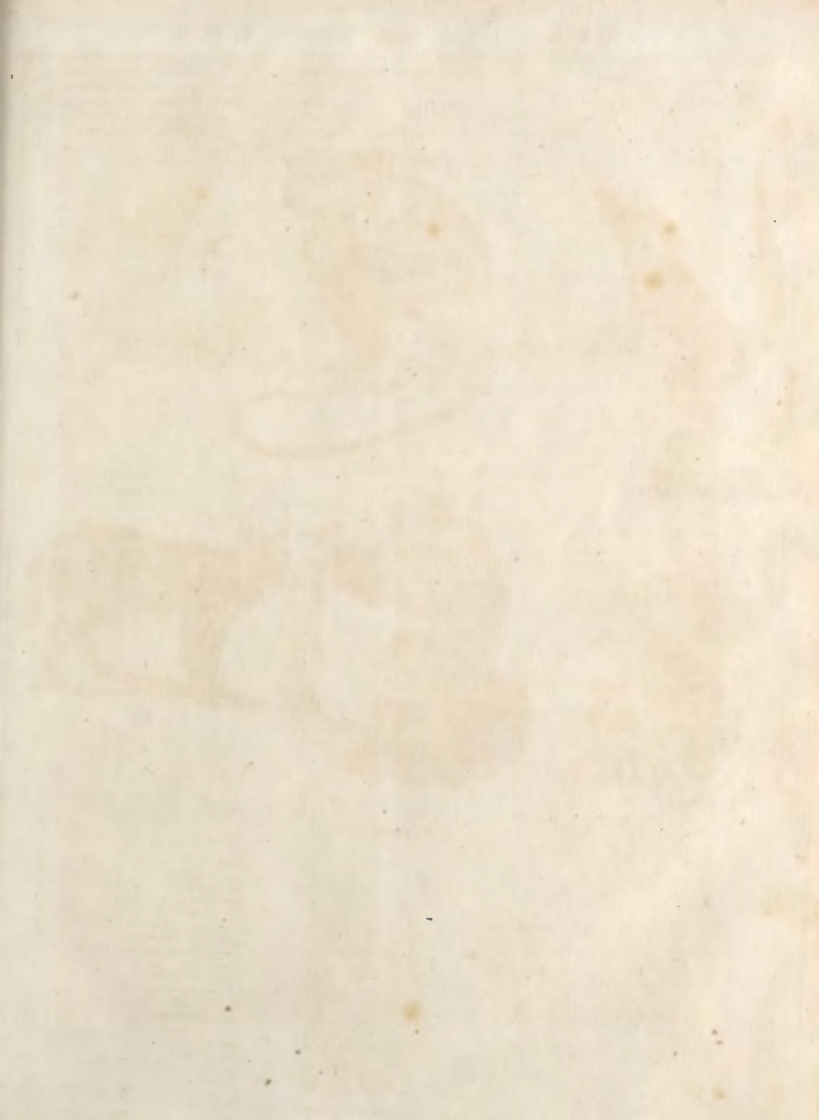
SIREN in zoology, a genus belonging to the order of amphibia nantes. The body is naked, and furnished with two unguiculated feet and a tail. It has a great resemblance to a lizard, only it is larger. It is found in marshy grounds in Carolina.

SIRIUS, in astronomy, a bright star in the constellation Canis. See ASTRONOMY, n° 206.

SIRLET (Flavius), an eminent Roman engraver on precious stones: his Laocœon, and representations in miniature of antique statues at Rome, are almost invaluable, and very scarce. He died in 1737.

SIRMOND (James), a famous Jesuit, and one of the most learned men France has produced, was born at Riom in 1559. He became well skilled in ecclesiastical antiquities; and acquired great reputation throughout all Europe by his profound erudition and his works. He was invited to Rome in 1590 by father Acquaviva, to whom he was secretary for above 16 years. The cardinals Baronius, d'Ossat, and Barberino, had a particular esteem for him; and he was of some service to the former in assisting him in composing his *Annals*. In 1608 he returned to Paris; and from that time scarcely ever let a year pass without publishing some of his works. He at length became confessor to Lewis XIII. and for a long time enjoyed that place. He died at Paris in 1651. He published a great number of books; the principal of which are, *Excellent Notes on the Councils of France*, the *Capitularies of Charles the Bald*, and the *Theodosian Code*; good editions of the *Works of Theodoret* and *Hincmar of Rheims*; and many *Opuscula on different Subjects*, printed at Paris in 1696, in five vols folio.

SISON, BASTARD PARSLEY, a genus of the dymnia order, belonging to the pentandria class of plants. There are six species, the most remarkable of



SIMIA.

Fig. 13. *Wagler.*



Fig. 18. *Fair Monkey.*



Fig. 16. *Fox-tailed Monkey.*



Fig. 19.

SIYA-GHUSH
or, Caracol.



Fig. 14.
Four-Fingered Monkey.



Fig. 17. *Striped Monkey.*

Fig. 20.

Chinefe SWAN-PAN.

N.º 1.

1	2	3	4	5	6	7	8	9	0
2	1	6	8	10	12	14	16	18	0
3	3	6	9	12	15	18	21	24	0
4	4	8	12	16	20	24	28	32	0
5	5	10	15	20	25	30	35	40	0
6	6	12	18	24	30	36	42	48	0
7	7	14	21	28	35	42	49	56	0
8	8	16	24	32	40	48	56	64	0
9	9	18	27	36	45	54	63	72	0

N.º 2.

1	5	4	8	6
2	10	8	16	12
3	15	12	24	18
4	20	16	32	24
5	25	20	40	30
6	30	24	48	36
7	35	28	56	42
8	40	32	64	48
9	45	36	72	54

N.º 3.

Parts	
Tens	Units
a	a
b	b
Integers	
a	Units
b	Tens
c	Hundreds
d	Thousands
e	Tens Thousands
f	Hundred Thousands
g	Millions

Sistrum of which is the amomum, or common bastard-parley. This is a biennial plant about three feet high, growing wild in many places of Britain. Its seeds are small, striated, of an oval figure and brown colour. Their taste is warm and aromatic. Their whole flavour is extracted by spirit of wine, which elevates very little of it in distillation; and hence the spirituous extract has the flavour in great perfection, while the watery extract has very little. A tincture drawn with pure spirit is of a green colour. The seeds have been esteemed aperient, diuretic, and carminative; but are little regarded in the present practice.

SISTRUM, or **CISTRUM**, a kind of ancient musical instrument, used by the priests of Isis and Osiris. It is described by Spon as of an oval form, in manner of a racket, with three sticks traversing it breadthwise; which playing freely by the agitation of the whole instrument, yielded a kind of sound which to them seemed melodious. Mr Malcolm found the sistrum to be no better than a kind of rattle. Oisilius observes, that the sistrum is found represented on several medals and on talismans.

SISYMBRIUM, **WATER-CRESS**; a genus of the *Silicula* order, belonging to the *tetradynamia* class of plants. There are 25 species; the most remarkable is the *nasturtium*, or common water-cress. This grows naturally in rivulets and clear flowing waters in this country. The leaves are a strong antiscorbutic, and the expressed juice contains all their virtues. It is an ingredient in the *fuccicorbutici* of the shops, and may be taken in the dose of one or two ounces.

SISYPHUS, in fabulous history, one of the descendants of Eolus, married Merope, one of the *Pleiades*, who bore him *Glaucus*. He resided at *Epyra* in *Peloponnesus*, and was a very crafty man. Others say, that he was a Trojan secretary, who was punished for discovering secrets of state; and others again, that he was a notorious robber, killed by *Theseus*. However, all the poets agree that he was punished in *Tartarus* for his crimes, by rolling a great stone to the top of an hill, which constantly recoiled, and, rolling down incessantly, renewed his labour.

SITE, denotes the situation of an house, &c. and sometimes the ground-plot or spot of earth it stands on.

SITTA, in ornithology, a genus belonging to the order of *picæ*. The bill is subulated, cylindrical, straight, and entire; the superior mandible being longer than the inferior, and compressed at the point. The tongue is lacerated, and the nostrils covered with hairs. There are three species, distinguished by their colour. The *Europæa*, or nut-hatch, is in length near five inches three-quarters, breadth nine inches; the bill is strong and straight, about three quarters of an inch long; the upper mandible black, the lower white: the irides are hazel; the crown of the head, back, and coverts of the wings, of a fine bluish grey: a black streak passes over the eye from the mouth: the cheeks and chin are white; the breast and belly of a dull orange-colour; the quill-feathers dusky; the wings underneath are marked with two spots, one white at the root of the exterior quill, the other black at the joint of the bastard-wing: the tail consists of twelve feathers; the two middle are grey, the two exterior feathers tipped with grey; then

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succeeds a transverse white spot; beneath that the rest is black: the legs are of a pale yellow; the back-toe very strong, and the claws large.

The bird runs up and down the bodies of trees, like the woodpecker tribe; and feeds not only on insects, but nuts, of which it lays up a considerable provision in the hollows of trees: it is a pretty light, says Mr Willoughby, to see her fetch a nut out of her hoard, place it fast in a chink, and then, standing above it with its head downwards, striking it with all its force, break the shell, and catch up the kernel. It breeds in the hollows of trees; if the entrance to its nest be too large, it stops up part of it with clay, leaving only room enough for admission: in autumn it begins to make a chattering noise, being silent for the greatest part of the year. Dr Plott tells us, that this bird, by putting its bill into a crack in the bough of a tree, can make such a violent sound as if it was rending asunder, so that the noise may be heard at least twelve score yards.

SIUM, **KEX**; a genus of the *dignia* order, belonging to the *pentadria* class of plants. There are eight species; the most remarkable is the *latifolium*, or great water-parley, which grows spontaneously in many places both of England and Scotland on the sides of lakes, ponds, and rivulets. The stalk is erect and furrowed, a yard high or more. The leaves are pinnated with three or four pair of large-elliptic pinnæ, with an odd one at the end, all serrated on the edges. The stalk and branches are terminated with erect umbels, which is the chief characteristic of the species. Cattle are said to have run mad by feeding upon this plant.

SIXTH, in music, one of the simple original concord or harmonic intervals. See **INTERVAL**.

SIXTUS V. (pope), the most extraordinary man of his time. His father, a poor vine-dresser, unable to maintain him, put him out to a farmer, who made him keep his sheep, and afterwards his hogs. His real name is not known, but in this station he called himself *Felix*; and, from his earliest youth, he seems to have had an unaccountable prepossession or impulse of his future greatness. By degrees he rose to be inquisitor at Venice; but quarrelling with the senate, he was obliged to quit the territories of the republic. Being rallied upon his precipitate retreat, he replied, that having made a vow to be pope at Rome, he did not think it right to stay to be hanged at Venice. By his intrigues and address he obtained a cardinal's hat from pope Pius V. By an affectation of great humility, and the appearance of being loaded with bodily infirmities, he so far deceived the conclave, after the death of pope Gregory XIII. that, being divided into factions, in order to put an end to the hopes and cabals of each, they elected him pope, imagining that he would not live long, and in the mean time that the factions would be weakened, and render the choice of a successor less difficult. Sixtus was no sooner elected, than he threw away his crutch, and with it all his assumed debility, to the great astonishment of the whole conclave. Nor was the change in his manners remarkable than in his person. Instead of his former humility and complaisance, he treated every one with reserve and haughtiness; those particularly who had been most instrumental in his exaltation.

Sixtus,
||
Size.

tation. The lenity of his predecessor Gregory's government had introduced a licentiousness among all ranks of people : but the reformation of abuses both in church and state was the first and principal care of Sixtus; and this he signified very early. It had been customary with many preceding popes to order the prison-doors to be set open on the day of their coronation; and in expectation of this act of grace, many of the banditti and other delinquents were wont to surrender themselves on the election of a new pope. Sixtus, on the contrary, ordered that four of the most notorious offenders should be publicly executed at the very time of his coronation; two by the axe, and two by the halter: and, in conformity to the resolution he had taken he put an early stop to the profligacy of the people, he conducted himself with an unexampled severity in the punishment of offenders, without the least respect to persons; of which many instances are recorded. He particularly directed the legates and governors of the ecclesiastical state to be expeditious in their criminal processes; declaring, he had rather have the gibbets and gallies full than the prisons; and had in view the shortening law-proceedings in general. At his accession to the papacy, he found the apostolic chamber not only exhausted, but in debt; he left it clear, and enriched with five millions of gold. To him the city of Rome was obliged for several of its greatest embellishments, particularly the Vatican library; and to him its citizens were indebted for the introduction of trade into the ecclesiastical state. This great man, who was also a patron of learning and of men of genius, died, not without the suspicion of having been poisoned by the Spaniards, in 1590; having enjoyed the papacy little more than five years. A Latin version of the Bible, compiled by his order, appeared in the same year, in three vols folio; but so many faults were discovered in it, that it was suppressed by his successor Gregory XIV. Clement VIII. who succeeded Gregory caused a new edition to be printed, in which the errors of the first are corrected; and this is very scarce.

SIYA-GHUSH, the caracal of Buffon, an animal of the cat kind. It has a lengthened face, and small head; very long slender black ears, terminated with a long tuft of black hairs; inside and bottom of the ears white; nose white; eyes small: the upper part of the body is of a very pale reddish brown, the tail rather darker; belly and breast whitish: limbs strong, and pretty long: tail about half the length of the body. They inhabit Persia, India, and Barbary; where they are often brought up tame, and used in the chase of lesser quadrupeds, and of the larger sort of birds, such as cranes, pelicans, peacocks, &c. which they surprisewith great address: when they seize their prey, they hold it fast with their mouth, and lie for a time motionless on it. They are said to attend the lion, and to feed on the remains of the prey that animal leaves. They are very fierce when provoked: Dr Charleton says, he saw one fall on a hound, which it killed; and tore to pieces in a moment, notwithstanding the dog defended itself to the utmost. The Arabian writers call it *Anakel Ard*: they say that it hunts like the panther; jumps up at cranes as they fly; and covers its steps when hunting.

SIZE, the name of an instrument used for finding the bigness of fine round pearls. It consists of thin

pieces or leaves, about two inches long, and half an inch broad, fastened together at one end by a rivet. In each of these are round holes drilled of different diameters. Those in the first leaf serve for measuring pearls from half a grain to seven grains; those of the second, for pearls from eight grains or two carats to five carats, &c.; and those of the third, for pearls from six carats and a half to eight carats and a half.

SIZE, is also a sort of paint, varnish, or glue used by painters, &c.

The shreds and parings of leather, parchment, or vellum, being boiled in water and strained, make size. This substance is much used in many trades.—The manner of using size is to melt some of it over a gentle fire; and scraping as much whiting into it as may only colour it, let them be well incorporated together; after which you may whiten frames, &c. with it. After it dries, melt the size again, and put more whiting, and whiten the frames, &c. seven or eight times, letting it dry between each time: but before it is quite dry, between each washing with size, you must smoothe and wet it over with a clean brush-pencil in fair water.

To make gold-size. Take gum animi and asphaltum, of each one ounce; minium, litharge of gold, and amber, of each half an ounce: reduce all into a very fine powder, and add to them four ounces of linseed-oil, and eight ounces of drying oil: digest them over a gentle fire that does not flame, so that the mixture may only simmer, but not boil; for fear it should run over and set the house on fire, keep it constantly stirring with a stick till all the ingredients are dissolved and incorporated, and do not leave off stirring till it becomes thick and ropy; and being boiled long enough, let it stand till it is almost cold, and then strain it through a coarse linen cloth, and keep it for use.—To prepare it for working, put what quantity you please in a horse-muscle shell, adding as much oil of turpentine as will dissolve it; and making it as thin as the bottom of your feed-lac varnish, hold it over a candle, and then strain it through a linen-rag into another shell; add to these as much vermilion as will make it of a darkish red: if it is too thick for drawing, you may thin it with some oil of turpentine. The chief use of this size is for laying on of metals.

The best gold-size for burnishing is made as follows. Take fine bole, what quantity you please; grind it finely on a marble, then scrape into it a little beef-suet; grind all well together; after which mix in a small proportion of parchment-size with a double proportion of water, and it is done.

To make silver-size. Take tobacco-pipe clay in fine powder, into which scrape some black-lead, and a little Genoa soap, and grind them all together with parchment-size as already directed.

SKELETON, in anatomy, the dried bones of any animal joined together by wires, or by the natural ligaments dried, in such a manner as to show their position when the creature was alive.

SKIE, one of the greatest of the Western Islands of Scotland, so called from *Skianach*, which in the Erse dialect signifies winged, because the two promontories of Valeracel and Trotternel, by which it is bounded on the north-west and north-east, are supposed to resemble wings. The island lies between the shire of Ross and the

Size
||
Skie.

the western part of Lewis, extending 40 miles in length from north to south; in some places 20, and in others 30, in breadth; the circumference of the whole amounting to about 100. The island of Skie is divided between two proprietors: the southern part belongs to the laird of Macleod, said to be lineally descended from Leod son to the black prince of Man: the northern district, or barony of Trotterness, is the property of Sir James Macdonald, whose ancestor was Donald, king or lord of the isles, and chief of the numerous clan of Macdonalds, who are counted the most warlike of all the Highlanders. Skie is part of the shire of Inverness, and formerly belonged to the diocese of the isles: on the south, it is parted from the main land by a channel three leagues in breadth; though, at the ferry of Glenelly, it is so narrow that a man may be heard calling for the boat, from one side to the other. Skie is well provided with variety of excellent bays and harbours.

The face of the country is roughened with mountains, some of which are so high as to be covered with snow on the top at Midsummer; in general, their sides are clothed with heath and grass, which afford good pasture for sheep and black cattle. Between the mountains there are some fertile valleys, and the greater part of the land towards the sea-coast is plain and arable. The island is well watered with a great number of rivers, above 30 of which afford salmon; and some of them produce black muscles in which pearls are bred, particularly the rivers Kilmartin and Ord: Martin was assured by the proprietor of the former, that a pearl hath been found in it valued at 20*l*. Sterling. Here is also a considerable number of freshwater lakes well stored with trout and eels. The largest of these lakes takes its denomination from St Columba, to whom is dedicated a chapel that stands upon a small isle in the middle of the lake. Skie likewise affords several cataracls, that roar down the rocks with great impetuosity. That the island has been formerly covered with woods, appears from the large trunks of fir and other trees daily dug out of the bogs and peat-marshes in every part of this country.

The air is cold and moist; the climate rainy, but not unwholesome. The soil is generally black, though it likewise affords clay of different colours; such as white, red, and blue, and in some places fuller's earth. The island produces barley, oats, rye, pease, and plenty of grass for pasture, together with pot-herbs and roots for the kitchen: in the article of fruit it is very defective; tho' there are some in the orchards belonging to the proprietors.

The minerals found here are lead and iron ore, which, however, have never been wrought to any advantage. Near the village Sartle, the natives find black and white marcasites, and variegated pebbles. The apple-green, in the neighbourhood of Loch-fallart, produces beautiful agates of different sizes and colours: stones of a purple hue are, after great rains, found in the rivulets: crystal, of different colours and forms, abounds in several parts of the island, as well as black and white marble, free-stone, limestone, and talc: small red and white coral is found on the southern and western coasts in great abundance. The fuel consists chiefly of peat and turf, which are impregnated with iron ore and salt-petre; and coal has been discovered in several districts.

The animals are horses, hogs, sheep, goats, cows, and deer. The black cattle are here exposed to all the rigours of the severe winter, without any other provender than the tops of the heath and the alga marina; so that they appear like mere skeletons in the spring, though as the grass grows up, they soon become plump and juicy, the beef being sweet, tender, and finely interlarded. Here are land and water fowl in abundance; eagles, hawks, heathcocks, growle, ptarmigan, pigeons, plover, wild geese, &c. The amphibious animals are seals and otters. Among the reptiles they reckon vipers, asps, weasels, frogs, toads, and three different kinds of serpents; the first spotted black and white, and very poisonous; the second, yellow with brown spots; and the third of a brown colour, the smallest and least poisonous.

All the coast of Skie swarms with fish, cod, ling, mac-karel, whiting, haddock, thornback, turbot, and herrings, which they preserve without salt, by gutting and hanging them to dry in the smoke. In the bays and anchoring places, the natives find shell-fish of all kinds. The kyle of Scalpa teems with oysters, in such a manner that, after some spring-tides, 20 horse-loads of them are left upon the sands. Near the village of Bernstall, the beach yields muscles sufficient to maintain 60 persons *per* day; this providential supply helps to support many poor families in times of scarcity.

The people are strong, robust, healthy, and prolific. They generally profess the Protestant religion; are honest, brave, innocent, and hospitable. They speak the language, wear the habit, and observe the customs that are common to all the Hebrides. The meconium in new-born infants is purged away with fresh butters: the children are bathed every morning and evening in water, and grow up so strong, that a child of 10 months is able to walk alone: they never wear shoes or stockings before the age of eight or ten, and night-caps are hardly known: they keep their feet always wet; they lie on beds of straw or heath, which last is an excellent refoorative: they are quick of apprehension, ingenious, and very much addicted to music and poetry. They eat heartily of fish; but seldom regale themselves with flesh-meat: their ordinary food consists of butter, cheese, milk, potatoes, colewort, brochan, and a dish called *oon*, which indeed is no other than the froth of boiled milk or whey raised with a stick like that used in making chocolate.

There are two fairs held annually at Portry, on the east side of Skie; the first on the middle of June, the other about the beginning of September. The commodities here sold, are horses, cows, sheep, goats, hides, butter, cheese, fish, and wool. The cattle sold in these fairs swim over to the main land through a mile or half a mile of sea. Many thousands of these beasts are driven up yearly to England, where they are fatted for the market, and counted delicious eating.

In Skie appear many ruins of Danish forts, watch-towers, beacons, temples, and sepulchral monuments. All the forts are known by the term *Dun*; such as Dun-Skudborg, Dun-Derig, Dun-Skerinefs, Dun-David, &c.

SKIFF, the least of two ship-boats, serving chiefly to go ashore in when the ship is in the harbour.

Skin
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Slate.

SKIN, in anatomy, the general covering of the body of any animal. See ANATOMY, n° 73, 75, &c.

SKIN, in commerce, is particularly used for the membrane stripped off the animal to be prepared by the tanner, skinner, parchment-maker, &c. and converted into leather, &c. See TANNING.

SKINNER (Stephen), an English antiquarian, born in 1622. He travelled, and studied in several foreign universities during the civil wars; and in 1654, returned and settled at Lincoln, where he practised physic with success until the year 1667, when he died of a malignant fever. His works were collected in folio, in 1671, by Mr Henshaw, under the title of *Etymologicæ Linguae Anglicanae*, &c.

SKIRMISH, in war, a disorderly kind of combat or encounter, in preference of two armies, between small parties, who advance from the body for that purpose, and introduce to a general and regular fight.

SKULL, in anatomy, the bony case in which the brain is inclosed. See ANATOMY, n° 10, &c.

SKY-ISLAND. See SKIE.

SKY, the blue expanse of air or atmosphere. For the reason of its blue colour and concave figure, see ORBIS, N° 137, and p. 5567, col. 1.

SLAB, an outside fappy plank or board sawed off from the sides of a timber-tree. The word is also used for a flat piece of marble.

SLATE, (*stegania*), a stone of a compact texture, and laminated structure, splitting into fine plates.

Dr Hill distinguishes four species of *stegania*. 1. The whitish *steganium*, being a soft, friable, slaty stone, of a tolerably fine and close texture, considerably heavy, perfectly dull and destitute of brightness, variegated with a pale brown or brownish yellow. This species is common in many counties of England, lying near the surface of the ground. It is generally very full of perpendicular as well as horizontal cavities, many of which are filled up with a spar a little purer and more crystalline than the rest; and is commonly used for covering houses. 2. The red *steganium* is a very fine and elegant slate, of a smooth surface, firm and compact texture, considerably heavy, and of a very beautiful pale purple, glittering all over with small glossy spangles: it is composed of a multitude of very thin plates or flakes, laid closely and evenly over one another, and cohering pretty firmly: this is very common in the northern parts of England, and is much valued as a strong and beautiful covering for houses. 3. The common blue *steganium*, is very well known as a useful and valuable stone, of a fine smooth texture and glossy surface, moderately heavy, and of a pale greyish blue; composed of a multitude of even plates, laid close upon one another, and easily splitting at the commissures of them: this is also very common in the north parts of England, and is used in most places for the covering of houses. There are other species of this slate, viz. the brownish blue friable *steganium*, usually called *coal-slate*; the greyish black friable *steganium*, commonly called *sliver*; and the greyish blue sparkling *steganium*. 4. The friable, aluminous, black *steganium*, being the Irish slate of the hops: this is composed of a multitude of thin flakes, laid very evenly and regularly over one another, and splits very readily at the commissures of them. It is common in many parts of Ireland, and is found in some places in Eng-

land, always lying near the surface in very thick strata. In medicine it is used in hæmorrhages of all kinds with success, and is taken often as a good medicine in fevers.

SLAVE, a person in the absolute power of a master, either by war or conquest. See SERVANT.—Ménage and Vossius derive the word from *Sclavus*, the name of a Scythian people, whom Charlemagne condemned to perpetual imprisonment; whence the Italians made their *schlavo*, the Germans their *schlave*, the French their *esclave*, and we *slave*. The Italians and other nations used to buy these Selavi or Slavonians to make drudges of; whence the proper name of a nation, became in time the name of a state or condition.—The Romans called their slaves *servi*, from *servare*, to “keep, save;” as being such as were not killed, but saved, to yield money either by sale or by their work. Though other authors are of opinion that the Roman name *servi* might come from that of *Serbi*, as that of *slaves* from *Slavi*, a people.

We find no mention of slaves before the deluge; but immediately after, viz. in the curse of Canaan, Gen. ix. 25: whence it is easily inferred, that servitude commenced soon after that time; for in Abraham's days we find it generally established.—Some will have it to have commenced under Nimrod, because it was he who first began to make war, and of consequence to make captives; and to bring such as he took, either in his battles or irruptions, into slavery.

Among the Romans, a slave, when he was set at liberty, changed his name into a surname, and took the nomen or prænomen of his master; to which he added the cognomen he had been called by when a slave. Great part of the Roman wealth consisted in slaves: they had the power of life and death over them, which no other nation had; but this severity was afterwards moderated by the laws of the emperors. The slaves were esteemed the proper goods of their masters, and all they got belonged to them; but if the master was too cruel in his correction, he was obliged to sell his slave at a moderate price. The Romans not only approved of, but even invented new ways of making slaves; for instance, a man born free among them might sell his freedom and become a slave. There were generally three ways of obtaining slaves; either when they bought them with the booty taken from the enemy, distinct from the share reserved for the public; or of those who took them prisoners in war; or of merchants who dealt in them, and sold them at fairs.

Slavery is absolutely abolished in Britain and France, as to personal servitude. See SERVANTS.

SLAUGHTER. See MAN-SLAUGHTER, HOMICIDE, MURDER, &c.

SLEEP, that state of the body in which, though the vital functions continue, the senses are not affected by the ordinary impressions of external objects.

Under the article DREAMS, the nature of sleep has been investigated so fully, that little remains to be said in this place, besides the obviating a few objections that may be made to the account of it there given.—Sleep we have shown to arise immediately from the communication between our sentient principle and external objects being cut off, in consequence of which memory is also lost, and the person becomes insensible of existence. This state may

Slave
||
Sleep.

may be induced either by such causes as affect the brain, the nervous system, or the blood; though it probably depends in most cases on the state of the vital fluid. The greatest difficulties that occur in giving a solution of the phenomenon of sleep is, that it may be brought on by seemingly opposite causes. Thus, though moderate fatigue will induce a propensity to sleep, the same may be brought on by eating a full meal without any fatigue at all. In like manner, though moderate fatigue will induce sleep, too great a degree of fatigue will prevent it altogether.—This, however, may easily be solved, on the principles laid down in the abovementioned article. It is there supposed that the mass of blood contains the vital principle, or what is called the *animal-spirits*, like a general reservoir, to be distributed through the whole body. Part of the blood is sent to the brain, where another collection or reservoir is made, serving in a particular manner for the purposes of reason, memory, and the rest of our mental faculties. The rest of the blood is distributed through the whole body, where some part of the vital spirit is taken up by each of the small extremities of the nerves, and by means of the nerve communicates a certain sensation to the brain when these extremities are affected by any external object.—As long as the blood continues in a sound state, and can supply a certain quantity of these spirits, the person remains awake; but when the supply is interrupted, by whatever means, he necessarily falls asleep. This is the case with a person when moderately fatigued; the blood being then deprived in some measure of part of that animating principle which is necessary to the exercise of our external senses, or for keeping us awake. If the fatigue be carried to too great a length, the crasis of the blood itself is injured, and it becomes incapable of retaining the necessary quantity for carrying on the operations of life; which, though independent of our senses, are maintained by means of the same principle with them. Hence, though the person remains awake, he is far from being in health; and if the watchfulness continues for any considerable time, he is in great danger of becoming delirious.—After a person has taken a full meal, he is seized with drowsiness, because the fresh chyle continually pouring into the subclavian vein, requires the exertion of great part of the vital power to assimilate it to the blood, so that enough is not left to affect the senses so readily as usual. In like manner may we understand the sleep which follows the immoderate use of spirituous liquors, of large doses of opium, &c. These seem to act by rarefying the blood to such a degree, that the fine vessels are overstretched, and compress the small nervous fibres which every where accompany them, so as to destroy for a time their power of action. In the same manner do the vapours of charcoal or fixed air, anyhow applied, seem to act. Hence the best cure for persons affected by these things is to cool them as much as possible; and hence also we may see the reason why drunk people will bear an exposure to much greater degrees of cold, without injury, than such as are sober.—How cold itself induces sleep, is easily understood. The whole body is then so benumbed, that neither the blood can part with its animating principle, nor can the nerves take it up even if it should

do so; and hence the fatal sleep which ensues in such cases.

From what has been advanced concerning the nature of sleep, we may easily see, that its uses are to restore the spirits and strengthen the body, though too great indulgence in this respect has a contrary effect. The night is the most proper time for sleep, by reason of the absence of the solar light, which animates the whole creation, and in some measure prevents that waste of spirits which is the consequence of watching for any length of time. Hence we see why a person who has sat up all night finds a revival of his spirits in the morning; and why nocturnal watchings are prejudicial to health, even though a person should indulge himself in sleeping throughout the day.

Some animals require much more sleep than others, and many continue even for months in this state. For the human species six or seven hours are generally sufficient; though from habit many require eight, nine, or even ten hours. Those who addict themselves to study, in general require much sleep, on account of the great waste of spirits which intense thought occasions.

SLEEPERS, in natural history, a name given to those animals which sleep all winter; such as bears, marmots, dormice, bats, hedge-hogs, swallows, &c. These do not feed in winter, have no sensible evacuations, breathe little or none at all, and most of the viscera cease from their functions. Some of these creatures seem to be dead, and others return to a state like that of the fœtus before birth: in this state they continue, till by length of time maturing the process, or by new heat the fluids are attenuated, and the functions begin where they left off.

SLEEPERS, in a ship, timbers lying before and aft in the bottom of the ship, as the rung-heads do: the lowermost of them is bolted to the rung-heads, and the uppermost to the futtocks and rungs.

SLEIDAN (John), an excellent German historian, born of obscure parents, in 1506, at Sleidan, a small town on the confines of the duchy of Juliers. After studying some time in his own country, together with his townsman the learned John Sturmius, he went to France, and in 1535 entered into the service of the cardinal and archbishop John du Bellay. He retired to Strasburg in 1542, where he acquired the esteem and friendship of the most considerable persons, particularly of James Sturmius; by whose advice and assistance he was enabled to write the history of his own time. He was employed in some public negotiations; but the death of his wife, in 1555, plunged him into so deep a melancholy, that he lost his memory entirely, and died the year following. In 1555, came out, in folio, *De statu Religionis & Reipublice sub Carolo Quinto*, &c. in 25 books; from the year 1517, when Luther began to preach, to the year of its publication: which history was presently translated into almost all the languages of Europe. Besides this his main work, he wrote *De quatuor summis Imperiis, libri tres*; with some other historical and political pieces.

SLEIGHT OF HAND. See **LEGERDEMAIN**.

SLEUT-HOUNDE, the ancient Scots name of the blood-hound. The word is from the Saxon *slot*, the impression that a deer leaves of its foot in the mire, and

and bound, a "dog." So they derive their name from following the track. See the article *Blood-Hound*.

SLESWICK, an ancient and considerable town of Denmark, and capital of a duchy of the same name in the province of Gottorp, with a bishop's see, secularized in 1856. St Michael's church, which was the cathedral, is a magnificent structure, and has a chapter of noble ladies of the Protestant religion. This town was much more considerable than it is at present, it having suffered greatly by the wars of Germany. It is seated on the gulph of Sly, where there is a good harbour, 60 miles north-west of Lubeck, and 125 south-west of Copenhagen. E. Long. 9. 55. N. Lat. 54. 40.

SLESWICK, the duchy of, or *South Jutland*, is about 100 miles in length and 60 in breadth. It is bounded on the north by North Jutland, on the east by the Baltic Sea, on the south by Holstein, and on the west by the ocean. It contains 14 cities, 17 towns, 13 castles, 278 parishes, 1480 villages, 162 farms, 116 water-mills, and 106 gentlemens seats. It is a pleasant, fertile, populous country, and a sovereign duchy. Formerly the king of Denmark had half of it, and the other belonged to the house of Holstein-Gottorp; but the former having conquered this duchy, had the possession of it confirmed to him by the treaty of the north in 1720. In 1731, a prince of Bareith-Culmbach was made governor of this duchy, and resides at Gottorp.

SLIGO, an Irish county, in the province of Connaught, 25 miles in length, and as much in breadth; bounded on the east by that of Leitrim, on the west by the county of Mayo, on the north and north-west by the western ocean, and on the south and south-west by Roscommon and Mayo. It contains 5970 houses, 41 parishes, 6 baronies, 1 borough, and sends 4 members to parliament, two for the county, and two for the borough of the same name, which is the only market-town in the county, and is seated on a bay of the same name, 30 miles west of Killalla, and 110 north-east of Dublin. W. Long. 8. 40. N. Lat. 54. 12.

SLING, an instrument serving for casting stones with great violence. The inhabitants of the Balearic islands were famous in antiquity for the dexterous management of the sling: it is said they bore three kinds of slings, some longer, others shorter, which they used according as their enemies were either nearer or more remote. It is added, that the first served them for a head-band, the second for a girdle, and that the third they constantly carried with them in the hand.

SLOANE (Sir Hans, baronet), an eminent physician and naturalist, founder of the British Museum, was of Scottish extraction, and born at Killaleath in the north of Ireland in 1660. The earliest bent of his genius was to the study of nature, and this was encouraged by a proper education. He chose physic for his profession; and to attain a perfect knowledge of its several branches repaired to London, where he attended all the public lectures of anatomy and medicine, learned chemistry, and studied botany in Chelsea garden. His turn to natural history introduced him to the acquaintance of Mr Boyle and Mr Ray, which he carefully cultivated by communicating to them all his curious or useful observations. After spending four years in London, he went to Paris, where he attended the

hospitals, and heard the lectures of M. Tournefort, Du Verney, and other eminent masters. He then went to Montpellier; and having spent a year there in collecting plants, travelled through Languedoc with the same view, and in 1684 returned to London, when he presented to Mr Ray a great variety of plants and seeds, which the latter has described, with proper acknowledgments, in his *Historia Plantarum*. About this time he became acquainted with Dr Sydenham, who took him into his house, and recommended to him in the warmest manner to practise. Soon after, he was chosen a fellow of the Royal Society and of the college of physicians. But his desire to make new discoveries in natural history, induced him to make a voyage to Jamaica, in quality of physician to Christopher duke of Albemarle governor of that island; and though he staid there but 15 months, he brought from thence such a variety of plants, as greatly surprised Mr Ray, who did not think there had been so many to be found in both the Indies.

Dr Sloane now applied himself closely to his profession; and on the first vacancy was chosen physician to Christ's-hospital: but he applied the money he received from his appointment to the relief of those who were the greatest objects of compassion in the hospital, being unwilling to enrich himself by the gains he made of giving health to the poor. In 1693 he was chosen secretary to the Royal Society; and immediately revived the publication of the Philosophical Transactions, which had been omitted for some time, and continued to be the editor of them till 1712. As in his earliest days he had been fond of natural knowledge, he enriched his cabinet with every thing that was curious in art or nature; but this received a great augmentation by a bequest of William Courten, Esq; who had employed all his time and the greatest part of his fortune in collecting curiosities. The sense which the public entertained of this learned physician's merit evidently appears by the following honours conferred upon him. He was created a baronet by king Geo. I. chosen a foreign member of the royal academy at Paris, president of the college of physicians, and, on the death of Sir Isaac Newton, president of the Royal Society. He was the first in England who introduced the use of the bark into general practice, not only in fevers, but in a variety of other distempers, particularly in nervous disorders, in mortifications, and in violent hæmorrhages. His receipt for diseases in the eyes is well known, and warranted by success. Having faithfully discharged the respective duties of the places which he filled, he retired in 1740, at 80 years of age, to Chelsea, to enjoy in a peaceful tranquillity the remains of a well-spent life. He here continued to receive the visits of people of distinction, and of all learned foreigners; and admittance was never refused to the poor who came to consult him in case of sickness. It is remarkable, that at 16 years of age he had been seized with a spitting of blood, which confined him to his chamber for three years, and that he was always subject to it; yet, by his sobriety, temperance, and moderation, with the occasional use of the bark, he protracted his life to a great length, without even feeling the infirmities of old age; and, after a short illness of three days, died in 1752, in his 91st year.

He was a liberal benefactor to the poor, and a governor

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Smalkald.

vernor of almost every hospital about London, to each of which he gave considerable benefactions. He zealously promoted every proposal that had for its object the public good. He laid the plan of a dispensatory, where the poor might be furnished with proper medicines at prime cost; which, by the assistance of the college of physicians, was afterwards carried into execution. He gave the apothecaries company the entire freehold of their botanical garden at Chelsea, in the centre of which is a statue of him in marble, admirably well executed by Mr Rysbrack. In 1732 he exerted himself in promoting the establishment of the colony in Georgia; in 1739, of the foundling-hospital, and formed the plan for bringing up the children. His noble cabinet of curiosities he bequeathed to the public, on condition that the sum of 20,000*l.* not half the original cost, should be paid to his family; and also his library, consisting of above 50,000 volumes, 347 of which were illustrated with cuts coloured from nature, and 3566 manuscripts. He wrote the *Natural History of Jamaica*, in 2 vols folio.

SLOOP, a small vessel furnished with one mast, the main sail of which is attached to a gaff above, or to the mast on its foremoft edge, and to a long boom below, by which it is occasionally shifted to either quarter. See **VESSEL**.

SLOOP of War, a name given to the smallest vessels or war except cutters. They are either rigged as ships or frigates.

SLOUGH, a deep muddy place. The cast skin of a snake, the damp of a coal-pit, and the scar of a wound, are also called by the same appellation. The slough of a wild boar is the bed, soil, or mire, wherein he wallows, or in which he lies in the day-time.

SLUCZK, a large and populous town in Poland, in Lithuania, and capital of a duchy of the same name; famous for three battles gained here, by Constantine duke of Oltrog, over the Tartars, in the reign of Sigismund I. It is seated on the river Sluczka, 72 miles south-east of Minsk, and 70 south of Novogrodeck. E. Long. 28. 24. N. Lat. 52. 36.

SLUICE, in hydraulics, a frame of timber, stone, earth, &c. serving to retain and raise the water of the sea, a river, &c. and on occasion to let it pass: such is the sluice of a mill, which stops and collects the water of a rivulet, &c. in order to discharge it at length, in greater plenty, upon the mill-wheel: such also are those used in drains, to discharge the water off lands; and such are the sluices of Flanders, &c. which serve to prevent the waters of the sea overflowing the lower lands, except when there is occasion to drown them. See **CANAL**.

SMACK, a small vessel, commonly rigged as a sloop or hoy, used in the coasting or fishing trade, or as a tender in the king's service.

SMALAND, or **EAST GOTHLAND**, a province of Sweden, which makes part of Gothland; and is bounded on the north by Oltrogothia or east Gothland, on the east by the Baltic Sea, on the south by Schonen and Bleckingia, and on the west by Westrogothia or West Gothland. It is about 112 miles in length, and 62 in breadth; Calmar is the capital town.

SMALKALD, a town of Germany, in Franconia, and in the county of Henneburg; famous for the confederacy entered into by the German Protestants,

against the emperor, commonly called the *league of Smalkald*. The design of it was to defend their religion and liberties. It is seated on the river Werra, 35 miles south-west of Erford, and 50 north-west of Bamberg. E. Long. 10. 37. N. Lat. 50. 43. It is subject to the prince of Hesse-Cassel.

SMALLAGE, in botany. See **APIUM**.

SMALT, or **ZAFFRE**, is a blue glass composed of the calx of cobalt vitrified with some frit of glass or crystal. Ground smalt is called *azure* or *enamel blue*. See **ZAFFRE**.

SMARAGDUS, in natural history. See **EMERALD**.

SMELL, **ODOUR**, with regard to the organ, is an impression made on the nose, by little particles continually exhalng from odorous bodies: With regard to the object, it is the figure and disposition of odorous effluvia, which, striking on the organ, excite the sense of smelling: And with regard to the soul, it is the perception of the impression of the object on the organ, or the affection in the soul resulting therefrom.

The principal organs of smelling are, the nostrils and the olfactory nerves; the minute ramifications of which latter are described throughout the whole concave of the former. See **ANATOMY**, n° 404.

SMELT, in ichthyology. See **SALMO**.

SMELTING, in metallurgy, the fusion or melting of the ores of metals, in order to separate the metal-line part from the earthy, stony, and other parts. See **METALLURGY**, Part III.

SMILAX, **ROUGH BINDWEED**; a genus of the hexandria order, belonging to the diccia class of plants. There are 10 species, eight of which are hardy and will bear the winters of this country; the others require to be kept in a green-house. They are evergreen climbing plants, that with proper support will rise to a great height. They are well adapted for thickets, groves, wildernesses and wood works, planting them towards the front between the trees and shrubs, where they will run and spread very agreeably. They may be propagated by layers, cuttings, or seeds.

SMITH (Edmund), a distinguished English poet, the only son of Mr Neale an eminent merchant, by a daughter of baron Lechmere, was born in 1668. By his father's death he was left young to the care of Mr Smith, who had married his father's sister, and who treated him with so much tenderness, that at the death of his generous guardian he assumed his name. His writings are not many, and those are scattered about in miscellanies and collections: his celebrated tragedy of *Phædra* and *Hippolitus* was acted in 1707; and being introduced at a time when the Italian opera so much engrossed the polite world, gave Mr Addison, who wrote the prologue, an opportunity to rally the vitiated taste of the public. However, notwithstanding the esteem it has always been held in, it is perhaps rather to be considered as a fine poem than as a good play. This tragedy, with a Poem to the memory of Mr John Phillips, three or four Odes, with a Latin oration spoken at Oxford in *laudem Thomæ Bodleii*, were published as his works by his friend Mr Oldisworth. Mr Smith died in 1710, sunk into indolence and intemperance by poverty and disappointments; the hard fate of many a man of genius.

SMITZ (Gaspar), who, from painting a great number

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number of Magdalens, was called *Magdalen Smith*, was a Dutch painter, who came to England soon after the Restoration. For these portraits sat a woman that he kept, and called his wife. A lady, whom he had taught to draw, took him with her to Ireland, where he painted small portraits in oil, had great business and high prices. His flowers and fruit were so much admired, that one bunch of grapes sold there for 40 l. In his Magdalens he generally introduced a thistle on the fore-ground. He had several scholars, particularly Maubert, and one Gawdy of Exeter. Yet, notwithstanding his success, he died poor in Ireland, in 1707.

SMITHERY, a manual art, by which an irregular lump of iron is wrought into any intended shape by means of fire, hammering, filing, &c.

SMOKE, a dense elastic vapour, arising from burning bodies. As this vapour is extremely disagreeable to the senses, and often prejudicial to the health, mankind have fallen upon several contrivances to enjoy the benefit of fire, without being annoyed by smoke. The most universal of these contrivances is a tube leading from the chamber in which the fire is kindled to the top of the building, through which the smoke ascends, and is dispersed into the atmosphere. These tubes are called *chimneys*; which, when constructed in a proper manner, carry off the smoke entirely; but, when improperly constructed, they carry off the smoke imperfectly, to the great annoyance of the inhabitants. As our masters at present seem to have a very imperfect knowledge of the manner in which chimneys ought to be built, we can hardly perform a more acceptable service to the public than to point out the manner in which they ought to be constructed, so as to carry off the smoke entirely; as well as to explain the causes from which the effects so often complained of generally proceed, and the method of removing them.

Although we would naturally imagine, that the causes which occasion smoke in rooms are exceedingly various, yet, upon examination, it will be found, that they may all be reduced to one of these three general heads, each of which will admit of several varieties.

I. To a fault in the form of the tube or chimney itself.

II. To some fault in the other parts of the building, and a wrong position of the chimney with respect to these. Or,

III. To an improper situation of the house with respect to external objects. And as it is of the utmost consequence, in attempting a cure, accurately to distinguish from which of these defects the smoke proceeds, it will be necessary to point out with care the several phenomena which are peculiar to each.

I. Of smoke occasioned by a fault in the form of the chimney itself. But, before we proceed, it will be necessary to premise something with regard to the general cause of the ascent of smoke in chimneys.

The earth is every where surrounded with a great body of air called the *atmosphere*. This air is an elastic fluid subjected to many particular laws, as hath been elsewhere fully explained. In particular, it hath, like other fluids, a constant tendency to preserve an equilibrium in all its parts; so that if at any time the weight of it at one place is diminished, the heavier air rushes from all sides towards that point, till the

equilibrium be again restored. It is likewise known, that heat is one of the most powerful means of disturbing this general equilibrium of the air, by expanding it to a great degree, and making the same quantity occupy a much greater space than it did before, and consequently become lighter. Hence it necessarily follows, that wherever a fire is kindled, the air immediately contiguous to it will be heated, and of consequence rarified and made light; which must ascend into the higher regions of the atmosphere, till it becomes of the same gravity with the air contiguous to it; while the denser cold air below rushes toward the point from which it departed, is there heated and rarified in its turn, and ascends in the same manner, carrying the smoke or vapour arising from the burning body along with it. In this manner that constant suction of air towards every fire is produced, and from this cause proceeds the constant tendency of smoke to ascend upwards from the surface of the earth. But as the body of our atmosphere is often agitated with wind, &c. and as it is an elastic fluid, it endeavours to spread itself every way; from which causes the warm air would quickly be diffused among the cold air before it could arise to any considerable height; so that the smoke would always remain low, and be tossed about near the surface of the earth: all of which inconveniences are avoided by confining this heated air in a tube, which prevents it from mixing with the external air, till it arrive at the height to which we desire it should ascend.

To render this still more clear, see Plate CCLXXI. where AB (fig. 1.) represents the tube of a chimney, having a fire at the bottom at A. It is obvious, that, in this situation, the air which was heated by the fire at A will ascend directly upwards, without mixing with the external air, till it arrives at B, beyond which it will be at liberty to disperse in the atmosphere; and the more weighty air which presses in to supply its place can have no access to it but at the opening between A and E, where it also is heated by the fire, and in its turn ascends to the top of the chimney, thereby occasioning a constant stream of air to ascend up the vent, which carries the smoke along with it. This is the manner in which fuliginous vapours are made to ascend in chimneys; and by attending to it, we may draw the following corollaries with regard to the construction of this useful part of our habitations.

Ist, The higher the chimney, that is, the greater the distance between the fire-place and the top of the chimney, the greater will be the difference between the weight of the column of heated air in the tube, and another column of the atmosphere of the same diameter without the chimney; and consequently the air will enter with the greater force at the opening AE, and carry up the smoke more readily along with it: for as the warm air within the tube continues rarified to a high degree till it issues from the top of the chimney, and is, in every part of its length, lighter than the same bulk of external air marked by the dotted line CD, it follows, that the longer these two columns of unequal gravity are, the greater must be the difference of their weight. Hence it is that high chimneys (*ceteris paribus*) have a greater suction of air, and are less liable to vent ill, than low ones. A smoky chimney may therefore sometimes be cured by raising it higher.

Smoke.

Smoke. higher. It is likewise obvious, that if any opening is made into the chimney, as at F, the air will enter with less force at E, and carry up the smoke with less velocity, and by that means be in danger of producing smoke in the room; for this opening, as it admits the fresh air into the tube, has nearly the same effect as shortening the tube so much would have.

2d, As the smoke is forced up the chimney merely by the rarefaction of the air in consequence of heat, it is evident, that the more the air is heated, with the greater force (*ceteris paribus*) will it ascend, because the difference between the weight of the external and internal air will be greater; and as the air will be the more heated the nearer it is made to pass by the fire in its entry into the chimney, it is evident, that the smaller the opening at AE is, or, in other words, the lower the mantle of the chimney is, the air will be forced to pass the nearer the fire, and therefore be more rarefied, and ascend with the greater velocity; so that lowering the mantle of the chimney will often cure smoke.

But it is frequently inconvenient to have the mantle of the chimney too low. However, the same effect may often be produced by another contrivance. For as the fire-place is usually made wider than the length of the grate, a great deal of cool air passes at the two sides of the grate, without being much heated. This greatly diminishes the suction of the chimney; but it may easily be prevented by building up the vacancies at each side of the grate, so as to allow no air to enter from below, except what comes immediately through or before the fire. For this purpose, grates consisting of a neat hewed stone at each end, with a breast and bottom of iron fitted to them, as represented at fig. 2. are extremely convenient. But the aperture of the chimney is often not suddenly contracted above the mantle, but goes up tapering slowly, as in the same fig. 2. This structure allows a quantity of cool air to enter at the two corners of the mantle, and steal up the tube without coming near the fire. The most easy and effectual method of remedying this defect, is to place a sheet of milled iron within the mantle on each side, as low down as possible, making them slant a little upwards towards the middle of the chimney; as at A, fig. 2. the mantle being represented by the dotted line. By this contrivance, the air, which enters at the side of the mantle, before it can ascend into the chimney, is forced to pass very near the fire, and of course is much rarefied. The good effects of this would be still more strongly felt if one of these plates were placed a little lower than the other, and made so long that the ends should cross each other, as at AB, fig. 2. by which means every particle of air that went up the chimney behaved to pass immediately above the fire. It is almost unnecessary to observe, that these plates ought to be so contrived as to be taken out at pleasure to allow the chimney to be cleaned.

A chimney may not only be defective by having the mantle too high, or by being too wide from side to side, but also by being too deep between the fore-side and the back, as is often the case in very old houses. In this case, the distance between the fire and the mantle is so great, that much air passes up without being sufficiently rarefied, as is represented at fig. 3. This may be sometimes cured by bringing the grate a little for-

ward, which, by making the fire act more powerfully upon the mantle, rarefies the air more in its passage. But this can seldom produce the desired effect, and it often does harm: for when the grate is brought forward, there is a great vacancy left between it and the back of the chimney, so that the air passes under the grate, and ascends behind it very little rarefied; so that if the feet of the grate are not very low, there will be as much lost in this way as will be gained in the other; and as there is not enough of heated air in the chimneys of this kind to make the vapour ascend with rapidity, they are often choked with thick fuliginous vapours hanging in them, almost in equilibrio with the rest of the atmosphere, so that the least puff of wind beats them down the chimney, and pushes the smoke into the room; whereas, when it is far back, it is driven down upon the hearth, and rises upwards again when the gulf is over, and a great deal of it is caught within the mantle as it rises, which in the other case would have been dispersed through the room. When this is the case, the most effectual method of cure is, to bring the grate forward till the fore-part of it is immediately under the inner edge of the mantle; then build up the vacancy at the back of it the whole width of the fire-place from side to side, raising it perpendicularly till it is as high as the back of the grate, and then bending it forward towards the mantle, as is represented at fig. 4. When it is as high as the workman can reach, let it be suddenly turned backward again, sloping a little upward, as in the figure; then fit a sheet of milled iron to the inside of the mantle, making it slant a little upward toward the back-part, at a small distance above the new-erected masonry, and extending within a few inches of the back-wall, as at A, fig. 4. By this construction, all the air that enters into the chimney is made to pass immediately above the fire, between it and the heated iron, upon which the flame acts with the greater force, as the back of the fire-place is bent a little forward above the grate, and the heat is likewise reflected into the room with the greater force: at the same time, if the smoke is at any time beat down the chimney by a sudden gust of wind, it will be caught by the sheet of iron, and prevented from coming into the room. If the fire place be very wide between the one side and the other, the new masonry may be carried quite up to the sheet of iron on each of the sides.

3d, As every fire requires a constant succession of fresh air, the tube for conveying this rarefied air to the higher regions of the atmosphere must be of a sufficient size to contain the whole of it, and allow it a ready passage; otherwise a part of it will be forced to seek some other passage; by which means the apartment in which the fire is placed will be constantly filled with smoke. Every chimney, therefore, ought to have a degree of wideness sufficient to carry off the whole of the smoke arising from the fire usually burnt in it, otherwise the apartment will be almost continually filled with smoke. This is a fault more common at present than any of those already mentioned, especially in large towns, where the number of chimneys in one wall is often so great that it is difficult to get a sufficient space for each. The most obvious cure, where the situation admits of it, is to widen the chimney, by opening a hole a little above the grate thro'

Smoke.

Smoke.
Plate
CCLXXI.

Smoke.

Fire.
CCLXXI,

the back-wall of the chimney, slanting a little upward, and building on the outside of the wall a small chimney open from that hole to the top of the building, as in fig. 5. where AB represents the new tube going through the wall at the opening at A, which will receive the superfluous smoke, and carry it off. This additional chimney must always be carried as high as the other. But as there are many situations in which this method of cure would be impracticable, we must try every method for accelerating the ascent of the smoke, (for the more quickly it ascends, the more narrow may the tube be); and with that view the chimney may be heightened at top, and contracted at bottom, in any or all the various ways we have mentioned. But if none of these methods prove effectual, let the chimney be built quite close at the under part, leaving only as much room as is sufficient to contain the grate, having a cover of metal fitted to that opening, which can be taken off or put on at pleasure; by which the whole air that enters into the chimney is made to pass through the fire like a furnace, and carries the smoke up it with great velocity. These are well known in large towns by the name *smoke-chimneys*: but as they occasion a prodigious waste of fuel without warming the room, and, unless attended with very great care, are in danger of setting the building on fire, they ought to be as much avoided as possible. But if neither this nor any of the other methods prove effectual, the wall must either be taken down and rebuilt in a proper manner, or the chimney abandoned as incurable. As this is a defect more difficult to be remedied than any other, we would strongly recommend it to every builder to build his chimneys of a sufficient width throughout: there is no danger of erring on this extreme, as it is easy to remedy any defect that might arise from it.

4th, As the air which ascends through the chimney continues nearly of an equal degree of heat to the top, the tube should be of an equal degree of width at the top as at the bottom, as well as through the whole of its length. It ought not therefore to be made tapering gradually from the fire-place to the top, but to be suddenly contracted above the grate, as in fig. 6. from which it ought to be continued of an equal wideness throughout its whole length; but if it is narrower at one place than another, it ought to be at the under part, immediately above the fire, for a very short space; because, as this is within reach of the hand, the foot can be cleaned from it as often as is necessary; so that when the other parts of the chimney are clogged with soot, they will not be narrower than this place is at that time.

5th, It seldom happens that a chimney can be carried quite straight upwards: and it is an advantage that it is so, as they ought always to be bent a little. For if a chimney be straight, and of a proper width to transmit the whole of the smoke and no more, it will not be sufficient for that purpose, when there is a heavy fall of rain, or snow, or hail, with little wind; for the great drops will fall perpendicularly from the top to the bottom of the chimney: and as they occupy a considerable space, the smoke will not have room to ascend, but must be forced down with the shower, and dispersed in the apartment; whereas, if the chimney is bent, the rain falls upon some of the

sides, and glides gently down, without disturbing the ascent of the smoke. The same inconvenience will be felt in a straight chimney, where it is so placed as to be exposed to winds, which sometimes enter the top, and blow down with a sudden puff: for if it be straight, the air meets with no interruption till it descends into the chamber, and there disperses the smoke; but if it be crooked, the descent of the wind will be obstructed, its force broken, and the bad effects of it in a great measure prevented. Upon the whole, bent chimneys are always preferable to straight ones. However, a perpendicular chimney may be easily cured by some of the contrivances after mentioned.

These are the most general defects arising from the structure of the chimney itself, which are all reducible to the following causes: 1. Too little height; 2. Too great wideness of the bottom of the chimney; 3. Too little width; 4. Unequal wideness between the top and bottom; and, 5. Straightness of the tube. We have pointed out the best methods of curing each of these defects; and, to finish our remarks on this general head, and give the reader a more perfect idea of the best form of construction for a chimney, we have drawn two different sections of one constructed on the justest principles, in figures 6. and 7. the several parts of which appear so plain from the figures, and the reasons for this construction have been already so clearly assigned, that a very short explanation will be sufficient. Fig. 6. represents a front-view of the fire-place; supposing the fore-part of the wall taken down, and the chimney laid bare from top to bottom; AB and DC, representing the two sides of the fire-place; and BC, the mantle, being cut through, to show the manner in which the aperture is suddenly contracted, immediately above the fire within the mantle. The tube from the point E to the top ought to be of an equal wideness, and bent in any direction that may be convenient. The two planes FF, represent the two sides of the fire-place, which ought to be as much sloped inward towards the back as the form of the grate will admit of; for the more they are inclined, the more powerfully will they reflect the heat into the apartment. Fig. 7. represents a perpendicular section of the wall, through the middle of the chimney, to discover its shape, if viewed from a side. And here it is to be observed, that it ought ever to be a rule to bring the building at the under part of the chimney immediately behind the grate, as far forward as possible, because this throws more heat into the chamber than if it were placed farther back: but as the fore-part of the grate ought never to project beyond the inner edge of the mantle, care should be taken to have the under part of the mantle wrought as thin as the nature of the materials will admit of, making it thicker towards the upper part, so as to slope inwards above the fire, as represented at B, fig. 7. To throw the heat outward, let the upper part of the back of the fire-place be a little inclined outward, as at C; but after it is carried up in this manner a little higher than the mantle, let it be suddenly turned back as in the figure, the projection above the mantle inclining backward in the same direction, being carried up to the top at an equal wideness the whole way.

Although it is necessary to have all chimneys pretty wide, yet this on many occasions is attended with inconvenience.

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conveniences: for as they transmit a great quantity of heated air, too large a portion of that warm air which ought to heat the chamber is carried off; and as it is only when the fire is first kindled that the great quantity of gross vapour is exhaled, which fills the chimney, and maketh a large tube necessary, if it were so contrived as to contract or dilate at pleasure, we might have our chimney of a sufficient width to convey away the greatest quantity of smoke that could ever have occasion to pass through it, at the same time that we might never allow more air to pass off at other times than was necessary to carry away the whole of the smoke, by which means a much smaller quantity of fuel would keep our apartment equally warm. This, we apprehend, might be accomplished by the following simple apparatus. Let a sheet of milled iron be fixed at the upper part of the mantle, on the inside, at B, in such a manner as that, by means of a small wire *d*, passing through a small hole left for that purpose in the fore-part of the chimney, it might be let down at pleasure towards C, or drawn up towards B, so as to apply quite close to the upper edge of the chimney between B and C. This would leave the tube of its full wideness when necessary, or close it to any degree at pleasure, with the greatest ease (A.) It is unnecessary to add, that the plate at A, fig. 4. might be employed in the same manner, when it should be found convenient. So much for what relates to the construction of the chimney itself. We now proceed to consider the second general cause of smoke, viz.

II. Of smoky houses proceeding from faults of other parts of the building, altogether independent of the structure of the chimney itself.

1st, The first we shall mention is too great closeness of the room. Smoke, as shown above, is impelled up the chimney by the pressure of the air entering at the fire-place and ascending upwards; but if fresh air is not admitted into the apartment in sufficient quantities to supply the consumption by the fire, the room will be quickly exhausted, and the air in it become as light as the external air at the top of the chimney, so that the smoke will as readily be dispersed into the chamber as through the chimney. But if any door or window is opened so as to admit plenty of free air, the smoke will be quickly dispelled, and the proper circulation established: the same effect will be produced by making a small hole in some of the sides of the room; but unless this be done with some judgment, it may frequently add to the disease, as it may concur with some of the other causes of smoky houses, to be afterwards mentioned. A better method of remedying this evil would be to have a small hole made in the wall at the back of the chimney, and immediately underneath it: or a small perforation, made in the wall in any other convenient manner; the one

end of which should communicate with the external air, and the other communicate with the chamber in any place near the grate, and as low down as possible, through which a constant supply of air would be administered to the fire without the smallest inconvenience or trouble. If this were practised, doors and windows might with safety be made much closer than at present, and our apartments rendered equally warm and comfortable with a much smaller quantity of fuel than we use at present. For as the fire, in the present mode of constructing chambers, is kept alive by a constant succession of cold air from the doors, windows, and other crannies of the room, rushing towards the chimney in all directions, the air of the room, which, if not cooled by this means, would be quickly heated to a great degree, is constantly kept cold, in spite of the strong heat of a blazing fire; which, at the same time that it scorches the parts of our body which are most exposed to it, does not warm the parts which are turned from it; and we experience at the same time a burning heat and piercing cold, which is often productive of the most disagreeable effects. But if the fire were supplied with air in the manner above-mentioned, there would be less air drawn in through the crannies of the room, so that the air within would be soon warmed, and continue long so, even with a small degree of heat. However improper this might be for people in perfect health, it might surely be of great use for those who are in a weakly habit of body; especially if care were taken to carry off the foul air, by having a small tube leading from the upper part of the room to the top of the house, through which the air, which had been rendered noxious by the smoke of candles or perpiration, would be conveyed away, and a succession of fresh air admitted from the tube near the fire-place, to supply that want. That the reader may more readily comprehend what is here meant, we have represented in fig. 6. a view of two small tubes for this purpose, supposed to be laid open by taking away the boxing or inner coating of the wall which ought to cover them. These are of wood, and must not be above one inch in diameter. One end, *g g*, goes quite through the outer wall of the house, and communicates with the open air, having a small grate upon it to prevent vermin from entering. The other end, *h h*, passes behind the two slabs, at the side of the fire-place, and open in the inside of the fire-place at *i i*, at which place they have each of them a small bit of brass fixed to them, being closed with two sliding doors exactly like those that are used to cover the end of telescopes, by means of which more or less air may be admitted at pleasure.

2d, A second cause of smoke is the wrong position of doors and windows with respect to the fire places.

As the smoke is impelled up the chimney by the pressure

40 Y 2

pressure

(A) If any one should think, that the wire *d* would be a disagreeable object in the middle of a chimney-piece, it might easily be hid by a picture of any kind. The wire might be fixed to a small brass handle, moving freely upward and downward like that for a bell; only this should have a long slit in the middle of it, with notches on each side, to receive a pin placed in the middle of the slit, by means of which the wire might be lengthened or shortened at pleasure. The whole of this apparatus is represented at fig. 16, where (a) represents the wire fastened to the brass plate; (b) a piece of brass, raised a little, to serve as a handle. The slit in the middle is represented by the dark line, having notches, *c c c*, at convenient distances. The pin *d* is fixed into the wall, but left at liberty to turn about with ease; and its head stands up a little, so as to be easily turned with the finger and thumb. The body of this nail is made so thin in one direction, that when it is turned half round, it easily passes thro' the slit in the plate; but in the other direction its diameter is greater, so that when the plate is brought so as to have one of the notches opposite to the nail, and it is then turned half round, it catches the plate so that it cannot be moved till the nail is again turned about.

pressure of the air, if that air is driven away from the fire-place by any cause more powerful than the suction occasioned by the fire, the smoke must also be drawn away with it, and follow the same directions with that current of air; so that whatever tends to draw a current of air from the under-part of the chimney, will also tend to produce smoke in the house; from whence it is easy to conceive how doors or windows may occasion smoke when the wind is in certain directions. Thus, suppose a chamber, A, B, C, D, fig. 8. having a door or window at E, another at F, and a fire-place at G; when the wind is in the direction DA or CB, the general current of air will occasion a sort of suction at the opening E, so that the air will be drawn from the chimney G towards E: and if the current be strong, and the opening at E large, it will become more powerful than the suction of the chimney, and produce smoke in the apartment. If the window at F should be opened in this case, it would not mend the matter; for any wind which should enter at F, would be carried straight out at the opening E, and the current of air would be drawn from the chimney as strong as ever. If the window at E were shut, and that at F left open, and the wind still continued in the same direction as before, the current of air rushing past the window would have a tendency to draw the air of the room along with it, and occasion smoke, but not so powerfully as if the window at E were open; but if the wind were in the direction DB, it would be very bad: but if it blew in the direction CA, the case would be very much altered; for then a quantity of air being forced in at the opening F, and finding no ready passage, it would be pent up in the chamber, and force itself up the chimney with violence. We omit mentioning what would be the effect if the wind were in other directions, as it is imagined these will be sufficiently obvious to every attentive observer. It is only necessary here to observe, that as doors or windows are seldom so exactly made, but they produce some effect, as they always admit some air even when shut, and often occasion smoke when the wind blows from a particular quarter; and as workmen and others generally apprehend, when houses are troubled with smoke in this manner, that it is occasioned by some external cause, and apply their attention to cure it by altering the top of the chimney, which never can produce the smallest service in this case; we would recommend a more particular attention to be paid to the situation of doors and windows than is generally bestowed; especially in such situations where they are exposed to any violent current of air in a particular direction, as in narrow lanes, or defiles of any sort, where the wind, when in particular directions, is hurried along with a prodigious rapidity. And, that the effects of different positions may be still more obvious, we shall produce several other examples.

Suppose a chamber, fig. 9. having a door at A, and two windows B C, with a fire-place D. If the wind came in the direction DA, and if the door transmitted as much or more air than was admitted at both the windows, a current of air would run from all parts of the chamber towards A, and therefore would have a tendency to occasion smoke: but if as much or more air came in at the windows than could get out at the door, there could be no such current; but, on the

contrary, it would be forced up the chimney, and carry the smoke along with it: wherefore, in this situation, a room might sometimes be cured of smoke, by making the door as close as possible; nothing could be more hurtful in this case than boring a hole in the door. But if the house was in such a situation as to be more frequently exposed to a wind which came in the direction of A D, it would run little risk of being troubled with smoke.

Suppose a room, fig. 10. having a door at A, and two windows B and C, with a fire-place D. If the wind came in the direction CB or BC, and both the windows were open, it is evident that the smoke would be drawn from the chimney by the strong current of air passing through the room; or if the window upon which the wind came were closed, and the opposite one open, nearly the same effect would be produced: but if the window upon which the wind blew were open, and the opposite one and the door shut, the room would be immediately cleared of smoke entirely. In this situation, it is evident, that if the windows were badly made, so as to admit much air, it would tend to occasion smoke, especially if the door were in the same situation; it is therefore of consequence to attend to this circumstance in a situation similar to this.

Having premised so much with regard to single rooms, we shall now proceed to consider a more compound structure. Thus, let fig. 11. represent a building consisting of two chambers, K L, joined by a passage. The chamber K having a door B communicating with the passage, a window F, and fire-place G; and that at L having a door C, another door or window D, the window E, and fire-place H, the entry to the whole being by the door A. Let us now consider what would be the effect of the wind coming from different directions upon this building. And first, suppose the wind blew in the direction AM: If all the doors and windows were close shut, and very little air were admitted, there would be little risk of smoke; but as there would surely be some admitted through these different openings, there would be some chance that the chamber L would be troubled with smoke, because some of the air which forced its passage thro' the chinks of the door A would pass through the doors C and D, which might produce smoke in a small degree. There would be little chance that the chamber K would smoke in this case; because although there is a general suction through the passage from B to D, yet as it is in some measure interrupted by the close door at C, it will be but small; and as the wind is interrupted in its course by the wall of the passage, some of it will be forced through the chinks of the window E, which would more than counterbalance the effects of the other suction. But if the door D were open, both the chimneys would smoke; especially if the doors B and C were open also, as the current would be then very strong towards that point. But in all cases the smoke of this house would be prevented by keeping the door at D shut, and that at A open; but if the house was in such a situation as to be more exposed to that wind than any other, it would be better to close up the door D altogether. If the wind more commonly came from M towards A, it is more than probable that a house situated like this would be quite free of smoke, as the general current of air would be

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towards the chimneys; but the chamber K would run greater risk than L, as the suction might sometimes be drawn towards the window F; but if the door A were in the opposite side of the passage, that inconvenience would be avoided also. If the more general current of air were from K towards L, this house behaved to be troubled with smoke, unless the windows were very close; but there would not be the smallest chance for that when it came from L towards K.

We might now proceed to give more examples of this sort: but as it would be impossible to enumerate all the variety of cases that might occur, it is imagined that these will be sufficient to give the reader an idea of the manner in which any building ought to be examined in this respect; and he must be left to his own discretion to apply the principles above explained to all the variety of cases that may occur. In large complicated buildings, it no doubt requires a greater extent of thought to combine all the various circumstances together, and draw a general conclusion, than in smaller and more simple ones; but if the following general rules are attended to, the complaints arising from this cause would be but few. 1st, Avoid as much as may be long passages leading to very distant parts of a building, as there is often a strong current of air in these which helps to disturb the free circulation of air up the chimneys. 2d, Place the chimneys in general in that side of the apartment towards which the wind which in general prevails most in the situation where the house is placed blows. And, 3d, make as many, if not more, doors and windows (especially such as have occasion to be most frequently open) on that side of the building *from whence* the most prevalent wind does come.

III. The third general cause of smoke in houses is the wrong position of the house with regard to external objects, which, by interrupting the course of the air, makes it assume various directions, and wheel about in eddies, so as to prevent it from ascending with ease from the chimney-top, or beats it down into the room with violence. This is more seldom the cause of smoky houses than either of the two before-mentioned; although it seems to be almost the only one attended to by the persons who pretend to cure smoky houses at present, as most of their remedies are adapted to remove the disorders arising from this cause alone. We shall briefly point out the several cases in which this can occur, that every one may be enabled to judge for himself when these cures are proper or not.

The air (as has been said) is a fluid, and wind a current of that fluid; which, when driven along the surface of the earth, flows with a smooth and equal stream, unless when opposed by some object which interrupts its course; but when it meets with any object which directly opposes its course, it is in some measure pushed back again, and made to spread on every side, till it meets with some open side, towards which it flows with great impetuosity. It is likewise a fluid of considerable gravity, and therefore presses upon the surface of the earth with great force; so that, when a current of it flows along the surface of our globe, it has a tendency to move forward and press downward at the same time: from whence it happens, that when a current of air is forced over the top of any high object, the side of which descends perpendicularly down-

ward, the velocity of the current at first overcomes the gravity, and it flies a short way over in that direction; but the power of gravity acting upon the under surface, draws it downward, and in a short time overcomes the impetus that it had to rush forward, and occasions a sort of eddy nearly similar to what we see among water behind a stone which interrupts the violence of its currents.

To illustrate this more plainly, let A B, fig. 12. represent a part of a high building, near to which is a smaller one C D; and let the dotted line E F represent a current of air flowing with considerable force in the direction F E. It is plain that it will flow straight forward over the top of the small building; but when it meets with the large object, it will be interrupted in its course, and spread itself on every side, as represented by the dotted lines G G, &c. at last it will flow towards that place through which it can escape with the greatest ease. If the opposing object be large, and has no opening through which it can issue near the ground, then it will ascend to the top of it, and flow off in that direction, carrying the smoke which ascends from the small chimney C along with it: but if there is any opening below, either a street or lane, or any other passage that will admit the wind to pass, then will the natural gravity of the air draw the general current downward to flow off through the lower passage; in which case, the smoke which ought to ascend through the chimney C, meeting with a current of air opposing its passage, will not be at liberty to issue forth, but be forced back again into the room from whence it proceeded, unless some contrivance is fallen upon to prevent it.

Again, let A, fig. 13. represent a small building at the side of a great rock B, and the wind coming in the direction C D; when the current of air comes to the point D, being hurried forward with great velocity, it goes a little forward, but soon descends downward, and gradually is reflected more and more inward, as represented by the dotted lines E E, &c. so that, descending downwards upon the top of the chimney A, the smoke is beat back again into the apartments. Thus it is that in low houses, when contiguous to high objects, are in danger of being disturbed with smoke. If the contiguous object be not very high, the disorder may be cured by heightening the chimney of the low house; but if it is very high, it will be necessary to cover the top of the chimney in such a manner as to prevent the wind from entering it, at the same time that a passage is left at some of the sides through which the smoke may issue with freedom. Many are the contrivances which have been invented for this purpose, which are to be met with every-where; and as there is no difficulty in accomplishing the desired end by an infinite variety of methods, every one who needs such a thing may please his own fancy in the choice. We have thought it unnecessary to add any more but one kind of these, fig. 14. which will answer the end effectually.

It is evident that houses situated near high hills, or thick woods, will be in some measure exposed to the same inconvenience; but it is likewise plain, that if a house be situated upon the slope of a hill, as at F, fig. 13. it will not be in any danger of smoke when the wind blows towards that side of the hill upon which it

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is situated; for the current of air coming over the house-top in the direction GH, is immediately changed by the slope of the hill to the direction HC, which powerfully draws the smoke upward from the top of the chimney. But it is also evident, that a house in this situation will be liable to smoke when the wind blows from the hill; for the current of air coming downward in the direction CH, will beat downward on the chimney F, and prevent the smoke from ascending with freedom. But the effect will be much heightened if the doors and windows are chiefly in the lowermost side of the house.

These are some of the most general circumstances which prevent the free ascent of smoke, arising from external objects: but there are many other lesser causes which may at times occasion smoke, all of which it would be tedious here to enumerate; such as, blasts of air, reflected from the sides of mountains, and coming down valleys with great impetuosity, occasioning, in particular situations, eddies or whirlwinds of different sorts. In short, whatever in any measure disturbs the free motion of the air, is in danger of producing sudden gusts, which may occasion smoke. Therefore, whoever builds in a situation which is not altogether free, may lay his account with having some sudden gusts of smoke, unless he forms the top of his chimney so as to obviate it. And there are some situations so much exposed to sudden gusts of wind, sometimes whirling round, sometimes beat suddenly downward, or as suddenly carried up again, that it is difficult to guard against every danger. In these situations we would recommend something of the form of what is represented at fig. 15. which would be proof against every wind whatever.

Having thus traced the causes of smoky houses, and reduced them to distinct classes for the sake of distinctness; it is necessary, before we quit this subject, to observe, that in many cases, two or more of these may be combined to augment the malady, and therefore it is necessary to have all these circumstances in view in every particular case. It now only remains that we point out the several phenomena which may lead us to distinguish from which of these general causes the disorder complained of may proceed. And,

1st, If it is owing to a fault in the construction of the chimney itself, it will smoke almost continually, especially in calm weather.

2d, If it does not smoke in calm weather, or only when the wind comes from some particular quarter, and can then be cured by opening some door or window, the fault may be looked for in the distribution of the doors or windows of the house. The only case in which there is a difficulty to distinguish whether it is owing to the fault of the chimney or the house, is when it proceeds from too much closeness of the apartment. But this may be easily known by trying it in a calm: for if it proceeds from this cause, there will be no smoke in a perfect calm, if the doors are left open; whereas, if the defect proceeds from a fault in the chimney itself, it will still continue to smoke when calm, even when the doors are open.

3d, When the smoke is occasioned by external causes, there can be generally seen; but it may be likewise known by this, that it descends in sudden puffs with great violence at times, even when the doors and win-

dows are not altered. By attending to these few rules with care, there will be little danger of mistaking the cause from whence this disorder proceeds.

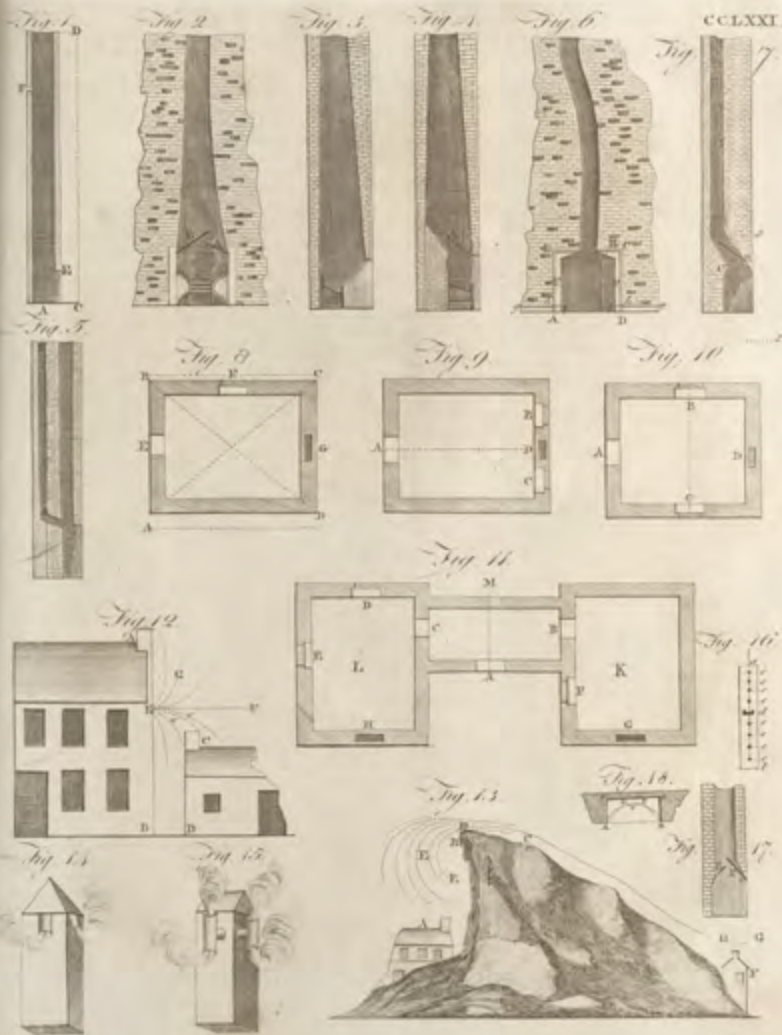
We shall conclude these observations with a few remarks on some particular cases, which can hardly be reduced to any of the foregoing heads. And,

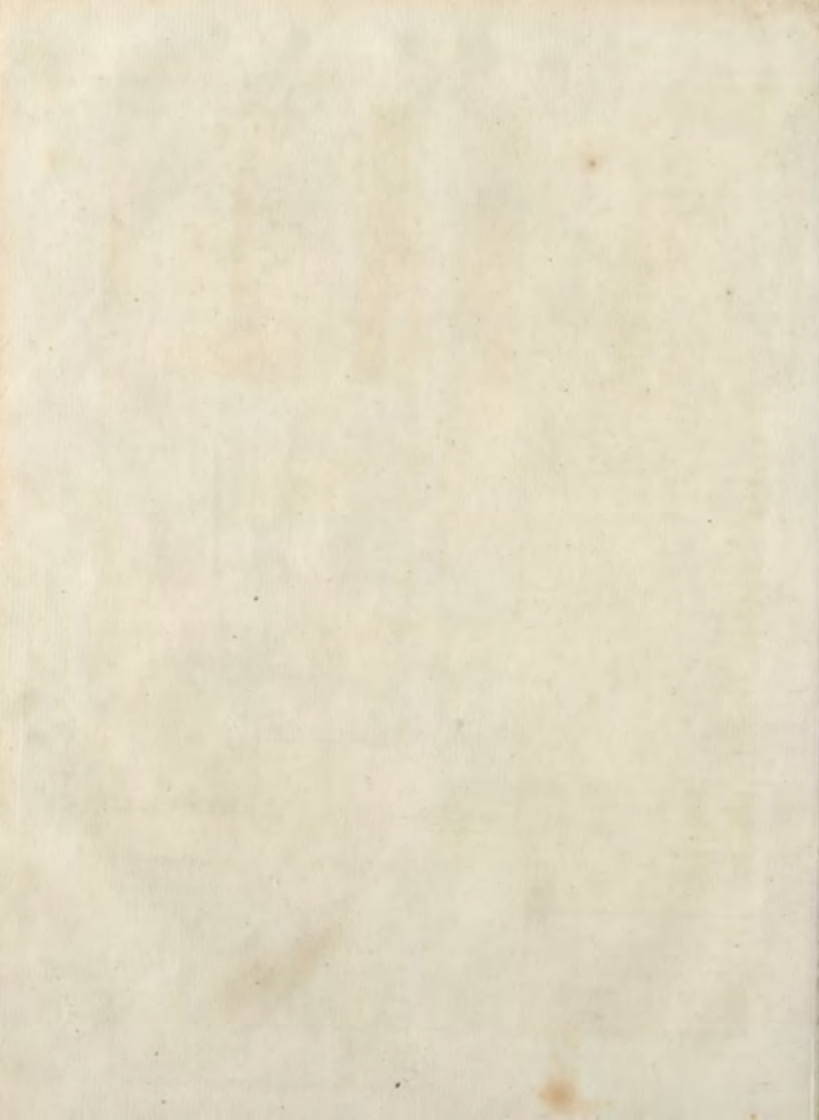
1st, It sometimes happens that the smoke is prevented from ascending with freedom, by having a small part of the top of the chimney broke down, so as that some parts of it remain higher than others, which in some measure reduces it to the state of a chimney at the side of a higher one. To prevent this, it is always proper to have the top of the chimney finished with stones neatly cut, and firmly built. It is not to be doubted but that those things which are placed upon particular chimneys with a view to cure them of smoke, do often, from the same cause, hurt the neighbouring chimneys built in the same wall.

2d, A chamber is sometimes filled with smoke, when a fire is kindled in a neighbouring chimney, and none in it, although there is no appearance of smoke when it has a fire burning in its own grate. This may sometimes proceed from a small hole breaking through the thin partition that divides the two chimneys from one another; and as smoke is a weighty body, which is only buoyed up by the warm air which passes thro' the fire, when it penetrates into the cold chimney it naturally subsides, and comes down to the chamber with which the chimney communicates, when there is no fire to carry it off. But this disease is generally produced by the smoke entering at the top of the chimney, and descending downwards: if this last is the case, it may be cured, on many occasions, by setting a pretty high stone at the top of the chimney, as a division between each two: but the surest method, in all cases, is to have a smoke-board exactly fitted into the chimney above the grate, which on all occasions effectually prevents it.

3d, It frequently happens, that a chimney does not carry off the smoke well at first when the fire is kindled, although there is not the smallest tendency to it at other times. This proceeds from the narrowness of the chimney; for when the fire is kindled, the whole tube is filled with cold air, as weighty as that in the apartment; and being expanded by the fire at the bottom, it endeavours to ascend upward; but being pent in by the narrowness of the tube, and pressed by the column of cold air above it, it is some time before it can wholly overcome that resistance, and some of it is forced into the chamber, till by degrees the whole chimney is heated, and then it vents quite well. If the smoke produced by this means is not very troublesome, it may be borne with; but if it be extremely disagreeable, it may be cured by having a large sheet of milled iron, large enough to reach between the two sides of the fire-place, and as deep as to reach from the mantle to the grate, or lower, which might by any contrivance be hung up before the fire at that time to act in some measure as a *smoke-chimney*. This would quickly make the fire burn, and carry off the smoke entirely. After that is effected, it might then be removed till another occasion.

SMOKE-FARthings. The pentecostals, or customary oblations offered by the dispersed inhabitants within a diocese when they made their procession to the mother-





Smoke
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cathedral church, came by degrees into a standing annual-rent, called *smoke-farthing*.

SMOKE-SILVER. Lands were holden in some places by the payment of the sum of 6d. yearly to the sheriff, called *smoke-silver*. Pat. 4. Edw. VI. Smoke-silver and smoke-penny are to be paid to the ministers of divers parishes as a *modus* in lieu of tithe-wood: and in some manors formerly belonging to religious houses, there is still paid as appendant to the said manors, the ancient Peter-pence, by the name of *smoke-money*. *Twiss's Hist. vindicat.* 77.—The bishop of London, anno 1444, issued out his commission, *Ad levandum le smoke-farthings*, &c.

SMOLENSKO, a large and strong town of Russia, and capital of a palatinate of the same name, with a castle, seated on a mountain, and a bishop's see. It is strong by its situation, being in the middle of a wood, and surrounded by almost inaccessible mountains. It has been taken and retaken several times by the Poles and Russians; but these last have had possession of it ever since the year 1687. It is seated on the river Nieper, near the frontiers of Lithuania, 188 miles south-west of Moscow. E. Long. 33. 15; N. Lat. 56. 10.

SMOLENSKO, a duchy and palatinate of Russia, bounded on the north by Biela, on the east by the duchy of Moscow, on the south by that of Severia and the palatinate of Meislaw, and on the west by the same palatinate and by that of Witepsk. It is full of forests and mountains; and the capital town is of the same name.

SMOLLET (Dr Tobias), was born in Scotland in the year 1720, and in the early part of his life served as a surgeon's mate in the navy. The incidents that befel him during his continuance in this capacity served as a foundation for one of the most entertaining novels in the English tongue, *The Adventures of Roderick Random*, 2 vols, 12mo; a book which still continues to have a most extensive sale, and first established the Doctor's reputation. All the first volume, and the beginning of the second, appears to consist of real incident and character, though certainly a good deal heightened and disguised. The Judge his grandfather, Crab and Potion the two apothecaries, and Squire Gawkey, were characters well known in that part of the kingdom where the scene was laid. Captains Oakham and Whiffle, Doctors Mackshane and Morgan, were also said to be real personages; but their names we have either never learnt, or have now forgotten. A bookbinder and barber long eagerly contended for being shadowed under the name of *Strap*. The Doctor seems to have enjoyed a peculiar felicity in describing sea-characters, particularly the officers and sailors of the navy. His Trunnion, Hatchway, and Pipes, are highly-finished originals; but what exceeds them all, and perhaps equals any character that has yet been painted by the happiest genius of ancient or modern times, is his Lieutenant Bowling. This is indeed nature itself; original, *unique*, and *sui generis*.

It is surprising that, notwithstanding Dr Smollet was so very successful in hitting off original characters in narration, he could never succeed in the drama. Very early in life, he wrote a tragedy intitled *The Regicide*, founded on the story of the assassination of James I. of Scotland; which, with all his interest and address, he never could get represented on the stage. He after-

wards published it by subscription; with what success we cannot now recollect: but we are much mistaken if he has not alluded to some of his own theatrical occurrences, in the story of *Melopoyne*, in *Roderick Random*.

By the publication of that work the Doctor had acquired so great a reputation, that henceforth a certain degree of success was insured to every thing known or suspected to proceed from his hand. In the course of a few years, *The Adventures of Peregrine Pickle* appeared; a work of great ingenuity and contrivance in the composition, and in which an uncommon degree of erudition is displayed, particularly in the description of the entertainment given by the Republican Doctor, after the manner of the ancients. Under this personage the late Dr Akenfide, author of a famous poem intitled *The Pleasures of Imagination*, is supposed to be typified; and it would be difficult to determine whether profound learning or genuine humour predominate most in this episode. Another episode of *The Adventures of a Lady of Quality*, likewise inserted in this work, contributed greatly to its success, and is indeed admirably well executed; the materials, it is said, the lady herself (the celebrated lady *Vane*) furnished.

These were not the only original compositions of this stamp with which the Doctor has favoured the public. Ferdinand Count Fathom and Sir Lancelot Greaves, are still in the list of what may be called *reading novels*, and have gone through several editions; but there is no injustice in placing them in a rank far below the former. No doubt invention, character, composition, and contrivance, are to be found in both; but then situations are described which are hardly possible, and characters are painted which, if not altogether unexampled, are at least incompatible with modern manners; and which ought not to be, as the scenes are laid in modern times.

The last work which we believe the Doctor published, was of much the same species, but cast into a different form—*The Expedition of Humphrey Clinker*. It consists of a series of letters, written by different persons to their respective correspondents. He has here carefully avoided the faults which may be justly charged to his two former productions. Here are no extravagant characters nor unnatural situations. On the contrary, an admirable knowledge of life and manners is displayed; and most useful lessons are given applicable to interesting, but to very common situations.

It appears from *Roderick Random*, that Mr Smollet was at the siege of Carthage; of which expedition he gives a faithful, though no very pleasing account. Soon after his return he must have taken his degree of Doctor of Physic, though we have not been able to learn at what time and at what place. It is said that, before he took a house at Chelsea, he attempted to settle as practitioner of physic at Bath; and with that view wrote a treatise on the waters—but was unsuccessful, chiefly because he could not render himself agreeable to the women, whose favour is certainly of great consequence to all candidates for eminence, whether in medicine or divinity. This, however, was a little extraordinary; for those who remembered Dr Smollet at that time, cannot but acknowledge that he was as graceful and handsome a man as

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Smollet.

any of the age he lived in; besides, there was a certain dignity in his air and manner which could not but inspire respect wherever he appeared. Perhaps he was too soon discouraged; in all probability, had he persevered, a man of his great learning, profound sagacity, and intense application, besides being endued with every other external as well as internal accomplishment, must have at last succeeded, and, had he attained to common old age, been at the head of his profession.

Abandoning physic altogether as a profession, he fixed his residence at Chelsea, and turned his thoughts entirely to writing. Yet, as an author, he was not near so successful as his happy genius and acknowledged merit certainly deserved. He never acquired a patron among the great, who by his favour or beneficence relieved him from the necessity of writing for a subsistence. The truth is, Dr Smollet possessed a loftiness and elevation of sentiment and character which appears to have disqualified him for currying favour among those who were able to confer favours. It would be wrong to call this disposition of his pride or haughtiness; for to his equals and inferiors he was ever polite, friendly, and generous. Bookellers may therefore be said to have been his only patrons; and from them he had constant employment in translating, compiling, and reviewing. He translated *Gil Blas* and *Don Quixote*, both so happily, that all the former translations of these excellent productions of genius are in a fair way of being superseded by his. His name likewise appears to a translation of *Voltaire's Prose Works*; but little of it was done by his own hand; he only revised it, and added a few notes. He was concerned in a great variety of compilations. His *History of England* was the principal work of that kind. It had a most extensive sale; and the Doctor is said to have received 2000*l.* for writing it and the continuation.

In the year 1755 he set on foot the *Critical Review*, and continued the principal manager of it till he went abroad for the first time in the year 1763. To speak impartially, he was, perhaps, too acrimonious sometimes in the conduct of that work. Having, in particular, made some very severe strictures on a pamphlet published by Admiral Knowles, as well as on the writer's character, the latter commenced a prosecution against the printer, declaring, it was said, he only wanted to know the author, that, if a gentleman, he might obtain the satisfaction of a gentleman from him. In this affair the Doctor behaved with great spirit. Just as sentence was going to be pronounced against the printer, he came into court, avowed himself the author of the strictures in question, and declared himself ready to give the Admiral any satisfaction he chose. Upon this, the Admiral began a fresh action against the Doctor, who was found guilty, fined 100*l.* and condemned to three months imprisonment in the King's Bench. It is there he is said to have written the *Adventures of Sir Lancelot Greaves*; in which he has described some remarkable characters, then his fellow-prisoners.

When lord Bute was called to the chief administration of affairs, he was prevailed upon to write in defence of that nobleman's measures; which he did in a weekly paper, called the *Briton*. This gave rise to the famous North-Briton; wherein, according to the opinion of the public, he was rather baffled. The truth

is, the Doctor did not seem to possess the talents necessary for political altercation. He wanted temper and coolness; and his friends accused his patron of having denied him the necessary information, and even neglected the fulfilling of some of his other engagements with him. Be that as it will, the Doctor is said not to have forgotten him in his subsequent performances.

His constitution being at last greatly impaired by a sedentary life and assiduous application to study, he went abroad for his health in the year 1763. He wrote an account of his travels in a *Series of Letters* to some friends, which were afterwards published in two volumes 8vo. During all that time he appears to have laboured under a constant fit of chagrin. But the state of his mind will be best learnt from himself. Thus he writes in his first letter: "In gratifying your curiosity, I shall find some amusement to beguile the tedious hours; which, without some such employment, would be rendered insupportable by dis temper and disquiet. You knew and pitied my situation, traduced by malice, persecuted by faction, abandoned by false patrons, and overwhelmed by the sense of a domestic calamity, which it was not in the power of fortune to repair." By this domestic calamity he means the loss of his only child, a daughter, whom he loved with the tenderest affection. The Doctor lived to return to his native country; but his health continuing to decline, and meeting with fresh mortifications and disappointments, he went back to Italy, where he died in October the 21st 1771, having been born in the year 1720. He was employed, during the last years of his life, in abridging the *Modern Universal History*, great part of which he had originally written himself, particularly the histories of France, Italy, and Germany.

It would be needless to expatiate on the character of a man so well known as Dr Smollet, who has, besides, given so many strictures of his own character and manner of living in his writings, particularly in *Hamphrey Clinker*; where he appears under the appellation of *Mr Serle*, and has an interview with Mr Bramble; and his manner of living is described in another letter, where young Melford is supposed to dine with him at his house in Chelsea. No doubt, he made a great deal of money by his connections with the bookellers; and had he been a rigid economist, or ended with the gift of retention, (an expression of his own), he might have lived and died very independent. However, to do justice to his memory, his difficulties, whatever they were, proceeded not from extravagance or want of economy. He was hospitable, but not ostentatiously so; and his table was plentiful, but not extravagant. No doubt he had his failings; but still it would be difficult to name a man who was so respectable for the qualities of his head, or more amiable for the virtues of his heart.

SMUGGLERS, in law, those persons who conceal or run prohibited goods, or goods that have not paid his majesty's customs.

SMUGGLING is restrained by a great variety of statutes, which inflict pecuniary penalties and seizure of the goods for clandestine smuggling; and affix the guilt of felony, with transportation for seven years, upon more open, daring, and avowed practices: but the last of them, 19 Geo. II. c. 34. is for this purpose *infamum*; for it makes all forcible acts of smuggling

Smollet, Smuggler

Smut,
Smyrna.

smuggling, carried on in defiance of the laws, or even in disguise to evade them, felony without benefit of clergy: enacting, that if three or more persons shall assemble, with fire-arms or other offensive weapons, to assist in the illegal exportation or importation of goods, or in refusing the same after seizure, or in refusing offenders in custody for such offences; or shall pass with such goods in disguise; or shall wound, shoot at, or assault any officers of the revenue when in the execution of their duty; such persons shall be felons, without the benefit of clergy. As to that branch of the statute which required any person, charged upon oath as a smuggler, under pain of death, to surrender himself upon proclamation, it seems to be expired; as the subsequent statutes, which continue the original act to the present time, do in terms continue only so much of the said act as relates to the punishment of the offenders, and not to the extraordinary method of apprehending or causing them to surrender: and for offences of this positive species, where punishment (though necessary) is rendered so by the laws themselves, which, by imposing high duties on commodities, increase the temptation to evade them, we cannot surely be too cautious in inflicting the penalty of death.

SMUT, in husbandry, a disease in corn, when the grains, instead of being filled with flour, are full of a stinking black powder.

As to the cause of this distemperature, some have attributed it to excessive rankness, or fatness of the soil; to the manuring the land with rotten vegetables; and to the sowing smutty seed. Mr Bradley thinks it is owing to the same cause with a blight, *viz.* to multitudes of insects. But Mr Tull is convinced from experiment, that it is caused by too much moisture; for planting several plants of corn in troughs of very moist earth, they all produced smutty ears, while very few were found in the field from whence these plants were taken.

There are two remedies for the smut, recommended by writers on husbandry, *viz.* steeping the seed in salt brine, and changing the seed.

As to the steeping of seed, when wheat is intended for drilling, it must be soaked in a brine of pure salt, dissolved in water, since urine is found to be highly prejudicial. The most expeditious way of bringing wheat for drilling, is to lay it in a heap, and wash it with a strong brine sprinkled on it, stirring it up with a shovel, that it may be all equally brined, or wetted with it; after this, sift on some fine lime all over the surface, and stir it up, still sifting on more in the same manner till the whole is dusted with lime, it will then be soon dry enough to be drilled without further trouble. It must be quicklime in its full strength that is used on this occasion.

The bread made of smutty corn is very pernicious, acting as a narcotic, and occasioning not only sleepiness, but vertiges, and even convulsions.

SMYRNA, a sea-port town of Turkey in Asia, and one of the largest and richest cities of the Levant. The goodness of the harbour has caused it to be rebuilt several times, after being destroyed by earthquakes. It is the rendezvous of merchants from almost all parts of the world, and the magazines of their merchandizes. Some time ago it was thought to contain 15,000 Turks, 10,000 Greeks, 1800 Jews, 200

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Armenians, and 200 Franks. The Turks have 19 mosques, the Greeks 2 churches, the Jews 8 synagogues, the Armenians 1 church, and the Latins 3 convents. There are three bishops; one Greek, another Latin, and the third Armenian. The streets are more open, better paved, and the houses better built, than in other towns of the continent. The street of the Franks is the finest in Smyrna, and lies all along the harbour. It is 8 days journey from Constantinople by land, 25 days from Aleppo by the caravans, 6 from Cognac, 7 from Cataya, and 6 from Satalia. The caravans of Persia often bring 2000 bales of silk in a year, besides drugs and cloths. The other commodities brought here, are thread made of goats hair, cotton yarn, cotton in bags, nut galls, wax, scammony, rhubarb, opium, aloes, tully, galbanum, gum-arabic, gum-tragacanth, gum-ammoniac, frankincense, zedoary, and all sorts of carpets. All the trade passes through the hands of the Jews, and they seem to have better capacities for trade than other merchants. The English and Dutch factories have Protestant chapels, and taverns are as open here as in Europe. The fortifications consist in a fort, a castle, a mountain, and an old citadel. In the year 1778, it was almost totally destroyed by an earthquake and fire.

SNAPPLE, in the manege, is a very slender bit-mouth without any branches, much used in England; the true bridle being reserved for war.

SNAIL, in zoology. See *HELIX* and *LIMAX*.

SNAKE, in zoology. See *ANGUIS*.

Method of Preserving SNAKES. When the snake is killed, it must first be washed clean, and freed from all filth and nastiness; then it is to be put into a glass of a proper size, the tail first, and afterwards the rest of the body, winding it in spiral ascending circles, and disposing the back, which is always the most beautiful, outwardly. A thread, connected to a small glass bead, is, by the help of a needle, to be passed thro' the upper jaw from within outwardly, and then thro' the cork of the bottle, where it must be fastened; by this means the head will be drawn into a natural posture, and the mouth kept open by the bead, whereby the teeth, &c. will be discovered: the glass is then to be filled with rum, and the cork sealed down to prevent its exhalation. A label, containing the name and properties of the snake, is then to be affixed to the wax over the cork; and in this manner the snake will make a beautiful appearance, and may be thus preserved a great number of years; nor will the spirits impair or change the lustre of its colours.

SNAKE-Root, in botany. See *POLYGALA*.

SNAKE-Weed, in botany. See *POLYGONUM*.

SNAPEDRAGON, in botany. See *ANTIRRHINUM*.

SNEEZING, a convulsive motion of the muscles of the breast, whereby the air is expelled from the nose with much vehemence and noise. It is caused by the irritation of the upper membrane of the nose, occasioned by acrid substances floating in the air, or by medicines called *sternutatory*. See *MEDICINE*, n° 220.

SNIGGLING, a method of fishing for eels, chiefly used in the day-time, when they are found to abound themselves near weirs, mills, or flood-gates. It is performed thus: Take a strong line and hook, baited with a garden-worm, and observing the holes

Smyrna
Sniggling.

Snipe
||
Snow.

Snow.

where the eels lie hid, thrust your bait into them by help of a stick; and if there be any, you shall be sure to have a bite; and may, if your tackling hold, get the largest of eels.

SNUIPE, in ornithology. See SCOLOPAX and SHOOTING.

These birds are easily taken, by means of lime-twigs, in this manner. Take 50 or 60 birchen-twigs, and lime them all very well together; take these out into places where there are snipes, and having found the places which they most frequent, which may be seen by their dung, set the twigs in these places, at about a yard distance one from another. Other places, are those where the water lies open in hard frosty and snowy weather: in these places also, and where-ever they are suspected to come to feed, let more lime-twigs be placed in the same manner. The twigs are not to be placed perpendicularly in the ground, but sloping, some one way, some another; the sportsman is then to retire to a distance, and watch the coming of the birds to these places. When they fly to them, they naturally take a sweep round the earth, and by this means they will almost always be caught by one or other of the twigs. When a first snipe is taken, the sportsman is not to run to take it up, for it will feed with the twig under its wings, and this will be a means of bringing down more of them to the place. When three or four are taken, they may be taken up, only leaving one fast to entice others: and thus the sport may be continued, as long as there are any birds of this kind about the place. It may be very proper, when the twigs are planted, to go about, and beat all the open and watery places near, that they may be raised from thence, and fly to those places where the twigs are placed to receive them.

SNORING, in medicine, otherwise called *rhencor* or *stertor*, is a sound like that of the cerchnon, but greater and more manifest. A *stertor* is that sound which is supposed to be made betwixt the palate and nostrils, by persons asleep; *cerchnon*, or *cerchnon*, is that bubbling noise which is made in respiration, from the larynx, or the aspera arteria. These affections are owing to a weakness of nature.

SNOW, a well-known meteor, formed by the freezing of the vapours in the atmosphere. It differs from hail and hoar-frost in being as it were crystallized, which they are not. This appears on examination of a flake of snow by a magnifying glass; when the whole of it will appear to be composed of fine shining spicula diverging like rays from a centre. As the flakes fall down through the atmosphere, they are continually joined by more of these radiated spicula, and thus increase in bulk like the drops of rain or hailstones. Dr Grew, in a discourse of the nature of snow, observes, that many parts thereof are of a regular figure, for the most part so many little sowels or stars of six points, and are as perfect and transparent ice as any we see on a pond, &c. Upon each of these points are other collateral points, set at the same angles as the main points themselves: among which there are divers other irregular, which are chiefly broken points, and fragments of the regular ones. Others also, by various winds, seem to have been thawed, and froze again into irregular clusters; so that it seems as if the whole body of snow were an infinite

mass of icicles irregularly figured. That is, a cloud of vapours being gathered into drops, the said drops forthwith descend; upon which descent, meeting with a freezing air as they pass through a colder region, each drop is immediately frozen into an icicle, shooting itself forth into several points; but these still continuing their descent, and meeting with some intermitting gales of warmer air, or in their continual wastage to and fro touching upon each other, some of them are a little thawed, blunted, and again froze into clusters, or intangled so as to fall down in what we call *flakes*.

The lightness of snow, although it is firm ice, is owing to the excess of its surface, in comparison to the matter contained under it; as gold itself may be extended in surface, till it will ride upon the least breath of air.

According to Signior Beccaria, clouds of snow differ in nothing from clouds of rain, but in the circumstance of cold that freezes them. Both the regular diffusion of the snow, and the regularity of the structure of its parts (particularly some figures of snow or hail which fall about Turin, and which he calls *rosette*) show that clouds of snow are acted upon by some uniform cause like electricity; and he endeavours to show how electricity is capable of forming these figures. He was confirmed in his conjectures by observing, that his apparatus for observing the electricity of the atmosphere never failed to be electrified by snow as well as rain. Professor Winthrop sometimes found his apparatus electrified by snow when driven about by the wind though it had not been affected by it when the snow itself was falling. A more intense electricity, according to Beccaria, unites the particles of hail more closely than the more moderate electricity does those of snow, in the same manner as we see that the drops of rain which fall from thunder-clouds are larger than those which fall from others, though the former descend through a less space.

In the northern countries, the ground is covered with snow for several months; which proves exceedingly favourable for vegetation, by preserving the plants from those intense frosts which are common in such countries, and which would certainly destroy them. Bartholin ascribes great virtues to snow-water, but experience does not seem to warrant his assertions. Snow or ice-water is always deprived of its fixed air; and those nations who live among the Alps, and use it for their constant drink, are subject to affections of the throat, which are thought to be occasioned by it.

From some late experiments on the quantity of water yielded by snow, it appears that the latter gives only about one-tenth of its bulk.

Snow, in sea-affairs, is generally the largest of all two-masted vessels employed by Europeans, and the most convenient for navigation.

The sails and rigging on the main-mast and fore-mast of a snow are exactly similar to those on the same masts in a ship; only that there is a small mast behind the main-mast of the former, which carries a sail nearly resembling the mizen of a ship. The foot of this mast is fixed on a block of wood on the quarter-deck abaft the main-mast; and the head of it is attached to the after-top of the main-top. The sail which is called the *try-sail* is extended from its mast towards the stern of the vessel.

When

When the floops of war are rigged as snows, they are furnished with a horle, which answers the purpose of the try-fail mast, the fore-part of the sail being attached by rings to the said horle, in different places of its height.

SNOWDON-HILL, the name of a mountain in Caernarvonshire in Wales, generally thought to be the highest in Britain; though some have been of opinion that its height is equalled, or even exceeded, by mountains in the Highlands of Scotland. The mountain is surrounded by many others, called in the Welsh language *Crib Coch*, *Crib y Dyffill*, *Lliwedd y'r Aran*, &c.

* Journey to Snowdon.

According to Mr Pennant *, this mountainous tract yields scarcely any corn. Its produce is cattle and sheep; which, during summer, keep very high in the mountains, followed by their owners with their families, who reside during that season in *havodys*, or "summer dach-houses," as the farmers in the Swiss Alps do in their *fermes*. These houses consist of a long low room, with a hole at one end to let out the smoke from the fire which is made beneath. Their furniture is very simple; stones are substituted for stools, and their beds are of hay, ranged along the sides. They manufacture their own cloaths, and dye them with the *lichen omphaloides* and *lichen parietinus*, mosses collected from the rocks. During summer the men pass their time in tending their herds, or in making hay, &c. and the women in milking, or making butter and cheese. For their own use they milk both ewes and goats, and make cheese of the milk. Their diet consists of milk, cheese, and butter; and their ordinary drink is whey, though they have, by way of reserve, a few bottles of very strong beer, which they use as a cordial when sick. They are people of good understanding, wary, and circumspect; tall, thin, and of strong constitutions. In the winter-time they descend into the *ben dref*, or "old dwelling," where they pass their time in inactivity.

The view from the highest peak of Snowdon is very extensive. From hence Mr Pennant saw the county of Chester, the high hills of Yorkshire, part of the north of England, Scotland, and Ireland; a plain view of the isle of Man; and that of Anglesea appeared like a map extended under his feet, with every rivulet visible. Our author took much pains to have this view to advantage; sat up at a farm on the west till about 12, and walked up the whole way. The night was remarkably fine and starry; towards morning the stars faded away, leaving an interval of darkness, which, however, was soon dispelled by the dawn of day. The body of the sun appeared most distinct, with the roundness of the moon, before it appeared too brilliant to be looked at. The sea, which bounded the western part of the prospect, appeared gilt with the sun-beams, first in slender streaks, and at length glowed with redness. The prospect was disclosed like the gradual drawing up of a curtain in a theatre; till at last the heat became sufficiently strong to raise mists from the various lakes, which in a slight degree obscured the prospect. The shadow of the mountain extended many miles, and showed its bicapitated form; the Wyddfa making one head, and Crib y Dyffill the other. At this time he counted between 20 and 30 lakes either in Caernarvon, or in Merionethshire. In making another visit, the sky was obscured very

soon after he got up. A vast mist involved the whole circuit of the mountain, and the prospect down was horrible. It gave an idea of numbers of abysses, concealed by a thick smoke furiously circulating around them. Very often a gulf of wind made an opening in the clouds, which gave a fine and distinct view of lake and valley. Sometimes they opened in one place, at others in many at once; exhibiting a most strange and perplexing sight of water, fields, rocks, and chasms. They then closed again, and every thing was involved in darkness; in a few minutes they would separate again, and repeat the above-mentioned scene with infinite variety. From this prospect our traveller descended with great reluctance; but before he had reached the place where his horses were left, he was overtaken by a thunder-storm. The rolling of the thunder-claps, being reiterated by the mountains, was inexplicably awful; and after he had mounted, he was in great danger of being swept away by the torrents which poured down in consequence of a very heavy rain.

It is very rare (Mr Pennant observes), that the traveller gets a proper day to ascend the hill: for it very often appears clear; but by the evident attraction of the clouds by this lofty mountain, it becomes suddenly and unexpectedly enveloped in mist, when the clouds have just before appeared very high and very remote. At times he observed them lower to half their height; and notwithstanding they have been dispersed to the right and left, yet they have met from both sides, and united to involve the summit in one great obscurity.

The height of Snowdon was measured, in 1682, by one Mr Calwell, with instruments made by Flamsteed: according to his mensuration, the height is 3720 feet; but more modern computations make it only 3568, reckoning from the quay at Caernarvon to the highest peak. The stone that composes this mountain is excessively hard. Large coarse crystals, and frequently cubic pyrites are found in the fissures. An immense quantity of water rushes down the sides of Snowdon and the neighbouring mountains, inasmuch that Mr Pennant supposes, if collected into one stream, they would exceed the waters of the Thames.

SNOW-Drop, in botany. See CHIONANTHUS.

SNUFF, a powder chiefly made of tobacco, the use of which is too well known to need any description here.

The many mischiefs attending the practice of taking this powder of tobacco at the nostrils, have been described by the writers in general on these subjects, since this pernicious custom has reigned in the world; but one of the most remarkable accidents occasioned by it, is related in the *Alta Eruditorum*.

The case is this. A fat person, greatly addicted to the taking Spanish snuff, after many years continued use of it, complained one day of a mighty uneasiness which it occasioned in the middle of his oesophagus, and soon after this he began to find his swallowing difficult. He applied for relief to a physician; and naming nothing of the pain which had preceded this difficulty of swallowing, it was treated as a complaint arising from some glutinous humour in the oesophagus. It is no wonder that the medicines in this intention had no effect. The patient grew worse; and, tired of this doctor, applied to another, who, supposing the complaint arose from some sharp humour vellicating the

parts, gave medicines in that intention, equally without success. After this a common quack tried the most violent medicines on him, but without success. Finally, he applied to the use of the *excusula ventriculi*, an instrument made to be thrust down the œsophagus into the stomach: but this he could never get down; and in the use of this instrument he first felt that there was absolutely a lump of flesh, which stopped its passage farther than the place where the seat of his complaint was. The distemper after this increased upon him, till he could only swallow liquids, and those at last by no other means but by sucking them thro' a quill, by which means he could get down milk, water-gruel, and the like, by a little at a time. At length consulting another physician, and telling him of the immoderate quantity of Spanish snuff he had been used to take, and that it often happened to him on taking the driest snuff of this kind, that it got into his œsophagus, and occasioned violent pain, coughing, and spitting of blood, he soon concluded that a polypus had formed itself in the œsophagus, wounded by this sharp powder; and that there was no relief, but that the death of the patient was quickly approaching. The man, from a very corpulent habit, was so extenuated, that he appeared a mere skeleton; he died some little time after of absolute hunger, the œsophagus being so entirely filled up by this unnatural swelling, that not the least drop of a liquid could get down.

After death the œsophagus was opened, and a fleshy excrescence, or polypus, was discovered, of the bigness of the cavity of the part; and, taking its origin about the middle, from the back-part of the œsophagus, it reached down to the pylorus. This was of a whitish colour, and much resembled a large worm; and its substance was fibrous, and very tender.

SNYDERS (Francis), a Flemish painter, born at Antwerp in 1579, and bred under his countryman Henry Van Balen. His genius first displayed itself in painting fruit: he afterwards attempted animals, hunting, fish, &c. in which he exceeded all his predecessors. He also painted kitchens, &c. and gave dignity to subjects that seemed incapable of it. He was made painter to Ferdinand and Isabella, archduke and duchess, and became attached to the house of the cardinal infant of Spain. The king of Spain and the elector Palatine adorned their palaces with huntings by this artist. Rubens, Jordaens, and Snyders, used to co-operate in the enriching of each other's pictures according to their several talents; and thus they became more valuable than if finished by either of them singly. Snyders died in 1657.

SOAL-FISH, in ichthyology. See PLEURONECTES.

SOAP, a composition of caustic, fixed alkaline salt, and oil, sometimes hard and dry, sometimes soft and liquid; much used in washing, whitening linens, and by dyers and fullers.—Soap may be made by several methods, which, however, all depend upon the same principle. The soap which is used in medicine is made without heat; see CHEMISTRY, n° 326.

In manufactures where large quantities of it are prepared, soap is made with heat. A lixivium of quicklime and soda is made, but is less concentrated than that above referred to, and only so much that it can sustain a fresh egg. A part of this lixivium is to be even di-

luted, and mixed with an equal weight of oil of olives. The mixture is to be put on a gentle fire, and agitated, that the union may be accelerated. When the mixture begins to unite well, the rest of the lixivium is to be added to it; and the whole is to be digested with a very gentle heat, till the soap be completely made. A trial is to be made of it, to examine whether the just proportion of oil and alkali has been observed. Good soap of this kind ought to be firm, and very white when cold; not subject to become moist by exposure to air, and entirely miscible with pure water, to which it communicates a milky appearance, but without any drops of oil floating on the surface. When the soap has not these qualities, the combination has not been well made, or the quantity of salt or of oil is too great, which faults must be corrected.

In soft or liquid soaps, green or black soaps, cheaper oils are employed, as oil of nuts, of hemp, of fish, &c. These soaps, excepting in consistence, are not essentially different from white soap.

Any fixed alkalis are much disposed to unite with oils that are not volatile, both vegetable and animal, since this union can be made even without heat. The compound resulting from this union partakes at the same time of the properties of oil and of alkali; but these properties are modified and tempered by each other, according to the general rule of combinations. Alkali formed into soap has not nearly the same acrimony as when it is pure; it is even deprived of almost all its causticity, and its other saline alkaline properties are almost entirely abolished. The same oil contained in soap is less combustible than when pure, from its union with the alkali, which is an unflammable body. It is miscible, or even soluble, in water, to a certain degree, by means of the alkali. Soap is entirely soluble in spirit of wine; and still better in aqua-vite sharpened by a little alkaline salt, according to an observation of Mr Geoffroy.

When oil unites with alkali in the formation of soap, it is little altered in the connection of its principles; for it may be separated from the alkali by decomposing soap with any acid, and may be obtained nearly in its original state.

Concerning the decomposition of soap by means of acids, we must observe, first, that all acids, even the weakest vegetable acids, may occasion this decomposition, because every one of them has a greater affinity than oil with fixed alkali. Secondly, these acids, even when united with any basis, excepting a fixed alkali, or the inflammable principle, are capable of occasioning the same decomposition; whence all ammoniacal salts, all salts with basis of earth, and all those with metallic bases, are capable of decomposing soap, in the same manner as disengaged acids are; with this difference, that the oil separated from the fixed alkali, by the acid of these salts, may unite more or less intimately with the substance which was the basis of the neutral salt employed for the decomposition.

Soap may also be decomposed by distillation, as Lemery has done. When first exposed to fire, it yields a phlegm called by him a *spirit*; which nevertheless is neither acid nor alkaline, but some water which enters into the composition of soap. It becomes more and more coloured and empyreumatic as the fire is increased, which shows that it contains the most subtle part

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of the oil. It seems even to raise along with it, by help of the oil and action of the fire, a small part of the alkali of the soap: for, as the same chemist observes, it occasions a precipitate in a solution of corrosive sublimate. After this phlegm, the oil rises altered, precisely as if it had been distilled from quicklime, that is, empyreumatic, soluble in spirit of wine, at first sufficiently subtle and afterwards thicker. An alkaline residuous coal remains in the retort, consisting chiefly of the mineral alkali contained in the soap, and which may be disengaged from the coal by calcination in an open fire, and obtained in its pure state.

Alkaline soaps are very useful in many arts and trades, and also in chemistry and medicine. Their principal utility consists in a deterfing quality that they receive from their alkali, which, although it is in some measure saturated with oil, is yet capable of acting upon oily matters, and of rendering them saponaceous and miscible with water. Hence soap is very useful to cleanse any substances from all fat matters with which they happen to be soiled. Soap is therefore daily used for the washing and whitening of linen, for the cleansing of woollen-cloths from oil, and for whitening silk and freeing it from the resinous varnish with which it is naturally covered. Pure alkaline lixiviums, being capable of dissolving oils more effectually than soap, might be employed for the same purposes; but when this activity is not mitigated by oil, as it is in soap, they are capable of altering, and even of destroying entirely by their causticity, most substances, especially animal-matters, as silk, wool, and others: whereas soap cleanses from oil almost as effectually as pure alkali, without danger of altering or destroying; which renders it very useful.

Soap furnishes medicine with a very efficacious and valuable remedy. Till lately, that Mrs Stephens's lithontriptic remedy has been published, physicians attended little to the medicinal qualities of soap. They soon found that soap, which is the principal ingredient of this famous remedy, is also the only one which has any real efficacy. And although this remedy has been found to be insufficient to dissolve most stones of the bladder, yet experience and observation have sufficiently evinced that it can prevent the enlargement, or even the formation, of stones in persons disposed to that disease; that it can, in a word, attenuate, divide, and expel, the stony particles generated in the urinary passages, and which are the first materials of the stone. And accordingly soap is frequently used successfully in these cases. When soap was once discovered to act sensibly on the glue or binding substance of that urinary sand, gravel, and even of some stones, it was naturally supposed to be capable of acting more powerfully on other thickened matters, which are too frequent causes of many obstinate diseases. These considerations have induced the best practitioners to prescribe soap as a resolving, aperitive, and deobstruent remedy; and we are certain that it has been employed as such with great success.

From the properties of soap we may know that it must be a very effectual and convenient anti-acid. It absorbs acids as powerfully as pure alkalis and absorbent earths, without having the causticity of the former, and without oppressing the stomach by its weight like the latter.

Lastly, we may perceive that soap must be one of the best of all antidotes to stop quickly, and with the least inconvenience, the bad effects of acid corrosive poisons, as aqua-fortis, corrosive sublimate, &c.

SOAP (*Starkey's*.) See CHEMISTRY, n° 327.

Acid Soap. This is formed by the addition of concentrated acids to the expressed oils. Thus the oil is rendered partially soluble in water; but the union is not sufficiently complete to answer any valuable purpose.

SOAP-EARTH. See STRATITES.

SOAPWORT. See SAPONARIA.

SOC. (Sax.) signifies power or liberty to minister justice or execute laws: also the circuit or territory wherein such power is exercised. Whence our law-Latin word *soca* is used for a feignory or lordship enfranchised by the king, with the liberty of holding or keeping a court of his *sockmen*: And this kind of liberty continues in divers parts of England to this day, and is known by the names of *ske* and *soke*.

SOCAGE, in its most general and extensive signification, seems to denote a tenure by any certain and determinate service. And in this sense it is by our ancient writers constantly put in opposition to chivalry, or knight-service, where the render was precarious and uncertain. The service must therefore be certain, in order to denominate it socage; as to hold by fealty and 20s. rent; or, by homage, fealty, and 20s. rent; or, by homage and fealty without rent; or, by fealty and certain corporal service, as ploughing the lord's land for three days; or by fealty only without any other service: for all these are tenures in socage.

Socage is of two sorts: free-socage, where the services are not only certain, but honourable; and villen-socage, where the services, though certain, are of a base nature. See VILLENAGE. Such as hold by the former tenure are called, in Glanvil and other subsequent authors, by the name of *liberi sokemanni*, or tenants in free-socage. The word is derived from the Saxon appellation *soc*, which signifies liberty or privilege; and, being joined to a usual termination, is called *socage*, in Latin *socagium*; signifying thereby a free or privileged tenure.

It seems probable that the socage-tenures were the relics of Saxon liberty; retained by such persons as had neither forfeited them to the king, nor been obliged to exchange their tenure for the more honourable, as it was called, but at the same time more burdensome, tenure of knight-service. This is peculiarly remarkable in the tenure which prevails in Kent, called *gavelkind*, which is generally acknowledged to be a species of socage-tenure; the preservation whereof inviolate from the innovations of the Norman conqueror is a fact universally known. And those who thus preserved their liberties were said to hold in free and common socage.

As therefore the grand criterion and distinguishing mark of this species of tenure are the having its renders or services ascertained, it will include under it all other methods of holding free lands by certain and invariable rents and duties; and in particular, *Petit Serjeanty*, Tenure in *BURGAGE*, and *GAVELKIND*. See these articles.

SOCIETY, in general, denotes a number of persons united together for their mutual assistance, security,

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Society. rity, interest, or entertainment.

The social principle in man is of such an expansive nature, that it cannot be confined within the circuit of a family, of friends, of a neighbourhood: it spreads into wider systems, and draws men into larger communities and commonwealths; since it is in these only that the more sublime powers of our nature attain the highest improvement and perfection of which they are capable.

Royal Society, an academy or college, established by charter by king Charles II. for promoting natural knowledge and useful arts by experiments.

It consists of several hundred fellows or members, mostly British; some persons of the highest rank, and many eminent gentlemen and learned men of other nations. Their meetings are held once a-week, at their house in Crane-court, Fleet-Street, London; where they discourse upon the productions and rarities of nature and art, and consider how the same may be improved for the good of mankind: here are also read letters and other philosophical papers sent by ingenious persons both at home and abroad; upon which they discourse in the plainest manner, without affecting studied speeches.

This society, of which his Britannic majesty is perpetual patron, is governed by a council of twenty-one members, ten of whom are yearly chosen out of the society, on St Andrew's day. The chief of the council bears the title of President, whose proper office is to call and dissolve the meetings; to propose the matter to be debated; call for experiments; and admit such members as shall be elected, which must be by a majority of at least twenty-one votes; whereupon he is admitted, after paying 40s. and subscribing that he will endeavour to promote the good of the Royal Society of London by the improvement of natural knowledge; and being thus admitted, he afterwards pays 23s. a-quarter, as long as he continues a member of the society.

Society-Islands, the name of certain islands discovered in the South Sea. They had this general name from Captain Cook in 1769. They are six in number, and lie very near to each other. The particular names which they bear among the natives are, *Ulietea* or *Raietea*, *Otaha*, *Balabola*, *Huahine*, *Tubai*, and *Maurua*. They are situated between the longitude of 15° 57', and 152° west; and from latitude 16° 10' to 16° 55' south, the nearest island being about 40 leagues to the westward of Otaheitee.

"Here," says Captain Cook, "benevolent nature has spread her luxuriant sweets with a lavish hand; and the natives, copying the bounty of nature, are equally liberal, contributing plentifully and cheerfully to the wants of navigators." And Mr Forster describes the inhabitants of these fruitful regions, as ready at all times to perform kind offices to their esteemed guests; they would carry them in and out of the boats on their backs, to prevent the surf from wetting their feet; they often loaded themselves with the curiosities which had been purchased, and rarely refused to go into the water for any bird which had been shot. If the rain caught any of the ship's company on their excursions into the country, or the heat of the sun and fatigue of the journey oppressed them, they were invited to repose in their dwellings, and seated on their best

provisions. Their friendly host stood at a distance, and never talked of any thing till they intreated him; all the while some one of the family was employed in fanning them with a leaf or the bough of a tree. Before they left the house, they were commonly adopted according to their different ages, in the quality of father, brother, or son: which circumstance took its rise from an opinion that all the gentlemen of the ship were related. The chiefs of all the Society-Islands are descended from the same family; the officers therefore, and all who dined or messed together, were by them considered as relations. Their hospitality was frequently quite disinterested, and led their visitors to form the most favourable conclusions concerning their conduct towards each other." In short, says Mr Forster, "they are hospitable without seeming to know it, and leave to strangers who visit them the pleasing and grateful talk of recording their virtues."

SOCINIANS, in church-history, a sect of Christian heretics, so called from their founder Faustus Socinus. See **SOCINUS**.—They maintain, "That Jesus Christ was a mere man, who had no existence before the Virgin Mary; that the Holy Ghost is no distinct person, but that the Father is truly and properly God. They own that the name of God is given in the holy scriptures to Jesus Christ; but contend, that it is only a deputed title, which, however, invests him with an absolute sovereignty over all created beings, and renders him an object of worship to men and angels. They deny the doctrines of satisfaction and imputed righteousness; and only say that Christ preached the truth to mankind, set before them in himself an example of heroic virtue, and sealed his doctrines with his blood. Original sin and absolute predestination they esteem scholastic chimeras. They likewise maintain the sleep of the soul, which they say becomes insensible at death, and is raised again with the body at the resurrection, when the good will be established in the possession of eternal felicity, while the wicked will be consigned to a fire that will not torment them eternally, but consume both their souls and bodies for a certain duration proportioned to their demerits."

SOCINUS (Lælius), the first author of the sect of the Socinians, was born at Sienna, in 1525. Being designed by his father for the law, he began very early to search for the foundation of that science in the Word of God; and, by that study, discovered that the Romish religion taught many things contrary to revelation; when, being desirous of penetrating farther into the true sense of the scriptures, he studied Greek, Hebrew, and even Arabic. In 1547, he left Italy, to go and converse with the Protestants; and spent four years in travelling into France, England, the Netherlands, Germany, and Poland, and at length settled at Zurich. He, by this means, became acquainted with the most learned men of his time, who testified, by their letters, the esteem they had for him: but as he discovered to them his doubts, he was greatly suspected of heresy. He, however, conducted himself with such address, that he lived among the capital enemies of his opinions, without receiving the least injury. He met with some disciples, who heard his instructions with respect; these were Italians who left their native country on account of religion, and wandered about in Germany and Poland. He commu-

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nicated likewise his sentiments to his relations by his writings, which he caused to be conveyed to them at Sienna. He died at Zurich in 1562. Those who were of the opposite sentiments to his, and were personally acquainted with him, confess that his outward behaviour was blameless. He wrote a Paraphrase on the first Chapter of St John; and other works are ascribed to him.

SOCINUS (Faustus), nephew of the preceding, and principal founder of the Socinian sect, was born at Sienna in 1539. The letters which his uncle Lælius wrote to his relations, and which infused into them many seeds of heresy, made an impression upon him; so that, knowing himself not innocent, he fled as well as the rest when the inquisition began to persecute that family. He was at Lyon's when he heard of his uncle's death, and departed immediately to take possession of his writings. He returned to Italy; and made himself so agreeable to the grand duke, that the charms which he found in that court, and the honourable posts he filled there, hindered him for twelve years from remembering that he had been considered as the person who was to put the last hand to the system of samofatenian divinity, of which his uncle Lælius had made a rough draught. At last he went into Germany in 1574, and paid no regard to the grand duke's advices to return. He staid three years at Basil, and studied divinity there; and having fallen into a set of principles very different from the system of Protestants, he resolved to maintain and propagate them; for which purpose he wrote a treatise *De Jesu Christo Servatore*. In 1579, Socinus retired into Poland, and desired to be admitted into the communion of the Unitarians; but as he differed from them in some points, and refused to be silent upon them, he met with a repulse. However, he did not cease to write in defence of their churches against those who attacked them. At length his book against James Paleologus furnished his enemies with a pretence to exasperate the king of Poland against him; but though the mere reading of it was sufficient to refute his accusers, Socinus thought proper to leave Cracow, after having resided there four years. He then lived under the protection of several Polish lords, and married a lady of a good family: but her death, which happened in 1587, so deeply afflicted him as to injure his health; and to complete his sorrow, he was deprived of his patrimony by the death of Francis de Medicis great duke of Florence. The consolation he found in seeing his sentiments at last approved by several ministers, was greatly interrupted in 1598; for he met with a thousand insults at Cracow, and was with great difficulty saved from the hands of the rabble. His house was plundered, and he lost his goods; but this loss was not so uneasy to him as that of some manuscripts, which he extremely regretted. To deliver himself from such dangers, he retired to a village about nine miles distant from Cracow, where he spent the remainder of his days at the house of Abraham Blonski, a Polish gentleman, and died there in 1604. All Faustus Socinus's works are contained in the two first volumes of the *Bibliotheca Fratrum Polonorum*.

SOCMANS, SOKEMANS, or Socmen, (Socmanni), are such tenants as hold their lands and tenements by fage-tenure. See SOCAGE.

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SOCOTORA, an island lying between Asia and Arabia Felix; about 150 miles in length, and 22 in breadth. It is particularly noted for its fine aloes, known by the name of *Socotrine aloes*. The religion of the natives is a mixture of Mahometanism and Paganism; but they are civil to strangers who call there in their passage to the East Indies. It abounds in fruit and cattle; and they have a king of their own, who is dependent on Arabia.

SOCRATES, the greatest of the ancient philosophers, "the very founder of philosophy itself," as the earl of Shaftesbury calls him, was born at Alopece, a small village of Attica, in the fourth year of the 77th olympiad, or about 467 years before Christ. His parents were very mean; Sophroniscus his father being a statuary or carver of images in stone, and Phœnareta his mother a midwife. However, he is observed to have been so far from being ashamed of his parents, that he often took occasion to mention them. Plutarch says, that as soon as he was born, Sophroniscus his father, consulting the oracle, was advised to suffer his son to do what he pleased, neither compelling him to what he disliked, nor diverting him from what he was inclined to; in short, to be nowise solicitous about him, since he had one guide of life within him, meaning his Genius, who was better than 500 masters. But Sophroniscus, regardless of the oracle's direction, put him to his own trade of carving statues; which, though contrary to the inclination of Socrates, yet afterwards stood him in good stead: for his father dying, and his money and effects being lost by being placed in bad hands, he was necessitated to continue his trade for ordinary subsistence. But being naturally averse to this profession, he only followed it when necessity compelled him; and upon getting a little before-hand, would for a while lay it entirely aside. These intermissions of his trade were bestowed upon philosophy, to which he was naturally addicted; and this being observed by Crito, a rich philosopher of Athens, Socrates was at length taken from his shop, and put into a condition of philosophising at his ease and leisure.

The first master of Socrates was Anaxagoras, and then Archelaus: by the last of whom he was much beloved, and travelled with him to Samos, to Pytho, and to the Isthmus. He was scholar likewise of Damon, whom Plato calls a *most pleasing teacher of music*, and of all other things that he himself would teach to young men. He heard also Prodicus the sophist; to which must be added Diotyma and Aspasia, women excellently learned. Diotyma was supposed to have been inspired with a spirit of prophecy; and Aspasia taught him rhetoric. Of Euenus he learned poetry; of Ichomachus, husbandry; of Theodorus, geometry.

At length he began himself to teach; and was so eloquent, that he could lead the mind to approve or disapprove whatever he pleased; but never used this talent for any other purpose than to conduct his fellow-citizens into the path of virtue. As to his school, and the particular method of his teaching, Plato mentions the academy Lycæum, and a pleasant meadow without the city on the side of the river Ilyssus, as places frequented by him and his auditors. Xenophon affirms, that he was continually abroad; that in the morning he visited the places of public walking and exercise; when it was full, the forum; and that the rest of the

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day he fought out the most populous meetings, where he disputed openly for every one to hear that would: and Plutarch relates, that he did not only teach when the benches were prepared, and himself in the chair, or in set hours of reading and discourse, or at appointments in walking with his friends; but even when he played, or eat, or drank, or was in the camp or market, or finally when he was in prison: thus making every place a school of virtue. His method of rousing the soul, and enabling her to recollect her own original ideas, was twofold; by irony, and induction. He is said to have exceeded all men living in irony. His way was, to lessen and detract from himself in disputation, and to attribute somewhat more to those he meant to confute; so that he always dissembled with much gravity his own opinions, till he had led others, by a series of questions, called *induction*, to the point he aimed at. He professed only to know this, "That he knew nothing;" and used modestly to say, that his skill resembled that of his mother, "he being nothing more than a kind of midwife, who assisted others in bringing forth what they had within themselves." However, he was, as Xenophon represents him, excellent in all kinds of learning. Xenophon instances only in arithmetic, geometry, and astrology: Plato mentions natural philosophy; Idomeneus, rhetoric; Laertius, medicine. Cicero affirms, that by the testimony of all the learned, and the judgment of all Greece, he was, as well in wisdom, acuteness, politeness, and subtlety, as in eloquence, variety, and richness, in whatever he applied himself to, without exception, the prince of all. As to his philosophy, it may be necessary to observe, that having searched into all kinds of science, he noted these inconveniences and imperfections: first, that it was wrong to neglect those things which concern human life, for the sake of inquiring into those things which do not; secondly, that the things men have usually made the objects of their inquiries, are above the reach of human understanding, and the source of all the disputes, errors, and superstitions, which have prevailed in the world; and thirdly, that such divine mysteries cannot be made subservient to the uses of human life. Thus esteeming speculative knowledge, so far only as it conduces to practice, he cut off in all the sciences what he conceived to be of least use. In short, remarking how little advantage speculation brought to mankind, he reduced her to action: and thus, says Cicero, "first called philosophy away from things involved by nature in impenetrable secrecy, which had yet employed all the philosophers till his time, and brought her to common life, to inquire after virtue and vice, good and evil." See *SOCRATIC Philosophy*.

That Socrates had an attendant spirit, genius, or dæmon, which diverted from dangers, is testified by Plato, Xenophon, and Antisthenes, who were his contemporaries, and confirmed by innumerable authors of antiquity; but what this attendant spirit, genius, or dæmon was, or what we are to understand by it, neither ancient nor modern writers have been able to determine. There is some disagreement concerning the name, and more concerning the nature of it: only it is agreed, that the advice it gave him was always dissuasive; "never impelling," says Cicero, "but often restraining him." It is commonly named his *dæmon*,

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by which title he himself owned it. Plato sometimes calls it his *guardian*, and Apuleius his *god*; because the name of *dæmon*, as St Austin tells us, at last grew odious. As for the sign or manner in which this dæmon or genius foretold, and by foretelling guarded him against evils to come, nothing certain can be collected about it. Plutarch conjectured, first, that it might be some apparition; but at last concludes, that it was his observation of some inarticulate unaccustomed sound or voice, conveyed to him by some extraordinary way, as we see in dreams. Others confine this foreknowledge of evils within the soul of Socrates himself; and when he said, that "his genius advised him," interpret him as if he had said, that "his mind foreboded and so inclined him." But this is said to be inconsistent with the description which Socrates himself gives of a voice and signs from without. Lastly, some conceive it to be one of those spirits that have a particular care of men; which Maximus Tyrius and Apuleius describe in such a manner, that they want only the name of a *good angel*: and this Lactantius has supplied, when having proved, that God sends angels to guard mankind, he adds, "and Socrates affirmed, that there was a dæmon constantly near him, which had kept him company from a child, and by whose beck and instruction he guided his life."

It is observed by many, that Socrates little affected travel; his life being wholly spent at home, excepting when he went out upon military services. In the Peloponnesian war, he was thrice personally engaged: first, at the siege of Potidæa; secondly, at Delium, a town in Boeotia, which the Athenians took; and thirdly, at Amphipolis, when it was taken by Brasidas the Lacedæmonian general. We are told in Plutarch's Symposium, and in the person of Alcibiades, that "he outwent all the soldiers in hardiness; and if at any time, (saith Alcibiades), as it often happens in war, the provisions failed, there were none who could bear the want of meat and drink like Socrates; yet, on the other hand, in times of feasting, he alone seemed to enjoy them: and though of himself he would not drink, yet being invited, he far out-drunk every body, and (which is most strange) was never seen drunk."—He forbore to accept any office in the commonwealth, except in his latter years that of senator: either, as *Ælian* saith, because he saw the Athenian government approaching to a tyranny; or, as himself professeth, because he was dissuaded by his dæmon from meddling in public affairs.

To this great philosopher Greece was principally obliged for her glory and splendour. He formed the manners of the most celebrated persons of Greece, as Alcibiades, Xenophon, Plato, &c. But his services and the great qualities of his mind could not secure him from envy, persecution, and calumny. The 30 tyrants forbade his instructing youth; and as he derided the plurality of the Pagan deities, he was charged with impiety. The day of trial being come, Socrates made his own defence, without procuring an advocate, as the custom was, to plead for him. He did not defend himself with the tone and language of a suppliant or guilty person, but, as if he were master of the judges themselves, with freedom, firmness, and some degree of contumacy. Many of his friends also spoke in his behalf; and lastly, Plato went up into the chair, and began

began a speech in these words: "Though I, Athenians, am the youngest of those that come up into this place"—but they stopped him, crying out, "of those that go down," which he was thereupon constrained to do; and then proceeding to vote, they cast Socrates by 281 voices. It was the custom of Athens, as Cicero informs us, when any one was cast, if the fault were not capital, to impose a pecuniary mulct; when the guilty person was asked the highest rate at which he estimated his offence. This was proposed to Socrates, who told the judges, that to pay a penalty was to own an offence; and that, instead of being condemned for what he stood accused, he deserved to be maintained at the public charge out of the Prytanæum. This was the greatest honour the Grecians could confer: and the answer so exasperated the judges, that they condemned him to death by 80 votes more.

The sentence being passed, he was sent to prison: which, says Seneca, he entered with the same resolution and firmness with which he had opposed the 30 tyrants; and took away all ignominy from the place, which could not be a prison while he was there. He lay here in fetters 30 days; and was constantly visited by Crito, Plato, and other friends, with whom he passed the time in dispute after his usual manner. He was often solicited by them to an escape; which he not only refused, but derided; asking, "If they knew any place out of Attica whither death would not come?" The manner of his death is thus related by Plato, who was an eye-witness of it. "Socrates, the day he was to die, had been discoursing to his friends upon the immortality of the soul; and "when he had made an end of speaking, Crito asked him, if he had any directions to give concerning his sons or other things in which they could serve him? I desire no more of you, faith Socrates, than what I have always told you: if you take care of yourselves, whatsoever you do will be acceptable to me and mine, though you promise nothing; if you neglect yourselves and virtue, you can do nothing acceptable to us, though you promise ever so much." That, answered Crito, we will observe; but how will you be buried? "As you think good," says he, "if you can catch me, and I do not give you the slip." Then with a smile applying himself to us, "I cannot persuade Crito," says he, "that I am that Socrates who was haranguing just now, or any thing more than the carcass you will presently behold; and therefore he is taking all this care of my interment. It seems that what I just now explained in a long discourse, has made no impression at all upon him; namely, that as soon as I shall have drank the poison, I shall not remain longer with you, but depart immediately to the seats of the blessed. These things, with which I have been endeavouring to comfort you and myself, have been said to no purpose. As therefore Crito was bound to the judges for my appearance, so you must now be bound to Crito for my departure; and when he sees my body burnt or buried, let him not say, that Socrates suffers any thing, or is in any way concerned: for know, dear Crito, such a mistake were a wrong to my soul. I tell you, that my body is only buried; and let that be done as you shall think fit, or as shall be most agreeable to the laws and customs of the country." This said, he arose and retired to an inner room, taking Crito with him, and leaving us, who like

orphans were to be deprived of so dear a father, to discourse upon our own misery. After his bathing, came his wife, and the other women of his family, with his sons, two of them children, one of them a youth; and when he had given proper directions about his domestic affairs, he dismissed them and came out to us. It was now near sun-set, for he had staid long within; when coming out he sat down, and did not speak much after. Then entered an officer, and approaching him said, Socrates, I am persuaded that I shall have no reason to blame you, for what I have been accustomed to blame in others; who have been angry at me and loaded me with curses, for only doing what the magistrate commands, when I have presented the poison to them. But I know you to be the most generous, the most mild, the best of all men that ever entered this place; and am certain, that if you entertain any repentment upon this occasion, it will not be at me, but at the real authors of your misfortune. You know the message I bring: farewell; and endeavour to bear with patience what must be borne. "And (said Socrates to the officer, who went out weeping) fare thee well: I will. How civil is this man! I have found him the same all the time of my imprisonment: he would often visit me, sometimes discourse with me, always used me kindly; and now see how generously he weeps for me. But come, Crito; let us do as he bids us: if the poison be ready, let it be brought in; if not, let somebody prepare it." The sun is yet among the mountains, and not set, says Crito: I myself have seen others drink it later, who have even eat and drank freely with their friends after the sign has been given; be not in haste, there is time enough. "Why, yes, (says Socrates): they who do so, think they gain something! but what shall I gain by drinking it late? Nothing, but to be laughed at for appearing too desirous of life; pray, let it be as I say." Then Crito sent one of the attendants, who immediately returned, and with him the man who was to administer the poison, bringing a cup in his hand; to whom Socrates said, "Prithee, my good friend, for thou art versed in these things, what must I do?" Nothing, said the man, but walk about as soon as you shall have drank, till you perceive your legs to fail; and then sit down. Then he presented the cup; which Socrates took without the least change of countenance, or any emotion whatever, and swallowed the draught with the greatest ease. Many of us, who till then had refrained from tears, when we saw him put the cup to his mouth and drink off the poison, were not able to refrain any longer, but gave vent to our grief; which Socrates observing, "Friends, (saith he), what mean you? I sent away the women for no other reason but that they might not disturb us with this; for I have heard, that we should die with gratulation and applause: be quiet then, and behave yourselves like men." These words made us with shame suppress our tears. When he had walked a while, and perceived his legs to fail, he lay down on his back, as the executioner directed; who in a little time looking upon his feet, and pinching them pretty hard, asked him if he perceived it? Socrates said, "No." Then he did the same by his legs; and showing us how every part successively grew cold and stiff, observed, that when that chillness reached his heart, he would die. After ly-

Socrates.

ing a while, he stretched himself forth ; when the executioner uncovering him found his eyes fixed, which were closed by Crato. This, says Plato, was the end of the best, the wisest, and the justest of men.' And this account of it by Plato, Tully professes, he could never read without tears.

He died, according to Plato, when he was more than 70 years of age. He was buried with many tears and much solemnity by his friends, among whom the excessive grief of Plato is observed by Plutarch : yet as soon as they had performed that last service, fearing the cruelty of the 30 tyrants, they stole out of the city ; the greater part to Megara, to Euclid, who received them kindly ; the rest to other places. Soon after, however, the Athenians were awakened to a sense of the injustice they had committed against Socrates ; and became so exasperated, that nothing would serve them but that the authors of it should be put to death ; as Melitus was, while Anytus was banished. In farther testimony of their penitence, they called home his friends to their former liberty of meeting ; they forbade public spectacles of games and wrestlings for a time ; they caused his statue, made in brass by Lyfippus, to be set up in the Pompeium ; and a plague ensuing, which they imputed to this unjust act, they made an order that no man should mention Socrates publicly and on the theatre, in order to forget the sooner what they had done.

As to his person, he was very homely ; was bald, had a dark complexion, a flat nose, eyes flicking out, and a severe downcast look. In short, his countenance promised so ill, that Zopyrus a physiognomist pronounced him incident to various passions, and given to many vices ; which when Alcibiades and others that were present laughed at, knowing him to be free from every thing of that kind, Socrates justified the skill of Zopyrus, by owning, that " he was by nature prone to those vices, but suppressed his inclination by reason." The defects of his person were amply compensated by the virtues and accomplishments of his mind. The oracle at Delphi declared him the wisest of all men, for professing only to know that he knew nothing : Apollo, as Tully says, conceiving the only wisdom of mankind to consist in not thinking themselves to know those things of which they are ignorant. He was a man of all virtues ; and so remarkably frugal, that how little forever he had, it was always enough. When he was amidst a great variety of rich and expensive objects, he would often say to himself, " How many things are there which I do not want !"

He had two wives, one of which was the noted Xantippe ; whom Aulus Gellius describes as an accursed froward woman, chiding and scolding always, by day and by night. Several instances are recorded of her impatience and his long-suffering. One day before some of his friends, he fell into the usual extravagances of her passion ; when he, without answering a word, went abroad with them ; but he was no sooner out of the door, than she, running up into the chamber, threw water down upon his head ; upon which, turning to his friends, " Did not I tell you (says he), that after so much thunder we should have rain ?" Another time she pulled his cloak from his shoulders in the open forum ; and some of his friends advising him to

beat her, " Yes, (says he), that while we two fight, you may all stand by, and cry, Well done Socrates ; to him, Xantippe !" He chose his wife, we are told, for the same reason that those who would excel in horsemanship choose the roughest and most spirited horses ; supposing if they are able to manage them, they may be able to manage any other. It is doubtful whether Socrates ever convinced any one beside himself by this reasoning ; or whether he owes any part of his reputation for wisdom, to this rule for choosing a wife !

They who affirm that Socrates wrote nothing, as Cicero, Plutarch, and others, mean only in respect to his philosophy ; for it is attested and allowed, that he assisted Euripides in composing tragedies, and was the author of some pieces of poetry. Dialogues also, and epistles, are ascribed to him. His philosophical disputations were committed to writing by his scholars ; by Plato and Xenophon chiefly. Xenophon set the example to the rest in doing it first, and also with the greatest punctuality ; as Plato did it with the most liberty, intermixing so much of his own, that it is not easy, if possible, to distinguish the master from the scholar. Hence Socrates, hearing him recite his *Lyfiss*, cried out, " How many things doth this young man feign of me !"

SOCRATES, was also the name of an ecclesiastical historian of the 5th century, born at Constantinople in the beginning of the reign of Theodosius : he professed the law, and pleaded at the bar, whence he obtained the name of *Scholaslicus*. He wrote an ecclesiastical history from the year 309, where Eusebius ended, down to 440 ; and wrote with great exactness and judgment. An edition of Eusebius and Socrates, in Greek and Latin, with notes by Reading, was published at London in 1720.

SOCRATIC PHILOSOPHY, the doctrines and opinions with regard to morality and religion, maintained and taught by SOCRATES. To him is ascribed the first introduction of moral philosophy, which is what is meant by that usual saying, " That Socrates first called philosophy down from heaven to earth ; that is, from the contemplation of the heavens and heavenly bodies, he led men to consider themselves, their own passions, opinions, faculties, duties, actions, &c."—Man, who was the sole subject of his philosophy, having a twofold relation to things divine and human, his doctrines were with regard to the former metaphysical, to the latter moral. The morality of Socrates we shall pass over, as resembling in its general branches what others taught in common with him ; yet more pure, more exact, more refined. His metaphysical opinions are thus collected out of Plato, Xenophon, Plutarch, and others. " There are three principles of all things, God, matter, and ideas. God is the universal intellect : matter the subject of generation and corruption : idea, an incorporeal substance, the intellect of God ; God the intellect of the world.—God is one, perfect in himself, giving the being and well-being of every creature ; what he is, I know not ; what he is not, I know.—That God, not chance, made the world and all creatures, is demonstrable from the reasonable disposition of their parts, as well for use as defence ; from their care to preserve themselves, and continue their species.—That he particularly regards

Socrates,
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gards man in his body, appears from the noble upright form thereof, and from the gift of speech; in his soul, from the excellency thereof above others.—That God takes care of all creatures, is demonstrable from the benefit he gives them of light, water, fire, and fruits of the earth in due season: that he hath a particular regard of man, from the destination of all plants and creatures for his service; from their subjection to man, though they exceeded him ever so much in strength; from the variety of man's sense, accommodated to the variety of objects, for necessity, use, and pleasure; from reason, whereby he discourseth through reminiscence from sensible objects; from speech, whereby he communicates all he knows, gives laws, and governs states; finally, that God, though invisible himself, is such and so great, that he at once sees all, hears all, is everywhere, and orders all." As to the other great object of metaphysical research, the soul, Socrates taught, that "it is pre-existent to the body, endued with the knowledge of eternal ideas, which in her union to the body she loseth, as stupefied, until awakened by discourse from sensible objects; on which account all her learning is only reminiscence, a recovery of her first knowledge: that the body being compounded is dissolved by death; but that the soul being simple passeth into another life, incapable of corruption: that the souls of men are divine: that the souls of the good after death are in a happy estate, united to God in a blessed inaccessible place; that the bad in convenient places suffer condign punishment: but that to define what those places are, is the attempt of a man who hath no understanding; whence, being once asked what things were in the other world? he answered, "Neither was I ever there, nor ever did I speak any that came from thence."

All the Grecian family of philosophers refer their origin to the discipline of Socrates; particularly the Platonics, Peripatetics, Academics, Cyrenaics, Stoics, &c. but the greatest part of his philosophy we have in the works of Plato.

SODA (*SALT of*), a name for the fossile alkali, or basis of sea-salt. In the eastern countries this alkali is found native, either in a pretty pure state, or mixed with earthy substances, from which it is easily separated by means of water; and Dr Heberden found it in considerable plenty on the peak of Teneriffe. It is also obtained from the ashes of the plant kali, and from those of the alga marina, which last form our kelp; but this is the most impure state in which it ever is obtained. The best sort of that artificially procured is made by burning the plant kali; and is prepared at Alicante in Spain, from an annual procumbent kali with short leaves like those of horseleek. These ashes are called *soude* or *sode* in France, where they are used as one of the common kinds of potash. They are brought to this country under the name of *Spanish ashes*, *bariglia* or *barilla*, in hard spongy masses, partly whitish or grey, and partly blackish. From these the saline part is extracted pure by powdering and dissolving in water. This, however, contains also a portion of vegetable alkali, and some sea-salt. A work has lately been erected in England for decomposing sea-salt and extracting the pure alkali from it, which is commonly sold in the shops under the name of *English pearl-ashes*; but it

is much less pure than that which comes from Alicante; being mixed with a large quantity of sea-salt. The process for decomposing the salt in this work is said to be mixing it with lime, and taking off the saline efflorescence which appears on the surface.

This mineral alkali will saturate fully as much acid as the vegetable, though its attraction for acids is not so great. It is certain, that if a quantity of vegetable alkali be added to a solution of Glauber's salt, or to sea-salt, they will be decomposed, and the mineral alkali will be obtained in its pure form: but whether this would also take place if the vegetable alkali were deprived of its fixed air, has not been ascertained; indeed it has been observed, that the two alkalis when rendered caustic are much less easily distinguished than when combined with fixed air. The mineral alkali easily then distinguishes itself by its superior mildness and readiness to crystallize. For the combinations of the salt of soda, see CHEMISTRY, n° 124, 185, 231, 270, 275, 296.

SODA is also a name for a heat in the stomach, or heart-burn. See MEDICINE, n° 406.

SODOM, formerly a town of Palestine in Asia, famous in scripture for the wickedness of its inhabitants, and their destruction by fire from heaven on account of that wickedness. The place where it stood is now covered by the waters of the Dead Sea, or the Lake Asphaltites.

SODOMY, the unnatural crime of buggery, thus called from the city of Sodom, which was destroyed by fire for the same. See BUGGERY.

The Levitical law adjudged those guilty of this execrable crime to death; and the civil law affixes the same punishment to it. The law of England makes it felony. There is no statute in Scotland against Sodomy; the libel of the crime is therefore founded on the divine law, and practice makes its punishment to be burned alive.

SODOR, a little village in Columbkil, one of the western isles of Scotland, near that of Mull. It was formerly a bishop's see, which comprehended all the islands, together with the isle of Man; for which reason the bishop is still called the *bishop of Sodor and Man*.

SOFA, in the Turkish customs, a bench of wood raised from the ground about a foot high, and placed round a hall or chamber for the people to sit down upon or to lie along, and in that posture to take a view of what passes in the streets, &c. for these benches are surrounded with windows; they are covered with fine Turkey carpets; and upon that are placed cushions of satin flowered with gold, or some other rich stuff.

SOFFITA, or **SOFFIT**, in architecture, any plafond or ceiling formed of cross beams of flying corniches, the square compartments or panels of which are enriched with sculpture, painting, or gilding; such are those in the palaces of Italy, and in the apartments of Luxembourg at Paris.

SOFI, or **SOPHI**. See **SOPHI**.

SOFTENING, in painting, the mixing and diluting of colours with the brush or pencil.

SOIL, in agriculture and gardening, denotes earth or ground considered with regard to the quality of its mould for the production and growth of vegetables. See EARTH.

Soda
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Seil.

Soissons
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Solanum.

SOISSONS, an ancient, large, and considerable town, in the isle of France, and capital of the Soissonnois, with a bishop's see. The cathedral has one of the most considerable chapters in the kingdom; and the bishop, when the archbishop of Rheims is absent, has a right to consecrate the king. It has 12 parishes, 6 abbeys, and a French academy, founded in 1694; is seated in a very pleasant and fertile valley, on the river Aisne, 30 miles west of Rheims, and 60 north-east of Paris. E. Long. 3. 24. N. Lat. 49. 23. The Soissonnois is bounded on the north by Laonnois; on the east by Champagne; on the south by La Brie; and on the west by Valois. It bounds in corn, wood, and pastures.

SOKE, or **SOC**. See **SOCAGE**.

SOKEMANS. See **Soc** and **SOCAGE**.

SOL, in music, the fifth note of the gammut, *ut, re, mi, fa, sol, la*. See **GAMMUT**.

SOL, or *Sou*, a French coin made up of copper mixed with a little silver. See the article **COIN**.

SOL, the *Sun*, in astronomy, astrology, &c. See **ASTRONOMY**, *passim*.

SOL, in chemistry, is gold; thus called from an opinion that this metal is in a particular manner under the influence of the sun.

SOL, in heraldry, denotes *Or*, the golden colour in the arms of sovereign princes.

SOLÆUS, or **SOLARIS**, in anatomy, one of the extensor muscles of the foot, rising from the upper and hinder part of the tibia and fibula.

SOLAND-GOOSE, in ornithology. See **PELICANUS**.

SOLANUM, **NIGHTSHADE**, comprehending the love-apple and potato; a genus of the monogynia order, belonging to the pentandria class of plants. There are 30 species; the most remarkable of which are, 1. The lycopericon, wolf's peach, love-apple, or tomentos, rises with strong herbaceous procumbent stalks branching out to the length of six or eight feet with large pinnated, rank-scented leaves, with four or five pairs of cut lobes, and simple racemous clusters of small yellow flowers at the axillæ, succeeded by large compressed roundish furrowed fruit, of a red colour and soft. The varieties are, the common large love-apple, with furrowed fruit; the cherry-fruited love-apple, having smooth round fruit of a red colour, the size of large cherries; yellow cherry-fruited; scentless-leaved; and burnt-leaved. It is a native of the hot parts of America. 2. The nigrum, or common black nightshade, rises with upright herbaceous stalks, branching two or three feet high; oval, angular, indented leaves; and, from the sides of the branches, roundish nodding umbels of white flowers succeeded by black and other coloured berries in the varieties. 3. The dulcamara, bitter sweet, or climbing woody night-shade, rises with long flexuous, inermous, woody stalks, climbing by support many feet high; oblong, pointed leaves, with the upper ones halber-shaped; and cymose clusters of small blue flowers, succeeded by bunches of small, oval, red berries. The varieties are, the white flowered; the variegated white striped leaved; gold striped leaved; the African thick leaved, formerly considered as a distinct species, but now found to be only a variety of this. 4. The tuberosum, tuberous-rooted, Peruvian nightshade, commonly called po-

tato. This hath a tuberous root, emitting numerous fibres, productive of many roundish and oblongish fleshy, edible tubers. Immediately from the root rise herbaceous, flexuose, smooth stalks, somewhat erectly, a yard long, garnished with large pinnated leaves, of several pair of entire lobes, and terminated by subdivided peduncles supporting bunches of small purple or white flowers in the different varieties, and succeeded by ripe seed in autumn. This species comprehends two principal varieties, viz. the red-rooted potato with white flowers, and the white-rooted potato with white flowers. Each of these comprehends several intermediate ones, such as the round red, oblong red, pale red, rough red, smooth red, red and white, early dwarf red, kidney-shaped white potato, round white, large oblong white, large red-ended white kidney shaped; large conglomerated American potato, being generally clustered together considerably, each root or tuber attaining a prodigious large size, and principally in estimation for feeding of cattle.

Culture. The first species, though a native of hot climates, will succeed here in the open air in summer, being previously raised in hot-beds, and thence transplanted. As it is a trailing plant, it should be well supported by walls, pales, or stakes, and should also have a sunny situation, or the fruit will not ripen. The common black nightshade grows wild in gardens, fields, and dunghills, in this country; and becoming a troublesome weed, is rarely cultivated. The dulcamara is also hardy, and will succeed any where; excepting the African thick-leaved kind, which requires to be potted, and treated as a green-house plant. It is propagated by layers and cuttings.—The method of cultivating and managing potatoes is mentioned under the articles **AGRICULTURE**, n° 127—129, and **POTATO**.

Uses. The leaves of the deadly nightshade have been supposed discutient and cooling when applied externally, and poisonous when taken inwardly. Of late it has been shown, that an infusion of half a grain, or a grain, of the dried leaves, may be taken with safety, and that afterwards the dose may by degrees be increased to five or six grains. They generally occasion some considerable evacuation, and sometimes, especially when taken in large doses, alarming disturbances in the nervous system; which, however, go off with the operation of the medicine. It was expected, that the great activity of this vegetable would make it very serviceable in many obdurate disorders; but this expectation has not been verified by experience, and the colleges both of London and Edinburgh have rejected these leaves from their materia medica. The twigs and roots of the dulcamara, or woody nightshade, have been recommended as deobstruents for resolving coagulated blood, &c. and are generally said to occasion some considerable evacuation by sweat, urine, or stool, particularly the latter. The fruit of the lycopericon is of great estimation in Spain and Portugal for improving soups, also for stewing, fauces, &c. The uses of the potato as an esculent plant are well known.

SOLAR, something belonging to the *SUN*.

SOLAR SPOTS. See **SPOTS**, and **ASTRONOMY**, n° 14—18. 33, 34, 35. 39.

SOLDER, **SODDER**, or *soder*, a metallic or mineral

Solanum
Soldier.

Soldering, **Solder.** **ral composition** used in soldering or joining together other metals. See the next article.

Solders are made of gold, silver, copper, tin, bismuth, and lead; usually observing, that in the composition there be some of the metal that is to be soldered mixed with some higher and finer metals. Goldsmiths usually make four kinds of folder, viz. folder of eight, where to seven parts of silver there is one of brass or copper; folder of six, where only a sixth part is copper; folder of four, and folder of three. It is the mixture of copper in the folder that makes raised plate come always cheaper than flat. The folder used by plumbers is made of two pounds of lead to one of block-tin. Its goodness is tried by melting it and pouring the bigness of a crown-piece upon a table; for if good, there will arise little bright shining stars therein. The folder for copper is made, like that of the plumbers, only with copper and tin; for very nice works, instead of tin they sometimes use a quantity of silver. Solder for tin is made of two thirds of tin and one of lead; but where the work is any thing delicate, as in organ-pipes, where the juncture is scarce discernable, it is made of one part of bismuth and three parts of pewter.

SOLDERING, among mechanics, the joining and fastening together two pieces of the same metal, or of two different metals, by the fusion and application of some metallic composition on the extremities of the metals to be joined. See the preceding article.

To folder upon silver, brass, or iron: Take silver, five pennyweight; brass, four pennyweight; melt them together for soft folder, which runs soonest. Take silver, five pennyweight; copper, three pennyweight; melt them together for hard folder. Beat the folder thin, and lay it on the place to be soldered, which must be first fitted and bound together with wire, as occasion requires; then take borax in powder, and temper it like pap, and lay it upon the folder, letting it dry; then cover it with quick coals, and blow, and it will run immediately; take it presently out of the fire, and it is done. It is to be observed, that if any thing is to be soldered in two places, which cannot well be done at one time, you must first folder with the harder folder, and then with the soft; for if it be first done with the soft, it will unfold again before the other is fastened. Let it be observed, that if you would not have your folder run about the piece that is to be soldered, you must rub such places over with chalk.—In the foldering either of gold, silver, copper, or either of the metals above-mentioned, there is generally used borax in powder, and sometimes rosin. As to iron, it is sufficient that it be heated red hot, and the two extremities thus hammered together, by which means they will become incorporated with each other. For the finer kinds of iron and steel instruments, however, gold proves an excellent folder. This metal will dissolve twice or thrice its weight of iron in a degree of heat very far less than that in which iron itself melts; hence, if a small plate of gold is wrapped round the parts to be joined, and afterwards melted by a blow-pipe, it strongly unites the pieces together without any injury to the instrument, however delicate.

SOLDIER, a military man lifted to serve a prince or state in consideration of a certain daily pay.

SOLDIER-Grub. See **CANCER.**

SOLE, in the manege, a nail or fort of horn under a horse's foot, which is much more tender than the other horn that encompasses the foot, and by reason of its hardness is properly called the *horn* or *hoof*.

SOLE, in ichthyology. See **PLEURONECTES.**

SOLEÆ, among the Romans, a kind of sandals or slippers which covered only the sole of the feet, and bound on with thongs of leather; instead of which the women and the effeminate ones of the other sex, tied them on with purple coloured ribbons, or such as were curiously adorned with gold and silver.

SOLECISM, in grammar, a false manner of speaking, contrary to the use of language and the rules of grammar, either in respect of declension, conjugation, or syntax.—The word is Greek, *σολοκισμός*, derived from the *Soli*, a people of Attica, who being transplanted to Cilicia, lost the purity of their ancient tongue, and became ridiculous to the Athenians for their improprieties therein.

Solecisms, on some occasions, are pardonable: *Impetratum est à ratione ut peccare juvenitatis causa liceret.* Vaugelas is frequently repeating that of Quintilian, *Aliud est Latine, aliud grammaticè loqui.*

SOLEMN, something performed with much pomp, ceremony, and expence. Thus we say, solemn feasts, solemn funerals, solemn games, &c.—In law, *solemn* signifies something authentic, or that is clothed in all its formalities.

SOLE, the **RAZOR-FISH**, a genus of insects belonging to the order of vermes testacea. The shell is oblong, bivalved, and opening at both sides; the cardo has a subulated reflected tooth, not inserted into the opposite valve. There are eleven species, distinguished by peculiarities in their shells. Three of them, viz. the siliqua, vagina, and ensis, are found on the British coasts, and lurk in the sand near the low-water mark in a perpendicular direction. When in want of food, they elevate one end a little above the surface, and protrude their bodies far out of the shell. On the approach of danger they dart deep into the sand, sometimes two feet at least. Their place is known by a small dimple on the surface. Sometimes they are dug out with a shovel; at other times they are taken by striking a barbed dart suddenly into them. When the sea is down, these fish usually run deep into the sand; and to bring them up, the common custom is to throw a little salt into the holes, on which the fish raises itself, and in a few minutes appears at the mouth of its hole. When half the shell is discovered, the fisherman has nothing more to do than to take hold of it with his fingers and draw it out: but he must be cautious not to lose the occasion, for the creature does not continue a moment in that state; and if by any means the fisherman has touched it, and let it slip away, it is gone for ever; for it will not be decoyed again out of its hole by salt; so that there is then no way of getting it but by digging under it, and throwing it up with the sand. The fish has two pipes, each composed of four or five rings or portions of a hollow cylinder, of unequal lengths, joined one to another; and the places where they join are marked by a number of fine streaks or rays. Now the reason why the salt makes these creatures come up out of their holes, is, that it gives them violent pain, and

Soldier
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Solen.

even corrodes these pipes. This is somewhat strange, as the creature is nourished by means of salt-water; but it is very evident, in that if a little salt be strewn upon these pipes in a fish taken out of its habitation, it will corrode the joinings of the rings, and often make one or more joints drop off: the creature, to avoid this mischief, arises out of its hole, and throws off the salt, and then retires back again. The use of these pipes to the animal, is the same with that of many other pipes of a like kind in other shell-fish; they all serve to take in water: they are only a continuation of the outer membrane of the fish, and serve indifferently for the taking in and throwing out the water, one receiving, and the other discharging it, and either answering equally well to their purpose.

When one of these fish is taken out of its hole, and laid upon the sand, if any thing touches it, it immediately gets in order for its progressive motion. It throws out a long cylindric part, of half the length of the shell, and of the shape of a clapper of a bell; this is suspended to the middle of the animal by a ligament, but in all other parts it is loose: this serves as a leg to the creature. As it lies upon the sand, it extends this about an inch from the end of the shell, and changes its cylindric figure to a flat one, which terminates in a point, flat and sharp at the edges; with this it opens its passage into the sand. When the opening is made, it extends this part still farther, and buries it deeper; and after this bends it back again in such a manner, that its point turns up towards the shell: thus it gives this part the figure of a hook, and by this hook it draws its whole body and shell down. In this attempt it brings the edges of the shells every where close together; and instead of lying flat upon the sand, it now by degrees gets into a vertical position, and then there remains nothing to do but to draw it deeper into the sand. To effect this, it now again extends its leg, which it easily passes into the sand in its flatted shape; and when it has thus pierced to its utmost length, the creature inflates, and extends it by degrees to the size of the shell, and to a round or cylindric figure; the consequence of which is, that there is now a hole made of the shape of the shell, and equal to its diameter, into which it can easily sink: to facilitate this, however, the creature swells out the extremity of the leg into a sort of button, which holding fast in its place, nothing more is necessary than to contract the rest of the leg, in order to pull down the shell after it. This operation is repeated as often as is necessary, and the creature, at every movement of this kind, getting down half the length of its shell, or thereabouts, is very soon plunged as deep as its occasions require.

When it has occasion to ascend out of its hole, the same leg serves for that purpose; nothing more being required, than the putting out the end of the leg, swelling it, and thus thrusting itself up to the length of that leg; then retracting it into the shell again, and thrusting out and inflating its end for a second movement of the same kind. These motions may be all perceived in the creature when out of the sand, particularly that by which it buries itself; for if held up in the fingers, it thrusts out the leg, and performs all the motions as if in the sand, making a fruitless attempt to save itself in its old way.

These fish were used as food by the ancients; and Athenæus, from Sophron, speaks of them as great delicacies, and particularly grateful to widows. They are often used as food at present, and are brought up to table fried in eggs.

SOLFAING, in music, the naming or pronouncing the several notes of a song by the syllables *ut, re, mi, fa, sol, &c.* in learning to sing it.

Of the seven notes in the French scale *ut, re, mi, fa, sol, la, si*, only four are used among us in singing, as *mi, fa, sol, la*: their office is principally, in singing, that by applying them to every note of the scale, it may not only be pronounced with more ease, but chiefly that by them the tones and semitones of the natural scale may be better marked out and distinguished. This design is obtained by the four syllables *fa, sol, la, mi*. Thus from *fa* to *sol* is a tone, also from *sol* to *la*, and from *la* to *mi*, without distinguishing the greater or less tone; but from *la* to *fa*, also from *mi* to *fa*, is only a semitone. If then these be applied in this order, *fa, sol, la, fa, sol, la, mi, fa, &c.* they express the natural series from C; and if that be repeated to a second or third octave, we see by them how to express all the different orders of tones and semi-tones in the diatonic scale; and still above *mi* will stand *fa, sol, la*, and below it the same inverted *la, sol, fa*, and one *mi* is always distant from another an octave; which cannot be said of any of the rest, because after *mi* ascending come always *fa, sol, la*, which are repeated invertedly descending.

To conceive the use of this, it is to be remembered, that the first thing in learning to sing, is to make one raise a scale of notes by tones and semi-tones to an octave, and descend again by the same; and then to raise and fall by greater intervals at a leap, as thirds and fourths, &c. and to do all this by beginning at notes of different pitch. Then those notes are represented by lines and spaces, to which these syllables are applied, and the learners taught to name each line and space thereby, which makes what we call *solfaing*; the use whereof is, that while they are learning to tune the degrees and intervals of sound, expressed by notes on a line or space, or learning a song to which no words are applied, they may not only do it the better by means of articulate sounds, but chiefly, that by knowing the degrees and intervals expressed by those syllables, they may more readily know the places of the semi-tones, and the true distance of the notes. See the article **SINGING**.

SOLFATERRA, a mountain of Italy in the kingdom of Naples, and Terra di Lavoro. This mountain appears evidently to have been a volcano in ancient times; and the soil is yet so hot, that the workmen employed there in making alum need nothing else, besides the heat of the ground, for evaporating their liquids †. Of this mountain we have the following account by Sir William Hamilton.—“Near Altruni (another mountain, formerly a volcano likewise) rises the Solfaterra, which not only retains its cone and crater, but much of its former heat. In the plain within the crater, smoke issues from many parts, as also from its sides: here, by means of stones and tiles heated over the crevices, through which the smoke passes, they collect in an awkward manner what they call *sale armoniaco*; and from the sand of the plain they extract sulphur

† See
Chemistry,
no 134.

Solfaterra,
Solicitor.

sulphur and alum. This spot, well attended to, might certainly produce a good revenue, whereas I doubt if they have hitherto ever cleared 200 l. a-year by it. The hollow sound produced by throwing a heavy stone on the plain of the crater of the Solfaterra, seems to indicate that it is supported by a sort of arched natural vault; and one is induced to think that there is a pool of water beneath this vault (which boils by the heat of a subterraneous fire still deeper), by the very moist stream that issues from the cracks in the plain of the Solfaterra, which, like that of boiling water, runs off a sword or knife, presented to it, in great drops. On the outside, and at the foot of the cone of the Solfaterra, towards the lake of Agnano, water rushes out of the rocks so hot, as to raise the quicksilver in Fahrenheit's thermometer to the degree of boiling water (A); a fact of which I was myself an eye-witness. This place, well worthy the observation of the curious, has been taken little notice of; it is called the *Pisciarrelli*. The common people of Naples have great faith in the efficacy of this water; and make much of it in all cutaneous disorders, as well as for another disorder that prevails here. It seems to be impregnated chiefly with sulphur and alum. When you approach your ear to the rocks of the Pisciarrelli, from whence this water issues, you hear a horrid boiling noise, which seems to proceed from the huge cauldron that may be supposed to be under the plain of the Solfaterra. On the other side of the Solfaterra, next the sea, there is a rock which has communicated with the sea, till part of it was cut away to make the road to Puzzole; this was undoubtedly a considerable lava, that ran from the Solfaterra when it was an active volcano. Under this rock of lava, which is more than 70 feet high, there is a stratum of pumice and ashes. This ancient lava is about a quarter of a mile broad; you meet with it abruptly before you come in sight of Puzzole, and it finishes as abruptly within about 100 paces of the town. The ancient name of the Solfaterra was *Forum Vulcani*; a strong proof of its origin from subterraneous fire. The degree of heat that the Solfaterra has preserved for so many ages, seems to have calcined the stones upon its cone and in its crater, as they are very white, and crumble easily in the hottest parts.

SOLICITOR, a person employed to take care of and manage suits depending in the courts of law or equity; and those of the lower sort, it is observed, are too often made use of, to the damage of the people, and the increase of champerty and maintenance. Solicitors are within the statute to be sworn, and admitted by the judges, before they are allowed to practise in our courts, in like manner as attorneys.

There is also a great officer of the law, next to the attorney-general, who is styled the king's solicitor-general; who holds his office by patent during the king's pleasure, has the care and concern of managing the king's affairs, and has fees for pleading, besides other fees arising by patents, &c. He hath his attendance on the privy-council; and the attorney-general and he were anciently reckoned among the officers of the exchequer; they have their audience, and come within the bar in all other courts.

SOLID, in philosophy, a body whose parts are so firmly connected together, as not to give way or slip from each other upon the smallest impression; in which sense *solid* stands opposed to *fluid*.

Geometricians define a solid to be the third species of magnitude, or that which has three dimensions, viz. length, breadth, and thickness or depth.

Solids are commonly divided into regular and irregular. The regular solids are those terminated by regular and equal planes, and are only five in number, viz. the tetrahedron, which consists of four equal triangles; the cube, or hexahedron, of six equal squares; the octahedron, of eight equal triangles; the dodecahedron, of twelve; and the icosahedron, of twenty equal triangles.

The irregular solids are almost infinite, comprehending all such as do not come under the definition of regular solids; as the sphere, cylinder, cone, parallelogram, prism, paralleloiped, &c.

SOLIDS, in anatomy, &c. denote the continent parts of the human body; being a congeries of pipes, or vessels, which contain a liquor.

The solid parts of the body, though equally composed of vessels, are different with regard to their consistence; some being hard, and others soft. The hard, as the bones and cartilages, give firmness and attitude to the body, and sustain the other parts: the soft parts, either alone or together with the hard, serve to execute the animal functions. See **ANATOMY**.

SOLIDITY, that property of matter, or body, by which it excludes all other bodies from the place which itself possesses; and as it would be absurd to suppose that two bodies could possess one and the same place at the same time, it follows, that the softest bodies are equally solid with the hardest.

Among geometricians, the solidity of a body denotes the quantity or space contained in it, and is called also its solid content.

SOLILOQUY, a reasoning or discourse which a man holds with himself; or, more properly, according to Papias, it is a discourse by way of answer to a question that a man propothes to himself.

Soliloquies are become very common things on the modern stage; yet can nothing be more artificial, or more unnatural, than an actor's making long speeches to himself, to convey his intentions to the audience. Where such discoveries are necessary to be made, the poet should rather take care to give the dramatic persons such confidants as may necessarily share their inmost thoughts; by which means they will be more naturally conveyed to the audience: yet is even this a shift an accurate poet would not be found to have occasion for. The use and abuse of soliloquies is well delivered by the duke of Buckingham in the following lines:

Soliloquies had need be very few.

Extremely short, and spoke in passion too.

Our lovers talking to themselves, for want

Of others, make the pit their confidant:

Not is the matter mended yet, if thus

They trust a friend, only to tell it us.

SOLIS (Antonio de), an ingenious Spanish writer, of an ancient and illustrious family, born at Placenza in

(A) I have remarked, that after a great fall of rain, the degree of heat in this water is much less; which will account for what the Padre Torre says, (in his book, intitled, *Histoire et Phenomenes du Vesuve*), that when he tried it in company with Monsieur de la Condamine, the degree of heat, upon Reaumur's thermometer, was 68°.

Solid
Solis.

Solitary
Solstice.

in Old Castle, in 1610. He was intended to study the law; but his inclination toward poetry prevailed, and he cultivated it with great success. Philip IV. of Spain made him one of his secretaries; and after his death the queen-regent appointed him first historiographer of the Indies, a place of great profit and honour: his History of the Conquest of Mexico shows that she could not have named a fitter person. He is better known by this history abroad, than by his poetry and dramatic writings, though he was excellent in that way. He turned priest at 57 years of age, and died in 1686.

SOLITARY, something retired, or in private, remote from the company or commerce of others of the same species.

SOLITARIES, a denomination of nuns of St Peter of Alcantara, instituted in 1676, the design of which is to imitate the severe penitient life of that saint. Thus they are to keep a continual silence, never to open their mouths to any body but themselves; employ their time wholly in spiritual exercises, and leave the temporal concerns to a number of maids, who have a particular superior in a separate part of the monastery: they always go bare-footed, without sandals; gird themselves with a thick cord, and wear no linen.

SOLO, in music, a term used in pieces consisting of several parts, to mark those that are to perform alone.

SOLOMON, the son of David king of Israel, renowned in scripture for his wisdom, riches, and magnificent temple and other buildings. Towards the end of his life he sullied all his former glory by his apostasy from God; from which cause vengeance was denounced against his house and nation. He died about 975 B. C.

SOLOMON'S Seal, in botany; a species of *CONVOLVULARIA*.

SOLON, one of the seven wise men of Greece, was born at Athens about 369 B. C. His courage having procured him the government of his country, he abrogated Draco's laws, and published others more equitable. Pisistratus having made himself master of Athens, Solon retired into Lydia, where, Cræsus having asked him on a time if he did not think him happy? he answered, that none could be accounted so before their last breath; which Cræsus afterwards found fully verified. Solon died at the age of 80.

SOLSTICE, in astronomy, that time when the sun is in one of the solstitial points; that is, when he is at his greatest distance from the equator; thus called because he then appears to stand still, and not to change his distance from the equator for some time; an appearance owing to the obliquity of our sphere, and which those living under the equator are strangers to.

The solstices are two in each year; the æstival or summer solstice, and the hyemal or winter solstice. The summer solstice is when the sun seems to describe the tropic of cancer, which is on June 22. when he makes the longest day: the winter solstice is when the sun enters the first degree, or seems to describe the tropic of capricorn, which is on December 22. when he makes the shortest day. This is to be understood as in our northern hemisphere; for in the southern, the

sun's entrance into capricorn makes the summer solstice, and that into cancer the winter solstice. The two points of the ecliptic, wherein the sun's greatest ascent above the equator, and his descent below it, are terminated, are called the *solstitial points*; and a circle, supposed to pass through the poles of the world and these points, is called the *solstitial colure*. The summer solstitial point is in the beginning of the first degree of cancer, and is called the *æstival* or *summer point*; and the winter solstitial point is in the beginning of the first degree of capricorn, and is called the *winter point*. These two points are diametrically opposite to each other.

SOLUTION, in chemistry, denotes an intimate mixture of solid bodies with fluids, so as seemingly to form one homogeneous liquid: the dissolving fluid is termed the *dissolvent* or *menstruum*.

The most celebrated chemists have asserted, that water is capable of dissolving a certain proportion of salt without having its bulk increased thereby in the least; but, from some late experiments, this is contradicted; and it is maintained, that all salts, in whatever proportion they may be added, do actually increase the bulk of the solution, though, when the salt is at first thrown in, the bulk is constantly diminished. From these experiments it is also affirmed, that when water is completely saturated with one kind of salt, it will not take up any more of another, without letting fall some of the former.

SOLVENT, the same with dissolvent. See the article *DISSOLVENT*.

SOLWAY MOSS. See *Moving Moss*.

SOMBREIRO, the name of an uninhabited island in the West Indies in the form of an hat, whence the name is derived. It is also the name of one of the Newbar islands in the East Indies.

SOMBREIRO, *Wonderful Plant of*, is a strange kind of sensitive plant growing in the East Indies, in sandy bays and in shallow water. It appears like a slender straight stick; but when you attempt to touch it, immediately withdraws itself into the sand. Mr Miller gives an account of it in his description of Sumatra *. * *Phil. Transf.* vol. 68. p. 178. He never could observe any tentacula; but, after many unsuccessful attempts, drew out a broken piece about a foot long. It was perfectly straight and uniform, and resembled a worm drawn over a knitting needle. When dry it is a coral.

SOMERS (John), lord high chancellor of England, was born at Worcester in 1652. He was educated at Oxford, and afterward entered himself of the Middle-Temple, where he studied the law with great vigour. In 1688 he was of council for the seven bishops at their trial, and argued with great learning and eloquence against the dispensing power. In the convention which met by the prince of Orange's summons, January 22. 1689, he represented Worcester; and was one of the managers for the house of commons, at a conference with the house of lords upon the word *abdicated*. Soon after the accession of king William and queen Mary to the throne, he was appointed solicitor-general, and received the honour of knighthood. In 1692 he was made attorney-general, and in 1693 advanced to the post of lord keeper of the great seal of England. In 1695 he pro-

Solution
Somers.

Somer-
shire.

proposed an expedient to prevent the practice of clipping the coin. In 1697 he was created lord Somers, baron of Evesham, and made lord high chancellor of England. In the beginning of 1700 he was removed from his post of lord chancellor, and the year after was impeached of high crimes and misdemeanours by the house of commons, of which he was acquitted upon trial by the house of lords. He then retired to a studious course of life, and was chosen president of the royal society. In 1706 he proposed a bill for the regulation of the law; and the same year was one of the principal managers for the union between England and Scotland. In 1708 he was made lord president of the council; from which post he was removed in 1710, upon the change of the ministry. In the latter end of queen's Anne's reign, his lordship grew very infirm in his health; which indisposition is supposed to be the reason that he held no other post than a seat at the council-table, after the accession of king George I. He died of an apoplectic fit in 1716. Mr Addison has drawn his character very beautifully in the Freeholder.

SOMERSETSHIRE, a county of England, taking its name from Somerton, once the capital. It is bounded on the west by Devonshire, on the south by Dorsetshire, on the north by Bristol Channel or the Severn Sea, on the north-east by a small part of Gloucestershire, and on the east by Wiltshire. It is one of the largest counties in England, extending in length from east to west about 60 miles; in breadth, where broadest, from south to north, about 50; and 150 in circumference. It is divided into 42 hundreds, in which are 3 cities, 30 market-towns, 1700 villages, 385 parishes, of which 132 are vicarages, containing more than 100,000 of acres, and about 280,000 souls. It sends 18 members to parliament, viz. two for Bristol, two for Bath, two for Wells, two for Taunton, two for Bridgewater, two for Ilchester, two for Milbourn-port, and two for Minehead.

The air of this county is very mild and wholesome, especially that of the hilly part. The soil in general is exceeding rich, so that single acres very commonly produce forty or fifty bushels of wheat, and there have been instances of some producing sixty of barley. As there is very fine pasture both for sheep and black cattle, it abounds in both, which are as large as those of Lincolnshire, and their flesh of a finer grain. In consequence of this abundance of black cattle, great quantities of cheese are made in it, of which that of Cheddar is thought equal to Parmesan. In the hilly parts are found coal, lead, copper, lapis calaminaris, and okre. Wood thrives in it as well as in any county of the kingdom. It abounds also in pease, beans, beer, cyder, fruit, wild fowl, and salmon; and its mineral waters are celebrated all over the world.

The riches of this county, both natural and acquired, exceed those of any other in the kingdom, Middlesex and Yorkshire excepted. The woollen manufacture in all its branches is carried on to a very great extent; and in some parts of the county great quantities of linen are made. If to these the produce of various other commodities in which it abounds is added, the amount of the whole must undoubtedly be very great. Its foreign trade must also be allowed to be very extensive, when it is considered that it has a large trade for sea-coal, and possesses, besides other ports,

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that of Bristol, a town of the greatest trade in England, next to London.

Besides lesser streams, it is well watered and supplied with fish by the rivers Severn, Avon, Parrel, Froome, Ax, Torre, and Tone. Its greatest hills are Mendips, Poulton, and Quantock, of which the first abounds in coal, lead, &c. The rivers Severn and Parrel breed very fine salmon. The chief town is Bristol.

SOMNAMBULI, a name for persons who walk in their sleep. See **NOCTAMBULI**.

SOMNER (William), an eminent English antiquary in the 17th century, was born in 1606. His first treatise was that on the Antiquities of Canterbury (his native city), dedicated to archbishop Laud. He then applied himself to the study of the Saxon language; and having made himself master of it, he perceived that the old glossary prefixed to Sir Roger Twissden's edition of the laws of king Henry I. printed in 1644, was faulty in many places; he therefore wrote notes and observations, large and learned, on that edition, with a very useful glossary. His Treatise of Gavelkind was finished about 1648, though not published till 1660. Our author was zealously attached to king Charles I. and in 1648 he published a poem on his sufferings and death. His skill in the Saxon tongue led him to inquire into most of the European languages ancient and modern. He assisted Dugdale and Dodsworth in compiling the *Monasticon Anglicanum*. His Saxon Dictionary was printed at Oxford in 1659. He died in 1669.

SON, an appellation given to a male child considered in the relation he bears to his parents. See **PARENT and Child**.

SONATA, in music, a piece or composition, intended to be performed by instruments only; in which sense it stands opposed to *cantata*, or a piece designed for the voice. See **CANTATA**.

There are sonatas from one to eight parts; but usually they are performed by a single violin, or with two violins and a thorough-bass for the harpsichord, and frequently a more figured bass for the bass-viol.

Sonatas, though extremely numerous, are reduced by the Italians to two kinds: 1. Those proper for church-music, which usually begin with a grave and solemn motion, and afterwards strike into a brisker and gayer manner; these are what they more peculiarly call *sonatas*. 2. Those for the chamber, being little pieces for dancing.

SONG, in poetry, a little composition, consisting of easy and natural verses, set to a tune in order to be sung. See **POETRY**, n° 54.

SONG, in music, is applied in general to a single piece of music, whether contrived for the voice or an instrument. See **AIR**.

SONNA, a book of Mahometan traditions, where in all the orthodox muslimen are required to believe.

SONNET, in poetry, a composition contained in 14 verses, viz. two stanzas or measures of four verses each, and two of three, the eight first verses being all in three rhimes.

SONNITES, among the Mahometans, an appellation given to the orthodox muslimen or true believers; in opposition to the several heretical sects, particularly the Shiites, or followers of Ali.

SOOJU, or **SOY**. See **DOLICHOS**.

41 B

SOOT,

Somnam-
buli

Soofju.

SOOT
||
Sorbon.

SOOT, a volatile matter arising from wood and other fuel along with the smoke; or rather, it is the smoke itself, fixed and gathered to the sides of the chimney. Though once volatile, however, soot cannot be again resolved into vapour; but, if distilled by a strong fire, yields a volatile alkali and empyreumatic oil, a considerable quantity of fixed matter remaining at the bottom of the distilling vessel. If burnt in an open fire, it flames with a thick smoke; from whence other soot is produced. It is used as a material for making sal ammoniac, and as a manure. See **CHEMISTRY**, n° 231; and **AGRICULTURE**, n° 21.

SOOT-Black. See **COLOUR Making**.

SOPHI, or **SOFI**, a title given to the emperor of Persia; importing as much as wise, sage, or philosopher. There is no prince in the world whose authority is more absolute than that of the sophi of Persia.

SOPHISM, in logic, &c. an argument which carries much of the appearance of truth, and yet leads into error.

SOPHIST, a person who uses sophisms with a view to deceive those he would persuade or convince.

SOPHISTICATION, the adulterating any thing with what is not good or genuine; a practice too common in the making up medicines for sale; as also among vintners, distillers, and others, who are accused of sophisticating their wines, spirits, oils, &c. by mixing with them cheaper and coarser materials; and in many cases the cheat is carried on so artfully as to deceive the best judges.

SOPHOCLES, the celebrated Greek tragic poet, was archon or chief magistrate of Athens; in which station he commanded the forces of the republic, and signalized himself by his valour on several occasions. Of 100 tragedies which he is supposed to have written, only seven have been preserved to our time: they are translated into Latin, with the Greek Scholia, by our countryman Johnson, and into English by Dr Franklin. Sophocles died about 406 B. C. aged 91.

SOPORIFIC, or **SOPORIFEROUS**, a medicine that has the faculty of procuring sleep. Such are opium, laudanum, &c. The word is formed from the Latin *sopor*, "sleep." The Greeks in lieu hereof use the word *hypnotic*.

SORBON, or **SORBONNE**, the house or college of the faculty of theology established in the university of Paris. It was founded in 1252 by St Louis, or rather by Robert de Sorbon his confessor and almoner, first canon of Cambray, and afterwards of the church of Paris; who gave his own name to it, which he himself took from the village of Sorbon or Serbon, near Sens, where he was born. The foundation was laid in 1250; queen Blanche, in the absence of her husband, furnishing him with a house which had formerly been the palace of Julian the apostate, whereof some remains are still seen. Afterwards the king gave him all the houses he had in the same place, in exchange for some others in another. The college has been since magnificently rebuilt by the cardinal de Richelieu. The design of its institution was for the use of poor students in divinity. There are lodgings in it for 36 doctors, who are said to be of the *society of the Sorbonne*; those admitted into it without being doctors, are said to be of the *hospitality of the Sorbonne*. Six regent doctors hold lectures every day for an hour

and half each; three in the morning, and three in the afternoon.

SORBON, is also used in the general for the whole faculty of theology at Paris; in regard the assemblies of the whole body are held in the house of the Sorbon; and that the bachelors of the other houses of the faculty, as the house of Navarre, &c. come here to hold their *forbannique*, or act for being admitted doctor in divinity.

SORBUS, the **SERVICE TREE**: a genus of the trigynia order, belonging to the icelandia class of plants. There are three species. 1. The aucuparia, mountain-ash, quicken-tree, quick beam, or roan-tree, rises with a straight upright stem and regular branching head, twenty or thirty feet high or more, covered with a smooth greyish brown bark; pinnated leaves of eight or ten pair of long, narrow, serrated folioles, and an odd one, smooth on both sides; and large umbellate clusters of white flowers at the sides and ends of the branches, succeeded by clusters of fine red berries, ripe in autumn and winter. There is a variety yellow striped leaved. This species grows wild in many parts of this island, on mountainous places, woods, and hedge rows, often arriving to the growth of timber; and is admitted in most ornamental plantations, for the beauty of its growth, foliage, flowers, and fruit; the latter, in particular, being produced in numerous red large bunches all over the tree, exhibit a fine appearance in autumn and winter, till devoured by the birds, especially the blackbird and thrush, which are so allured by these fruit as to flock from all parts and feed on them voraciously. 2. The domestica, or cultivated service-tree, with eatable fruit, grows with an upright stem, branching thirty or forty feet high or more, having a brownish bark, and the young shoots in summer covered with a mealy down; pinnated leaves of eight or ten pair of broadish deeply serrated lobes and an odd one, downy underneath, and large umbellate clusters of white flowers at the sides and ends of the branches, succeeded by bunches of large, fleshy, edible red fruit, of various shapes and sizes in the varieties. This tree is a native of the southern warm parts of Europe, where its fruit is in high esteem to serve up in desserts, and is cultivated here in many of our gardens, both as a fruit-tree and to diversify hardy plantations. 3. The hebrida, or mongrel service-tree of Gothland, grows twenty or thirty feet high, it has half pinnated leaves, very downy underneath; and clusters of white flowers, succeeded by bunches of round reddish berries in autumn.

As to the merit of these trees in gardening, they all demand culture in every eminent shrubbery and other hardy plantations; being introduced as standards, they will effect a fine variety in assemblage, with their elegant pinnated leaves and clusters of flowers and fruit: the wild service particularly should be plentifully interpersed in all extensive shrubberies, for the singularity of their numerous clusters of berries in autumn and winter, which also prove food to encourage plenty of singing birds in the plantations. But the sorbus aucuparia may also be introduced as a forest-tree in timber plantations; and being mostly all heart, is valued for many purposes.

They are all easily propagated, by seed, in the open ground; also by layers, though the seedlings generally make the handsomest plants.

SOR.

Sorbus.

Sorex
||
Sorners.

SORCERY, (*fortilegium*), witchcraft, or divination by lots; a crime of which our ancient books are full, and of which we know not well what account to give. To deny the possibility, nay actual existence, of witchcraft and sorcery, is at once flatly to contradict the revealed word of God, in various passages both of the Old and New Testament; and the thing itself is a truth to which every nation in the world hath in its turn borne testimony, either by examples seemingly well attested, or by prohibitory laws, which at least suppose the possibility of a commerce with evil spirits. The civil law punishes with death not only the forerers themselves, but also those who consult them; imitating in the former the express law of God, "Thou shalt not suffer a witch to live." And our own laws, both before and since the conquest, have been equally penal; ranking this crime in the same class with heresy, and condemning both to the flames. The President Montequieu ranks them also both together, but with a very different view; laying it down as an important maxim, that we ought to be very circumspect in the prosecution of magic and heresy; because the most unexceptionable conduct, the purest morals, and the constant practice of every duty in life, are not a sufficient security against the suspicion of crimes like these. And indeed, the ridiculous stories that are generally told, and the many impostures and delusions that have been discovered in all ages, are enough to demolish all faith in such a dubious crime, if the contrary evidence were not also extremely strong. Wherefore it seems to be the most eligible way to conclude, with an ingenious writer of our own, That in general there has been such a thing as witchcraft, though one cannot give credit to any particular modern instance of it.

Our forefathers were stronger believers when they enacted, by stat. 33 Hen. VIII. c. 8. all witchcraft and sorcery to be felony without benefit of clergy; and again, by stat. 1 Jac. I. c. 12. that all persons invoking any evil spirit, or consulting, covenanting with, entertaining, employing, feeding, or rewarding any evil spirit; or taking up dead bodies from their graves to be used in any witchcraft, sorcery, charm, or incantment; or killing or otherwise hurting any person by such infernal arts; should be guilty of felony without benefit of clergy, and suffer death. And if any person should attempt by sorcery to discover hidden treasure, or to restore stolen goods, or to provoke unlawful love, or to hurt any man or beast, though the same were not effected, he or she should suffer imprisonment and pillory for the first offence, and death for the second. These acts continued in force till lately, to the terror of all ancient females in the kingdom; and many poor wretches were sacrificed thereby to the prejudice of their neighbours and their own illusions, not a few having by some means or other confessed the fact at the gallows. But all executions for this dubious crime are now at an end; our legislature having at length followed the wise example of Louis XIV. in France, who thought proper by an edict to restrain the tribunals of justice from receiving informations of witchcraft. And accordingly it is with us enacted, by statute 9 Geo. II. c. 5. that no prosecution shall for the future be carried on against any person for conjuration, witchcraft, sorcery, or incantment. But the misdemeanor of persons pretending to

use witchcraft, tell fortunes, or discover stolen goods, by skill in the occult sciences, is still deservedly punished with a year's imprisonment, and standing four times in the pillory.

SOREX, the *SHREW-MOUSE*; a genus of quadrupeds, belonging to the order of glires. The most remarkable species are, 1. The araneus, or field shrew-mouse, with short rounded ears; eyes small, and almost hid in the fur; nose long and slender, upper part the longest; head and upper part of the body of a brownish red; belly of a dirty white; length, from nose to tail, two inches and a half; tail one and a half. Inhabits Europe: lives in old walls, heaps of stones, or holes in the earth; is frequently near hayricks, dunghills, and necessary-houses; lives on corn, insects, and any filth; is often observed rooting in ordure, like a hog; from its food, or the places it frequents, has a disagreeable smell; cats will kill, but not eat it: it brings four or five young at a time. The ancients believed it was injurious to cattle; an error now detected. There seems to be an annual mortality of these animals in August, numbers being then found dead in the paths.

2. The fodiens, or water-shrew, has a long slender nose; very minute ears; very small eyes, hid in the fur; colour of the head and upper part of the body black; throat, breast, and belly, of a light ash-colour; beneath the tail, a triangular dusky spot; much larger than the last; length, from nose to tail, three inches three quarters; tail, two inches. Inhabits Europe: long since known in England, but lost till May 1768, when it was discovered in the fens near Revelley Abbey, Lincolnshire; burrows in the banks near the water; is called by the fen-men the *blind mouse*.

3. The minutus, or minute shrew, has a head near as big as the body; very slender nose; broad short naked ears; whiskers reaching to the eyes; eyes small, and capable of being drawn in; hair very fine and shining; grey above, white beneath; no tail; the least of quadrupeds, according to Linnæus. Inhabits Siberia; lives in a nest made of lichens, in some moist place beneath the roots of trees; feeds on seeds; it diges; runs swiftly; has the voice of a bat.

4. The tucan, or Mexican shrew, has a sharp nose; small round ears; without sight; two long fore-teeth above and below; thick, fat, and fleshy body; short legs, so that the belly almost touches the ground; long crooked claws; tawny hair; short tail; length, from nose to tail, nine inches. Inhabits Mexico; burrows, and makes such a number of cavities, that travellers can scarce tread with safety; if it gets out of its hole, does not know how to return, but begins to dig another; grows very fat, and is eatable; feeds on roots, kidney-beans, and other seeds. M. de Bufon thinks it a mole; but by the ears, it should be classed here.

SORITES, in logic, a species of reasoning in which a great number of propositions are so linked together, that the predicate of the one becomes continually the subject of the next following, till at last a conclusion is formed by bringing together the subject of the first proposition and the predicate of the last. See *Logic*, n° 96, 97.

SORNERS, in Scots law. See *LAW*, N° cxxxvi. 30.

SORREL, in botany. See **RUMEX**.

Wood-SORREL, in botany. See **OXALIS**.

SORREL-Colour, in the manege, is a reddish colour, generally thought to be a sign of a good horse.

SORTILEGE, (*fortilegium*,) a species of divination performed by means of *fortes* or lots.

The *fortes Præsentine*, famous in antiquity, consisted in putting a number of letters, or even whole words, into an urn; and then, after shaking them together, they were thrown on the ground; and whatever sentences could be made out from them, constituted the answer of the oracle. Another kind of *fortes* consisted in taking some celebrated poet, as Homer or Virgil, and opening the book, whatever presented itself first to the eye made the answer: and hence it got the name of *fortes Homericae*, *fortes Virgilianæ*, &c.

The superstitious among the ancient Christians practiced a similar kind of divination, by opening the Old and New Testament; whence it got the name of *fortes sanctorum*.

SOTERIA, in antiquity, sacrifices offered to the gods for delivering a person from danger; as also poetical pieces composed for the same purpose.

SOUBISE, a town of France, in the province of Guienne, and territory of Saintonge, with the title of a principality. It is seated on the river Charente, in W. Long. 1. o. N. Lat. 45. 54.

SOUGH, among miners, denotes a passage dug under ground, to convey off water from mines. See **MINE**.

SOVEREIGN, in matters of government, is applied to the supreme magistrate or magistrates of an independent government or state; by reason their authority is only bounded by the laws of God, of nature, and the fundamental laws of the state: such are kings, princes, &c.

SOVEREIGN Power, or **SOVEREIGNTY**, in the British polity, is the power of making laws; for wherever that power resides, all others must conform to it, and be directed by it, whatever appearance the outward form and administration of the government may put on. For it is at any time in the option of the legislature to alter that form and administration by a new edict or rule, and to put the execution of the laws into whatever hands it pleases: and all the other powers of the state must obey the legislative power in the execution of their several functions, or else the constitution is at an end. *Blackst. Com. Vol. I. p. 49*. In our constitution the law ascribes to the king the attribute of sovereignty: but that is to be understood in a qualified sense, i. e. as supreme magistrate, not as sole legislator; as the legislative power is vested in the king, lords, and commons, not in any of the three estates alone.

SOUL, a spiritual substance, which animates the bodies of living creatures; it is the principle of life and activity within them.

Various have been the opinions of philosophers concerning the substance of the human soul. The Cartesians make thinking the essence of the soul. Others again hold, that man is endowed with three kinds of souls, viz. the rational, which is purely spiritual, and infused by the immediate inspiration of God; the irrational, or sensitive, which is common to man and brutes; and lastly, the vegetative soul, or principle of growth and nutrition.

That the soul is an immaterial substance appears from hence, that its primary operations of willing and thinking have not only no connection with the known properties of body, but seem plainly inconsistent with some of its most essential qualities. For the mind discovers no relation between thinking and the motion and arrangement of parts.

As to the immortality of the human soul, the arguments to prove it may be reduced to the following heads: 1. The nature of the soul itself, its desires, sense of moral good and evil, gradual increase in knowledge and perfection, &c. 2. The moral attributes of God.

Under the former of these heads it is urged, that the soul, being an immaterial intelligent substance, does not depend on the body for its existence; and therefore may, nay, and must, exist after the dissolution of the body, unless annihilated by the same power which gave it a being at first. This argument, especially if the infinite capacity of the soul, its strong desire after immortality, its rational activity and advancement towards perfection, be likewise considered, will appear perfectly conclusive to men of a philosophical turn; because nature, or rather the God of nature, does nothing in vain.

But arguments drawn from the latter head, viz. the moral attributes of the Deity, are not only better adapted to convince men unacquainted with abstract reasoning, but equally certain and conclusive with the former: for as the justice of God can never suffer the wicked to escape unpunished, nor the good to remain always unrewarded; therefore, arguments drawn from the manifest and constant prosperity of the wicked, and the frequent unhappiness of good men in this life, must convince every thinking person, that there is a future state wherein all will be set right, and God's attributes of wisdom, justice, and goodness, fully vindicated. We shall only add, that had the virtuous and conscientious part of mankind no hopes of a future state, they would be of all men most miserable: but as this is absolutely inconsistent with the moral character of the Deity, the certainty of such a state is clear to a demonstration. See **MORAL Philosophy**, n° 228—238.

SOUL of Brutes. See **BRUTES**.

SOUND, a simple perception or idea, communicated to the soul by means of the ear, which is the primary organ of hearing. See **ACUSTICS**.

SOUND, in geography, denotes in general any strait or inlet of the sea between two head-lands. However, the name *sound* is given by way of eminence, to the strait between Sweden and Denmark, joining the German ocean to the Baltic, being about four miles over. See **DENMARK**, n° 24.

SOUNDING, the operation of trying the depth of the water, and the quality of the ground, by means of a plummet sunk from a ship to the bottom.

There are two plummets used for this purpose in navigation; one of which is called the *hand-lead*, weighing about eight or nine pounds; and the other the *deep sea-lead*, which weighs from 25 to 30 pounds; and both are shaped like the frustum of a cone or pyramid. The former is used in shallow waters, and the latter at a great distance from the shore; particularly

four,
south

on approaching the land after a sea-voyage. Accordingly the lines employed for this purpose are called the *deep-sea lead-line*, and the *hand lead-line*.

The hand-lead line, which is usually 20 fathoms in length, is marked at every two or three fathoms; so that the depth of the water may be ascertained either in the day or night. At the depth of two and three fathoms, there are marks of black leather; at 5 fathoms, there is a white rag; at seven, a red rag; at 10, black leather; at 13, black leather; at 15, a white rag; and at 17, a red ditto.

Sounding with the hand-lead, which is called *heaving the lead* by seamen, is generally performed by a man who stands in the main-chains to windward. Having the line all ready to run out without interruption, he holds it nearly at the distance of a fathom from the plummet; and having swung the latter backwards and forwards three or four times, in order to acquire the greater velocity, he swings it round his head, and thence as far forward as is necessary; so that, by the lead's sinking whilst the ship advances, the line may be almost perpendicular when it reaches the bottom. The person sounding then proclaims the depth of the water in a kind of song resembling the cries of hawkers in a city. Thus, if the mark of five fathoms is close to the surface of the water, he calls, 'By the mark five!' and as there is no mark at four, six, eight, &c. he estimates those numbers, and calls, 'By the dip four,' &c. If he judges it to be a quarter or an half more than any particular number, he calls, 'And a quarter five! and a half four,' &c. If he conceives the depth to be three quarters more than a particular number, he calls it a quarter less than the next: thus, at four fathom and three fourths, he calls, 'A quarter less five!' and so on.

The deep sea lead is marked with two knots at 20 fathom, three at 30, four at 40, and so on to the end. It is also marked with a single knot in the middle of each interval, as at 25, 35, 45 fathoms, &c. To use this lead more effectually at sea, or in deep water on the sea-coast, it is usual previously to bring to the ship, in order to retard her course: the lead is then thrown as far as possible from the ship on the line of her drift, so that, as it sinks, the ship drives more perpendicularly over it. The pilot, feeling the lead strike the bottom, readily discovers the depth of the water by the mark on the line nearest its surface. The bottom of the lead being also well rubbed over with tallow, retains the distinguishing marks of the bottom, as shells, ooze, gravel, &c. which naturally adhere to it.

The depth of the water, and the nature of the ground, which is called the *soundings*, are carefully marked in the log-book, as well to determine the distance of the place from the shore, as to correct the observations of former pilots.

SOUR CROUT; a preparation of cabbage, very useful at sea. See *Means of Preserving the Health of SEAMEN*.

SOUR-Gourd, or *African Calabash-tree*. See **ADANSONIA** and **BAOBAB**.

SOUTH (Dr Robert), an eminent divine, was the son of Mr William South a merchant of London, and was born at Hackney near that city in 1633. He studied at Westminster school, and afterwards in Christ-church college, Oxford. In 1654 he wrote a

copy of Latin verses to congratulate Cromwell upon the peace concluded with the Dutch; and the next year a Latin poem, intitled *Musica Incantans*. In 1660 he was elected public orator of the university; and the next year became domestic chaplain to Edward earl of Clarendon, lord high chancellor of England. In 1663 he was installed prebendary of Westminster, admitted to the degree of doctor of divinity, and had a sinecure bestowed on him in Wales by his patron the earl of Clarendon; after whose retirement into France in 1667 he became chaplain to the duke of York. In 1670 he was installed canon of Christ-church in Oxford; and in 1676 attended as chaplain to Laurence Hyde, Esq; ambassador extraordinary to the king of Poland. In 1678 he was presented to the rectory of Ilisp in Oxfordshire; and in 1680 rebuilt the chancel of that church, as he afterwards did the rectory-house belonging to it. After the revolution he took the oath of allegiance to king William and queen Mary, though he excused himself from accepting a great dignity in the church, vacated by the personal refusal of that oath. His health began to decline several years before his death, which happened in 1716. He was interred in Westminster Abbey, where a monument is erected to his memory. He published, 1. *Animadversion on Dr Sherlock's Vindication of the Holy and Ever Blessed Trinity*. 2. *A Defence of his Animadversions*. 3. *Sermons*, 8 vols. 8vo. And after his decease were published his *Opera Posthuma Latina*, and his posthumous English works. Dr South was remarkable for his wit, which abounds in all his writings, and particularly in his sermons; but at the same time they equally abound in ill-humour, spleen, and satire. He was remarkable for being a time-server. During the life of Cromwell he was a staunch Presbyterian, and then sided against the Independents: at the Restoration, he exerted his pulpit-eloquence against the Presbyterians; and in the reign of Queen Anne, was a warm advocate for Sacheverel.

SOUTH, one of the four cardinal points from which the winds blow. See **NAVIGATION** and **WIND**.

SOUTH-Sea, or *Pacific Ocean*, is that vast body of water interposed between Asia and America. It does not, however, strictly speaking, reach quite to the continent of Asia, excepting to the northward of the peninsula of Malacca; for the water interposed between the eastern coast of Africa and the peninsula just mentioned has the name of the *Indian Ocean*. The South-Sea, then, is bounded on one side by the western coast of America, through its whole extent, from the unknown regions in the north to the straits of Magellan and Terra del Fuego where it communicates with the southern part of the Atlantic. On the other side, it is bounded by the coast of Asia, from the northern promontory of Tichuski Nofs, to the peninsula of Malacca already mentioned. From thence it is bounded to the southward by the northern coasts of Borneo, Celebes, Macassar, New Guinea, New Holland, and the other islands in that quarter, which divide it from the Indian Ocean. Then, washing the eastern coast of the great island of New Holland, it communicates with that vast body of water encompassing the whole southern part of the globe, and which has the general name of the *Southern Ocean* all round. Thus does this

vast

South.

vaſt ocean occupy almoſt the ſemicircumference of the globe, extending almoſt from one pole to the other, and about the equatorial parts extending almoſt 180° in longitude, or 12,500 of our miles.

The northern parts of the Pacific Ocean are entirely deſtitute of land; not a ſingle iſland having yet been diſcovered in it from the latitude of 40° north and upwards, excepting ſuch as are very near the coaſts either of Aſia or America; but in the ſouthern part there are a great number, the ſituation and diſtances of which will appear from the annexed map. A geographical account of theſe iſlands, together with the manners and cuſtoms of the inhabitants, is given under the different articles as they occur in the alphabetical order; and the plate ſhows their figure and drefſes better than could be expreſſed by any verbal deſcription.

Till very lately the South-Sea was in a great meaſure unknown. From the great extent of ice which covers the ſouthern part of the globe, it was imagined that much more land exiſted there than in the northern regions: but that this could not be juſtly inferred merely from that circumſtance, is plain from what has been advanced under the article AMERICA, ° 3—24; and the ſouthern continent, long known by the name of TERRA AUSTRALIS, has eluded the ſearch of the moſt expert navigators ſent out from Britain and France by royal authority.

The firſt of theſe voyages was made by commodore now admiral Byron, in the Dolphin, a man of war of the ſixth rate, accompanied by the Tamar frigate, captain Mout. He ſailed from Plymouth the 21ſt of July 1764; and paſſing through the ſtraits of Magellan, diſcovered ſeveral iſlands in the ſouthern hemisphere. He then proceeded to the Ladrone iſlands; reſreſhed his crew at Tinian, which is one of them; proceeded to Batavia; and, returning to Europe by the Cape of Good Hope, caſt anchor in Plymouth Sound the 9th of M y 1766. In the Auguſt following, captain Wallis, in the Dolphin, ſailed on a ſecond circumnavigation of the globe, accompanied by captain Carteret in the Swallow ſloop. Having paſſed the ſtraits of Magellan, the two ſhips parted company. Captain Wallis directed his courſe more weſtwardly than any former navigator within the tropics; he diſcovered ſeveral iſlands, but particularly O-Taheitee, which he named *King George's Iſland*. Captain Carteret, beſides ſeveral iſlands, diſcovered the ſtraits which divide New Britain from what is now called *New Ireland*. Captain Wallis returned to England by the Eaſt Indies in May 1768, and captain Carteret by the ſame route in March 1769. In November 1766, commodore Bougainville ſailed from France with a frigate and a ſtore-ſhip: he entered the Pacific Ocean by the Straits of Magellan; touched at O-Taheitee, the northern part of Tiera del Eſperitu Santo; reſreſhed his crews in the very port which captain Carteret had not long left in New Ireland, touched at Batavia ſoon after the Swallow's departure from thence, ſell into company with that ſloop after leaving the Cape of Good Hope, and returned to France much about the ſame time. In 1766, the Royal Society preferred a memorial to his majeſty, repreſenting the advantages that would be derived to ſcience, if an accurate obſervation of the tranſit of Venus over the ſun, which was to happen in June 1769, was taken in ſome part

of the South-Sea; in conſequence of which, orders Southamp-
ton. were given for the Endeavour bark, of 370 tons, to be fitted out for that purpoſe, the command of which was given to lieutenant James Cook. This gentleman, and Mr Charles Green, were appointed by that learned body to make obſervations on the tranſit. Mr Banks, a gentleman of large fortune, and zealouſly devoted to the acquiſition of knowledge, accompanied by Dr Solander, a learned diſciple of the great Linnæus, embarked on this expedition; and captain Wallis returning juſt as they were about to ſail, the iſland of O-Taheitee, which he had diſcovered, was pointed out as the moſt eligible ſpot for the purpoſe of making the obſervation. Lieutenant Cook ſailed in July 1768, and went round Cape Horn. With indefatigable zeal he traſverſed the ſouthern regions of the great Pacific Ocean, and minutely examined the coaſt of New Zealand: With undaunted courage he perſevered amidſt rocks and ſhoals in tracing the eaſtern coaſt of New Holland; and having found it to be ſeparated from New Guinea by a ſtrait, he returned to England by the way of the Eaſt Indies, and came to an anchor in the Downs on the 12th of July 1771. Soon after the return of the Endeavour, a voyage to determine, with precision, the exiſtence of a ſouthern continent, was reſolved upon under the ſame royal auſpices which had given birth to the former expeditions. Two veſſels, the Reſolution and Adventure, were fitted out as king's ſhips for that purpoſe: captain Cook had the conduct of the expedition, and had the Reſolution for his ſhip; captain Furneaux, who had already ſailed round the world with captain Wallis as his firſt lieutenant, had the command of the Adventure. Dr Forſter, and his ſon Mr George Forſter, were appointed to embark in this expedition, to collect, deſcribe, and draw the objects of natural hiſtory which ſhould preſent themſelves; Mr Wales was appointed astronomer on board the Reſolution, and Mr William Bayley on board the Adventure; alſo Mr William Hodges, a very able artiſt, whoſe department it was to take drawings of perſons and proſpects that were curious and important. On the 13th of July 1772, the two ſhips ſailed on their voyage round the world, than which none was ever more productive of valuable information, or more beneficial to the advancement of ſcience. The Adventure having twice parted company from the Reſolution, returned to England in 1774; but the Reſolution did not arrive till the 3d July 1775. Neither ſhip touched at any of the Eaſt India ſettlements. In 1776 Captain Cook was once more ſent out to explore the Pacific Ocean; but was ordered to direct his chief attention to the northern part, eſpecially where the continents of Aſia and America approach each other. This taſk he executed with the ſame intrepidity and ſucceſs which have all along diſtinguiſhed him from other navigators: but his unfortunate death, and that of Capt. Clerk who ſucceeded him, have undoubtedly rendered that voyage much leſs uſeful to ſcience than otherwiſe it would have been; and no authentic account of the diſcoveries actually yet made has appeared.

SOUTHAMPTON, a ſea-port town of Hampſhire in England. It is commodiouſly ſeated on an arm of the ſea; is a place of good trade, and well inhabited. It is ſurrounded by walls and ſeveral watch-towers,

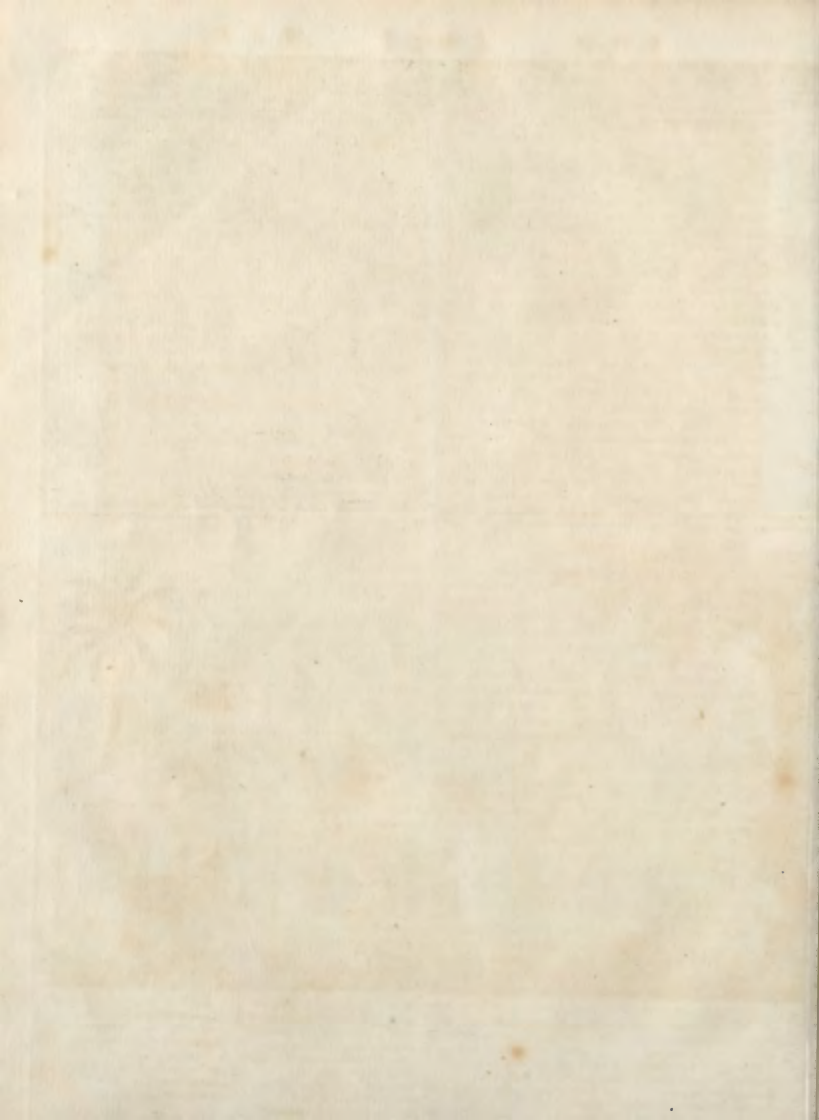
A MAP of the NEW DISCOVERIES in the SOUTH SEA, with the Tracks, of the NAVIGATORS.



FIGURES and DRESSES of the INHABITANTS of the SOUTH SEA ISLANDS.



- A.A.A. A Man, Woman, & Child of Easter Island.
 B. Woman of New Zealand.
 C. A New Zealand Warrior.
 D. Native of New Caledonia.
 E. Woman of New Holland.
 F. Woman of Otaheite.
 G. Another Woman of Otaheite, from her Nave with a Bonnet of Leaves.
 H. A Man of Otaheite.
 I. A Man of Malakoff.
 K.K. A Young Woman of Otaheite, adorned in her Marriage dress.
 L. A Priest of the Friendly Islands.
 M. Dancing Girl of Otaheite.
 N. A Man playing on a Lute.
 O. The Drum of Otaheite.
 P. A Piece of the manner of Appear-
 ing the Dead at the Friendly Is.
 Q. Model of Mannerism and Otaheite.
 R. A Canoe of the Friendly Is.
 S. A Boatful of Villagers of New Caledonia.
 T. A Canoe of Otaheite.
 U. A Branch of the Bread-Fruit Tree, with the Fruit.
 V. The Kangaroo, an Animal
 peculiar to New Holland.
 W. The manner of constructing Houses at Otaheite.
 X. A Species of the Big Tree found in New Caledonia.
 Y. A Floating Ice Island, numbers of which were seen towards the Southern Frigid Zone.
 Z. A Bell Sculpt.



towers, and had a strong castle to defend the harbour, now in ruins. It is a corporation and a county of itself, with the title of an earldom, and sends two members to parliament. W. Long. 1. 30. N. Lat. 50. 55.

SOUTHERN (Thomas), an eminent dramatic writer, was born at Dublin in 1660, and received his education in the university there. He came young to London to study law; but instead of that devoted himself to poetry and writing of plays. His Persian Prince, or Loyal Brother, was introduced in 1682, when the Tory interest was triumphant in England; and the character of the loyal brother being intended to compliment James duke of York, he rewarded the author when he came to the throne with a commission in the army. On the Revolution taking place, he retired to his studies, and wrote several plays, from which he is supposed to have derived a very handsome subsistence, being the first who raised the advantage of play-writing to a second and third night. The most finished of all his plays is Oroonoko, or The Royal Slave, which is built on a true story related in one of Mrs Behn's novels. Mr Southern died in 1746, in the 86th year of his age; the latter part of which he spent in a peaceful serenity, having, by his commission as a soldier, and the profits of his dramatic works, acquired a handsome fortune; and being an exact economist, he improved what fortune he gained to the best advantage. He enjoyed the longest life of all our poets; and died the richest of them, a very few excepted. His plays are printed in two volumes 12mo.

SOUTHERN Continent. See **SOUTH Sea**, and **TERRA Australis**.

SOUTHERNWOOD, in botany. See **ARTEMISIA**.
SOUTHWARK, a town of Surry, part of which now belongs to the city of London, and the whole is reckoned a suburb thereto, though it sends two members to parliament on its own account. The principal street runs from London-bridge to St. George's church; besides which there are three others, and two famous hospitals, namely, St Thomas's and Guy's, which are seated in that part called the *Borough*. There are also two prisons for debt, the King's Bench and the Marshalsea; and one for criminals, called the *New Gaol*. The famous bridge which joins Southwark to London is now greatly altered, the houses being taken down, which rendered the passage over it very inconvenient.

SOW, in zoology. See **SUS**.

Sow, in the iron works, the name of the block or lump of metal they work at once in the iron furnace.

SOWING, in agriculture and gardening, the depositing any kind of seed in the earth in order for a future crop. See **AGRICULTURE**.

Drill-Sowing See **DRILL-Sowing**.

SOY. See **DOLOCHOS**.

SPA, or **SPAW**, a town of Germany, in the circle of Westphalia, and in the bishopric of Liege. It contains about 300 houses, and is famous for its mineral waters known all over Europe. The inhabitants are very civil to strangers, and ready to do them all manner of good offices, but must be paid for their labour. It is seated in a valley, surrounded with mountains. That called the *Old Spaw* consists of miserable cottages, and is properly nothing but the suburb to the other. The inhabitants send out swarms of chil-

dren when strangers arrive, to get what they can by begging. The houses of the New Spaw are all wood, old-fashioned, dark, and small; and yet it is affirmed they can make 1200 beds for strangers. The church of the capuchins, and the parish church, are both seated upon eminences, and look very well at a distance. The inn, called the *Court of London*, is very large, the best in the place, and most frequented. The names of the five principal wells are, *Poubon, Geronstorf, Saviniere, Watpotz, and Tunnelt*. The inhabitants are employed in making toys and other little things for strangers. Near it there are excellent fish and good game. It is 17 miles S. E. of Liege. E. Lon. 5. 50. N. Lat. 50. 32.

SPACE is defined by Mr Locke to be a simple idea, which we attain both by our sight and touch; the modes whereof are distance, capacity, extension, duration, &c. See **METAPHYSICS**, n° 56, 58.

SPACE, in geometry, denotes the area of any figure, or that which fills the interval or distance between the lines that terminate it.

SPADIX, in botany, anciently signified the receptacle of the palms. It is now used to express every flower-stalk that is protruded out of a spathe or sheath.

The spadix of the palms is branched; that of all other plants, simple. This last case admits of some variety; in calla, dracontium and pothos, the florets cover it on all sides; in arum, they are disposed on the lower part only; and in zosteria, on one side.

SPAGIRIC ART, a name given by authors to that species of chemistry which works on metals, and is employed in the search of the philosopher's stone.

SPAHIS, horsemen in the Ottoman army, chiefly raised in Asia. The great strength of the grand seignior's army consists in the janissaries, who are the foot; and the spahis, who are the horse.

SPAIN, a country of Europe, famous both in ancient and modern history, situated in that large peninsula which forms the south-western part of Europe. It is bounded on the south and east by the Mediterranean sea and straits of Gibraltar, on the north and west by the bay of Biscay and Atlantic Ocean, on the south-west by Portugal, and on the north-east by the Pyrenees.

The most ancient name of Spain was Iberia, supposed by some to be derived from the Iberians, a people inhabiting Mount Caucasus, a colony of whom settled in this country. Others derive it from the Phenician word *Ebra* or *Ibra*, signifying a passage or limit. By the Romans it was called *Spania* or *Hispania*, by the Phenician name *Sphanija*; and this again from *shaphan*, a Phenician word signifying a rabbit, because the western part of Spain abounded with those animals.

Spain, as well as the rest of Europe, was probably peopled by the Celtes; but the Spanish historians derive the origin of their nation from Tubal the fifth son of Japhet, asserting that Span had been a monarchy for 2226 years before the coming of the Celtes into it. Till the coming of the Carthaginians into Spain, however, nothing certain can be affirmed of the Spaniards; and this happened not long before the commencement of the first Punic war. Their success in reducing the country, and their final expulsion.

21
Different
names of
Spain.

2
Conquests
of the Car-
thaginians
in Spain.

Spain.

fion by the Romans, has already been related under the articles **ROME** and **CARTHAGE**; we have here therefore only to take notice of the state of Spain under the Roman government, until the Romans were in their turn expelled by the northern barbarians.

³
Exceeding
great riches
of the
country.

At the time of the Roman conquest, Spain, though prodigious quantities of silver had been carried out of it by the Carthaginians and Tyrians, was yet a very rich country. In the most ancient times, indeed, its riches are said to have exceeded what is related of the most wealthy country in America. Aristotle assures us, that when the Phenicians first arrived in Spain, they exchanged their naval commodities for such immense quantities of silver, that their ships could neither contain nor sustain its load, though they used it for ballast, and made their anchors and other implements of silver. When the Carthaginians first came to Spain, they found the quantity of silver nothing lessened; since the inhabitants at that time made all their utensils, and even managers, of that precious metal. In the time of the Romans this amazing plenty was very much diminished; however, their gleanings were by no means despicable, since, in the space of nine years, they carried off 111,542 pounds of silver, and 4095 of gold, besides an immense quantity of coin and other things of value. The Spaniards were always remarkable for their bravery, and some of Hannibal's best troops were brought from thence. But as the Romans penetrated farther into the country than the Carthaginians had done, they met with nations whose love of liberty was equal to their valour, and whom the whole strength of their empire was scarce able to subdue. Of these the most formidable were the Numantines, Castabrians, and Alurians.

³
Virithus
opposes the
Roman
power with
success.

In the time of the third Punic war, one Virithus, a celebrated hunter, and afterwards the captain of a gang of banditti, took upon him the command of some nations who had been in alliance with Carthage, and ventured to oppose the Roman power in that part of Spain called *Lusitania*, now Portugal. The prætor, named *Vetilius*, who commanded in those parts, marched against him with 10,000 men; but was defeated and killed, with the loss of 4000 of his troops. The Romans immediately dispatched another prætor with 10,000 foot and 1300 horse: but Virithus having first cut off a detachment of 4000 of them, engaged the rest in a pitched battle; and having entirely defeated them, reduced great part of the country. Another prætor, who was sent with a new army, met with the same fate; so that, after the destruction of Carthage, the Romans thought proper to send a consul named *Quintus Fabius*, who defeated the Lusitanians in several battles, and regained two important places which had long been in the hands of the rebels. After the expiration of Fabius's consulate, Virithus continued the war with his usual success, till the senate thought proper to send against him the consul *Q. Cæcilius Metellus*, an officer of great valour and experience. With him Virithus did not choose to venture a pitched battle, but contented himself with acting on the defensive; in consequence of which the Romans recovered a great many cities, and the whole of Tarraconian Spain was obliged to submit to their yoke. The other consul, named *Servilius*, met with quite different success; being entirely defeated, and having his camp in great danger of being taken

⁵
Is reduced
to great
straits by
Metellus.

by Virithus. Notwithstanding all the success of Metellus, however, he could not withstand the intrigues of his countrymen against him, and he was not allowed to finish the war he had begun with so much success. In resentment for this he took all imaginable pains to weaken the army under his command; he disbanded the flower of his troops, exhausted the magazines, let the elephants die, broke in pieces the arrows which had been provided for the Cretan archers, and threw them into a river. Yet, after all, the army which he gave up to his successor *Q. Pompeius*, consisting of 30,000 foot and 2000 horse, was sufficient to have crushed Virithus if the general had known how to use it. But, instead of opposing Virithus with success, the imprudent consul procured much more formidable

Spain.

⁶
War between
the Romans
and Numantians;

enemies. The Termantians and Numantians, who had hitherto kept themselves independent, offered very advantageous terms of peace and alliance with Rome; but Pompeius insisted on their delivering up their arms. Upon this, war was immediately commenced. The consul with great confidence invetted Numantia; but being repulsed with considerable loss, he sat down before Termantia, where he was attended with still worse success. The very first day, the Termantines killed 700 of his legionaries; took a great convoy which was coming to the Roman camp; and having defeated a considerable body of their horse, pushed them from post to post till they came to the edge of a precipice, where they all tumbled down, and were dashed to pieces. In the mean time Servilius, who had been continued in his command with the title of *proconsul*, managed matters so ill, that Virithus surrounded him on all sides, and obliged him to sue for peace. The terms offered to the Romans were very moderate; being only that Virithus should keep the country he at that time possessed, and the Romans Virithus remain masters of all the rest. This peace the proconsul was very glad to sign, and afterwards got it signed by the senate and people of Rome.

The next year *Q. Pompeius* was continued in his command against the Numantines in Farther Spain, while *Q. Servilius Cæpio*, the new consul, had for his province Hither Spain, where Virithus had established his new state. Pompeius undertook to reduce Numantia by turning aside the stream of the *Durius*, now the *Douro*, by which it was supplied with water; but, in attempting this, such numbers of his men were cut off, that, finding himself unable to contend with the enemy, he was glad to make peace with them on much worse terms than they had offered of their own accord. The peace, however, was ratified at Rome; but in the mean time Cæpio, desirous of showing his prowess against the renowned Virithus, prevailed upon the Romans to declare war against him without any provocation. As Cæpio commanded an army greatly superior to the Lusitanians, Virithus thought proper to sue for peace; but finding that Cæpio would be satisfied with nothing less than a surrender at discretion, he resolved to stand his ground. But in the mean time, the latter having bribed some of the intimate companions of Virithus to murder him in his sleep, he by that infamous method put an end to a war which Virithus lasted fourteen years, very little to the honour of the

⁷
After

treacherously murdered.

Spain.

Spain.

8
The Romans
defeated by
the Numantines.

After the death of Viriathus, the Romans with like treachery ordered their new consul Popilius to break the treaty with the Numantines. His infamous conduct met with the reward it deserved; the Numantines, falling out, put the whole Roman army to flight with such slaughter, that they were in no condition to act during the whole campaign. Mancinus, who succeeded Popilius, met with still worse success; his great army, consisting of 30,000 men, was utterly defeated by 4000 Numantines, and 20,000 of them killed in the pursuit. The remaining 10,000, with their general, were pent up by the Numantines in such a manner that they could neither advance nor retreat, and would certainly have been all put to the sword or made prisoners, had not the Numantines, with a generosity which their enemies never possessed, offered to let them depart upon condition that a treaty was concluded with them upon very moderate terms. This the consul very willingly promised, but found himself unable to perform. On the contrary, the people, not satisfied with declaring his treaty null and void, ordered him to be delivered up to the Numantines. The latter refused to accept him, unless he had along with him the 10,000 men whom they had relieved as above related. At last, after the consul had remained a whole day before the city, his successor Furius, thinking this a sufficient recompence to the Numantines for breaking the treaty, ordered him to be received again into the camp. However, Furius did not choose to engage with such a desperate and resolute enemy as the Numantines had showed themselves; and the war with them was discontinued till the year 133 B. C. when Scipio Emilianus, the destroyer of Carthage, was sent against them. Against this renowned commander the Numantines with all their valour were not able to cope. Scipio, having with the utmost care introduced strict discipline among his troops, and reformed the abuses which his predecessors had suffered in their armies, by degrees brought the Romans to face their enemies, which at his arrival they had absolutely refused to do. Having then ravaged all the country round about the town, it was soon blocked up on all sides, and the inhabitants began to feel the want of provisions. At last they resolved to make one desperate attempt for their liberty, and either to break through their enemies, or perish in the attempt. With this view they marched out in good order by two gates, and fell upon the works of the Romans with the utmost fury. The Romans, unable to stand this desperate shock, were on the point of yielding; but Scipio, hastening to the places attacked, with no fewer than 20,000 men, the unhappy Numantines were at last driven into the city, where they sustained for a little longer the miseries of famine. Finding at last, however, that it was altogether impossible to hold out, it was resolved by the majority to submit to the pleasure of the Roman commander. But this resolution was not universally approved. Many shut themselves up in their houses, and died of hunger, while even those who had agreed to surrender repented their offer, and setting fire to their houses, perished in the flames with their wives and children, so that not a single Numantine was left alive to grace the triumph of the conqueror of Carthage.

Vol. X.

1

9
Scipio Emilianus
sent against
them.

10
Miserable
end of the
people.

After the destruction of Numantia the whole of Spain submitted to the Roman yoke; and nothing remarkable happened till the times of the Cimbric, when a prætorian army was cut off in Spain by the Lusitanians. From this time nothing remarkable occurs in the history of Spain till the civil war between Marius and Sylla. The latter having crushed the Marian faction, as related under the article ROME, proscribed all those that had sided against him whom he could not immediately destroy. Among these was Sertorius, a man of consummate valour and experience in war. He had by Marius been appointed prætor of Spain; and, upon the overthrow of Marius, retired to that province. Sylla no sooner heard of his arrival in that country, than he sent thither one Caius Annius with a powerful army to drive him out. As Sertorius had but few troops along with him, he dispatched one Julius Salinator with a body of 6000 men to guard the passes of the Pyrenees, and prevent Annius from entering the country. But Salinator having been treacherously murdered by assassins hired by Annius for that purpose, he no longer met with any obstacle; and Sertorius was obliged to embark for the coast of Africa with 3000 men, being all he had now remaining. With these he landed in Mauritania; but as his men were dragging carelessly about, great numbers of them were cut off by the Barbarians. This new misfortune obliged Sertorius to re-embark for Spain; but finding the whole coast lined with the troops of Annius, he put to sea again, not knowing what course to steer. In this new voyage he met with a small fleet of Cilician pirates; and having prevailed with them to join him, he made a descent on the coast of Yvea, overpowered the garrison left there by Annius, and gained a considerable booty. On the news of this victory Annius set sail for Yvea, with a considerable squadron, having 5000 land-forces on board. Sertorius, not intimidated by the superiority of the enemy, prepared to give them battle. But a violent storm arising, most of the ships were driven on shore and dashed to pieces, Sertorius himself with great difficulty escaping with the small remains of his fleet. For some time he continued in great danger, being prevented from putting to sea by the fury of the waves, and from landing by the enemy; at last, the storm abating, he passed the straits of Gades, now Gibraltar, and landed near the mouth of the river Bæotia. Here he met with some seamen newly arrived from the Atlantic, or Fortunate Islands; and was so taken with the account they gave him of those happy regions, that he resolved to retire thither to spend the rest of his life in quiet and happiness. But having communicated this design to the Cilician pirates, they immediately abandoned him, and set sail for Africa, with an intention to assist one of the barbarous kings against his subjects who had rebelled. Upon this Sertorius sailed thither also, but took the opposite side; and having defeated the king named *Afcalis*, obliged him to shut himself up in a successful city of Tingis, now Tangier, which he closely besieged. But in the mean time Pacianus, who had been country-friend by Sylla to assist the king, advanced with a considerable army against Sertorius. Upon this the latter, leaving part of his forces before the city, marched with the rest to meet Pacianus, whose army, though greatly superior to his own in number, he entirely defeated; killed

11
Sertorius
supports the
Marian faction
in Spain.

12
Is driven
out, and
undergoes
many hardships.

13
Lands in
Africa, and
carries on a
successful
war in that
country.

41 C

killed

Spain.

14
Returns to
Spain, and
defeats the
Romans
there.

killed the general, and took all his forces prisoners.—The fame of this victory soon reached Spain; and the Lusitanians, being threatened with a new war from Annus, invited Sertorius to head their armies. With this request he very readily complied, and soon became very formidable to the Romans. Titus Didius, governor of that part of Spain called *Betica*, first entered the lists with him; but he being defeated, Sylla next dispatched Metellus, reckoned one of the best commanders in Rome, to stop the progress of this new enemy. But Metellus, notwithstanding all his experience, knew not how to act against Sertorius, who was continually changing his station, putting his army into new forms, and contriving new stratagems. On his first arrival he sent for L. Domitius, then prætor of Hither Spain, to his assistance; but Sertorius being informed of his march, detached Hirtuleius, or Herculeus, his quaestor, against him, who gave him a total overthrow. Metellus then dispatched Lucius Lolius prætor of Narbonne Gaul against Hirtuleius; but he met with no better success, being utterly defeated, and his lieutenant-general killed.

15
Erects Lu-
stania into
a republic.

The fame of these victories brought to the camp of Sertorius such a number of illustrious Roman citizens of the Marian faction, that he formed a design of erecting Lusitania into a republic, in opposition to that of Rome. Sylla was continually sending fresh supplies to Metellus; but Sertorius with an handful of men, accustomed to range about the mountains, to endure hunger and thirst, and live exposed to the inclemencies of the weather, so harassed the Roman army, that Metellus himself began to be quite discouraged. At last, Sertorius, hearing that Metellus had spoken disrespectfully of his courage, challenged his antagonist to end the war by single combat; however, Metellus very prudently declined the combat, as being advanced in years; yet this refusal brought upon him the contempt of the unthinking multitude, upon which Metellus resolved to retrieve his reputation by some signal exploit, and therefore laid siege to Lacobriga, a considerable city in those parts. This he hoped to reduce in two days, as there was but one well in the place; but Sertorius, having previously removed all those who could be of no service during the siege, and conveyed 6000 skins full of water into the city, Metellus continued a long time before it without making any impression. At last, his provisions being almost spent, he sent out Aquinus at the head of 6000 men to procure a new supply; but Sertorius falling unexpectedly upon them, cut in pieces or took the whole detachment; the commander himself being the only man who escaped to carry the news of the disaster; upon which Metellus was obliged to raise the siege with disgrace.

17
Civilizes the
Lusitanians

And now Sertorius, having gained some intervals of ease in consequence of the many advantages he had obtained over the Romans, began to civilize his new subjects. Their savage and furious manner of fighting he changed for the regular order and discipline of a well-formed army; he bestowed liberally upon them gold and silver to adorn their arms, and by conversing familiarly with them, prevailed upon them to lay aside their own dress for the Roman *toga*. He sent for all the children of the principal people, and placed them in the great city of Osca, now Huesca, in the king-

Spain.

dom of Arragon, where he appointed them masters to instruct them in the Roman and Greek learning, that they might, as he pretended, be capable of sharing with him the government of the republic. Thus he made them really hostages for the good behaviour of their parents; however, the latter were greatly pleased with the care he took of their children, and all Lusitania were in the highest degree attached to their new sovereign. This attachment he took care to heighten by the power of superstition; for having procured a young hind of a milk-white colour, he made it so tame that it followed him wherever he went; and Sertorius gave out to the ignorant multitude, that this hind was inspired by Diana, and revealed to him the designs of his enemies, of which he always took care to be well informed by the great numbers of spies he employed.

While Sertorius was thus employed in establishing his authority, the republic of Rome, alarmed at his success, resolved to crush him at all events. Sylla was now dead, and all the eminent generals in Rome solicited this honourable though dangerous employment. After much debate a decree was passed in favour of Pompey the Great, but without recalling Metellus. But in the mean time, the troops of one Perperna, or Perperna, had, in spite of all that their general could do, abandoned him and taken the oath of allegiance to Sertorius. This was a most signal advantage to Sertorius; for Perperna commanded an army of 33,000 men, and had come into Spain with a design to settle there as Sertorius had done; but as he was defended from one of the first families in Rome, he thought it below his dignity to serve under any general, however eminent he might be. But the troops of Perperna were of a different opinion; and therefore declaring that they would serve none but a general who could defend himself, they to a man joined Sertorius; upon which Perperna himself, finding he could do no better, consented to serve also as a subaltern.

On the arrival of Pompey in Spain, several of the cities which had hitherto continued faithful to Sertorius, began to waver; upon which the latter resolved by some signal exploit, to convince them that Pompey could no more screen them from his resentment than Sertorius. With this view he laid siege to Lauron, now Liria, a place of considerable strength. Pompey, not doubting but he should be able to raise the siege, marched quite up to the enemy's lines, and found means to inform the garrison that those who besieged them were themselves besieged, and would soon be obliged to retire with loss and disgrace. On hearing this message, "I will teach Sylla's disciple," said Sertorius, "that it is the duty of a general to look behind as well as before him." Having thus spoken, he sent orders to a detachment of 6000 men, who lay concealed among the mountains, to come down and fall upon his rear if he should offer to force the lines. Pompey, surprised at their sudden appearance, durst not stir out of his camp; and in the mean time the besieged, despairing of relief, surrendered at discretion; upon which Sertorius granted them their lives and liberty, but reduced their city to ashes.

While Sertorius was thus successfully contending with Pompey, his quaestor Hirtuleius was entirely defeated by Metellus, with the loss of 20,000 men; upon which Sertorius advanced with the utmost expedition

18
Pompey the Great
sent against
him.

19
Sertorius
besieges
Lauron.

20
Takes and
burns it in
the night of
Pompey.

Spain.

21
Defeats
Pompey on
the banks
of the
Suero.

to the banks of the Suero in Tarraconian Spain, with a design to attack Pompey before he could be joined by Metellus. Pompey, on his part, did not decline the combat; but, fearing that Metellus might share the glory of the victory, advanced with the greatest expedition. Sertorius put off the battle till towards the evening; Pompey, tho' he knew that the night would prove disadvantageous to him, whether vanquished or victorious, because his troops were unacquainted with the country, resolved to venture an engagement, especially as he feared that Metellus might arrive in the mean time, and rob him of part of the glory of conquering so great a commander. Pompey, who commanded his own right wing, soon obliged Perperna, who commanded Sertorius's left, to give way. Hereupon Sertorius himself, taking upon him the command of that wing, brought back the fugitives to the charge, and obliged Pompey to fly in his turn. In his flight he was overtaken by a gigantic African, who had already lifted up his hand to discharge a blow at him with his broadsword; but Pompey prevented him by cutting off his right hand at one blow. As he still continued his flight, he was wounded and thrown from his horse; so that he would certainly have been taken prisoner, had not the Africans who pursued him quarrelled about the rich furniture of his horse. This gave an opportunity to the general to make his escape; so that at length he reached his camp with much difficulty. But in the mean time Afranius, who commanded the left wing of the Roman army, had entirely defeated the wing which Sertorius had left, and even pursued them so close that he entered the camp along with them. Sertorius, returning suddenly, found the Romans busy in plundering the tents; when, taking advantage of their situation, he drove them out with great slaughter, and retook his camp. Next day he offered battle a second time to Pompey; but Metellus then coming up with all his forces, he thought proper to decline an engagement with both commanders. In a few days, however, Pompey and Metellus agreed to attack the camp of Sertorius. Metellus attacked Perperna, and Pompey fell upon Sertorius. The event was similar to that of the former battle; Metellus defeated Perperna, and Sertorius routed Pompey. Being then informed of Perperna's misfortune, he hastened to his relief; rallied the fugitives, and repulsed Metellus in his turn, wounded him with his lance, and would certainly have killed him, had not the Romans, ashamed to leave their general in distress, hastened to his assistance, and renewed the fight with great fury. At last Sertorius was obliged to quit the field, and retire to the mountains. Pompey and Metellus hastened to besiege him; but while they were forming their camp, Sertorius broke through their lines, and escaped into Lusitania. Here he soon raised such a powerful army, that the Roman generals, with their united forces, did not think proper to venture an engagement with him. They could not, however, resist the perpetual attacks of Sertorius, who now drove them from place to place, till he obliged them to separate, one into Gaul, and the other to the foot of the Pyrenees.

23
Pompey and Metellus driven out of Spain by Sertorius.

Thus did this celebrated commander triumph over all the power of the Romans; and there is little doubt that he would have continued to make head against all

the other generals whom the republic could have sent; but, by the infamous treachery of Perperna, Sertorius was assassinated at an entertainment, in 73 B. C. after he had made head against the Roman forces for almost twenty years. Pompey was no sooner informed of his death, than, without waiting for any new succours, he marched against the traitor, whom he easily defeated and took prisoner; and having caused him to be executed, thus put an end, with very little glory, to a most dangerous war.

Many of the Spanish nations, however, still continued to bear the Roman yoke with great impatience; and as the civil wars which took place first between Julius Cæsar and Pompey, and afterwards between Octavianus and Anthony, diverted the attention of the republic from Spain, by the time that Augustus had become sole master of the Roman empire, they were again in a condition to assert their liberty. The CAN TABRIANS and ASTURIANS were the most powerful and valiant nations at that time in Spain; but, after incredible efforts, they were obliged to lay down their arms, or rather were almost exterminated, by Agrippa, as is related under these articles. From this time the Spaniards continued in quiet subjection to the Romans; but on the decline of the empire they were attacked by the northern nations, who put an end to the Roman name in the west. As the inhabitants had by that time entirely lost their ancient valour, the barbarians met with no resistance but from one another. In the reign of the emperor Honorius, the Vandals, Alans, and Suevians, entered this country; and having made themselves masters of it, divided the provinces among themselves. In 444, the Romans made one effort more to recover their power in this part of the world; but being utterly defeated by the Suevians, the latter established a kingdom there which lasted till the year 584, when it was utterly overthrown by the Visigoths under Leovigilde. The Gothic princes continued to reign over a considerable part of Spain till the beginning of the eighth century, when their empire was entirely overthrown by the Saracens. During this period, they had entirely expelled the eastern emperors from what they possessed in Spain, and even made considerable conquests in Barbary; but towards the end of the seventh century the Saracens over-ran all that part of the world with a rapidity which nothing could resist; and having soon possessed themselves of the Gothic dominions in Barbary, they made a descent upon Spain about the year 711 or 712. The king of the Goths at that time was called Roderic, and by his bad conduct had occasioned great dissatisfaction among his subjects. He therefore determined to put all to the issue of a battle, knowing that he could not depend upon the fidelity of his own people if he allowed the enemy time to tamper with them. The two armies met in a plain near Xeres in Andalusia. The Goths began the attack with great fury; but though they fought like men in despair, they were at last defeated with excessive slaughter, and their king himself was supposed to have perished in the battle, being never more heard of.

By this battle the Moors in a short time rendered themselves masters of almost all Spain. The poor remains of the Goths were obliged to retire into the mountainous parts of Asturias, Burgos, and Biscay:

Spain.

24
Sertorius treacherously murdered.

25
Spain entirely reduced by the Romans.

26
Seized by barbarous nations on the decline of the western empire.

27
The Gothic kingdom overthrown by the Saracens.

Spain.

28
The power
of the
Goths re-
vives under
Pelagio.

the inhabitants of Arragon, Catalonia, and Navarre, though they might have made a considerable stand against the enemy, chose for the most part to retire into France. In 718, however, the power of the Goths began again to revive under Don Pelagio or Pelayo, a prince of the royal blood, who headed those that had retired to the mountains after the fatal battle of Xeres. The place where he first laid the foundation of his government was in the Asturias, in the province of Liebana, about nine leagues in length and four in breadth. This is the most inland part of the country, full of mountains enormously high, and so much fortified by nature, that its inhabitants are capable of resisting almost any number of invaders. Alakor the Saracen governor was no sooner informed of this revival of the Gothic kingdom, than he sent a powerful army, under the command of one Alchaman, to crush Don Pelagio before he had time to establish his power. The king, though his forces were sufficiently numerous, (every one of his subjects arrived at man's estate being a soldier), did not think proper to venture a general engagement in the open field; but taking post with part of them himself in a cavern in a very high mountain, he concealed the rest among precipices, giving orders to them to fall upon the enemy as soon as they should perceive him attacked by them. These orders were punctually executed, tho' indeed Don Pelagio himself had repulsed his enemies, but not without a miracle, as the Spanish historians pretend. The slaughter was dreadful; for the troops who lay in ambuscade joining the rest, and rolling down huge stones from the mountains upon the Moors, (the name by which the Saracens were known in Spain, no fewer than 124,000 of these unhappy people perished in one day. The remainder fled till they were stopped by a river, and beginning to coast it, part of a mountain suddenly fell down, stopped up the channel of the river, and either crushed or drowned, by the sudden rising of the water, almost every one of that vast army.

30
Another
army cut in
pieces or
taken.

The Moors were not so much disheartened by this disaster but that they made a second attempt against Don Pelagio. Their success, however, was as bad as ever, the greatest part of their army being cut in pieces or taken; in consequence of which, they lost all the Asturias, and never dared to enter the hills with Pelagio afterwards. Indeed, their bad success had in a great measure taken from them the desire of conquering a country where little or nothing was to be got; and therefore they rather directed their force against France, where they hoped for more plunder. Into this country they poured in prodigious multitudes; but were utterly defeated, in 732, by Charles Martel, with the loss of 300,000 men, as the historians of those times pretend.

31
The Saracens utterly
defeated by
Charles
Martel.

Don Pelagio died in 737, and soon after his death such intestine divisions broke out among the Moors, as greatly favoured the increase of the Christian power. In 745 Don Alonso the Catholic, son-in-law to Pelagio, in conjunction with his brother Froila, passed the mountains, and fell upon the northern part of Galicia; and meeting with little resistance, he recovered almost the whole of that province in a single campaign. Next year he invaded the plains of Leon and Castile; and before the Moors could assemble any force to oppose him, he reduced Astorgas, Leon, Saldagna, Mon-

32
Conquests
of the Chris-
tians.

tes de Oca, Amaya, Alava, and all the country at the foot of the mountains. The year following he pushed his conquests as far as the borders of Portugal, and the next campaign ravaged the country as far as Castile. Being sensible, however, that he was yet unable to defend the flat country which he had conquered, he laid the whole of it waste, obliged the Christians to retire to the mountains, and carried off all the Moors for slaves. Thus secured by a desert frontier, he met with no interruption for some years; during which time, as his kingdom advanced in strength, he allowed his subjects gradually to occupy part of the flat country, and to rebuild Leon and Astorgas, which he had demolished. He died in 757, and was succeeded by his son Don Froila. In his time Abdelrahman, the Khaliff's viceroy in Spain, threw off the yoke, and rendered himself independent, fixing the seat of his government at Cordova. Thus the intestine divisions among the Moors were compounded; yet their success seems to have been little better than before: for, soon after, Froila encountered the Moors with such success, that 54,000 of them were killed on the spot, and their general taken prisoner. Soon after, he built the city of Oviedo, which he made the capital of his dominions, in order to be in a better condition to defend the flat country, which he now determined to people.

33
The Saracens in
Spain throw
off the yoke
of the khaliff.

In the year 758 the power of the Saracens received another blow by the rise of the kingdom of Navarre. This kingdom, we are told, took its origin from an accidental meeting of gentlemen, to the number of 600, at the tomb of an hermit named John, who had died among the Pyrenees. At this place,

34
History of
the king-
dom of Na-
varre.

where they had met on account of the supposed sanctity of the deceased, they took occasion to converse on the cruelty of the Moors, the miseries to which the country was exposed, and the glory that would result from throwing off their yoke; which, they supposed, might easily be done, by reason of the strength of their country. On mature deliberation, the project was approved; one Don Garcia Ximenes was appointed king, as being of illustrious birth, and looked upon as a person of great abilities. He recovered Ainsa, one of the principal towns of the country, out of the hands of the infidels, and his successor Don Garcia Inigas extended his territories as far as Biscay; however, the Moors still possessed Portugal, Murcia, Andalusia, Valencia, Granada, Tortosa, with the interior part of the country as far as the mountains of Castile and Saragossa. Their internal dissensions, which revived after the death of Abdelrahman, contributed greatly to reduce the power of the infidels in general.

35
Conquests
of two of Charles
the Great's
armies.

In 778, Charles the Great being invited by some discontented Moorish governors, entered Spain with two of his great armies; one passing through Catalonia, and the other through Navarre, where he pushed his conquests as far as the Ebro. On his return he was attacked and defeated by the Moors; though this did not hinder him from keeping possession of all those places he had already reduced. At this time he seems to have been master of Navarre: however, in 831, count Aznar, revolting from Pepin son to the emperor Lewis, again revived the independency of Navarre; but the sovereigns did not assume the title of kings till the time of Don Garcia, who began to reign in 857.

In the mean time, the kingdom founded by Don

Pe-

Spain.

Spain.

Pelagio, now called the kingdom of *Leon* and *Oviedo*, continued to increase rapidly in strength, and many advantages were gained over the Moors, who having two enemies to contend with, lost ground every day. In 921, however, they gained a great victory over the united forces of Navarre and Leon, by which the whole force of the Christians in Spain must have been entirely broken, had not the victors conducted their affairs so wretchedly that they suffered themselves to be almost entirely cut in pieces by the remains of the Christian army. In short, the Christians became at length so terrible to the Moors, that it is probable they could not long have kept their footing in Spain, had not a great general, named *Mohammed Ebn Amir Almanzor*, appeared, in 979, to support their sinking cause. This man was vizir to the king of Cordova, and being exceedingly provoked against the Christians on account of what his countrymen had suffered from them, made war with the most implacable fury. He took the city of Leon, murdered the inhabitants, and reduced the houses to ashes. Barcelona shared the same fate; Castile was reduced to a desert, Galicia and Portugal ravaged; and he is said to have overcome the Christians in fifty different engagements. At last, having taken and demolished the city of Compostella, and carried off in triumph the gates of the church of St James, a flux happened to break out among his troops, which the superstitious Christians supposed to be a divine judgment on account of his sacrilege. Taking it for granted, therefore, that the Moors were now entirely destitute of all heavenly aid, they fell upon them with such fury in the next engagement; that all the valour and conduct of Almanzor could not prevent a defeat. Overcome with shame and despair at this misfortune, he desired his followers to shift for themselves, while he himself retired to Medina Cœli, and put an end to his life by abstinence, in the year 998.

During this period a new Christian principality appeared in Spain, namely that of Castile, which is now distinguished into the Old and New Castile. The Old Castile was recovered long before that called the *New*. It was separated from the kingdom of Leon on one side by some little rivers; on the other it was bounded by the Asturias, Biscay, and the province of Rioja. On the south, it had the mountains of Segovia and Avila; thus lying in the middle between the Christian kingdom of Leon and Oviedo, and the Moorish kingdom of Cordova. Hence this district soon became an object of contention between the kings of Leon and those of Cordova; and as the former were generally victorious, some of the principal Castilian nobility retained their independency under the protection of the Christian kings, even when the power of the Moors was at its greatest height. In 884 we first hear of Don Rodriguez assuming the title of *count of Castile*, though it does not appear that either his territory or title were given him by the king of Leon. Nevertheless, this monarch having taken upon him to punish some of the Castilian lords as rebels, the inhabitants made a formal renunciation of their allegiance, and set up a new kind of government. The supreme power was now vested in two persons of quality, styled *judges*; however, this method did not long continue to give satisf-

faction, and the sovereignty was once more vested in a single person. By degrees Castile fell entirely under the power of the kings of Leon and Oviedo; and, in 1035, Don Sanchez bestowed it on his eldest son Don Ferdinand, with the title of *king*; and thus the territories of Castile were first firmly united to those of Leon and Oviedo, and the sovereigns were thenceforth styled *kings of Leon and Castile*.

Besides all these, another Christian kingdom was set up in Spain about the beginning of the 11th century. This was the kingdom of Arragon. The inhabitants were very brave, and lovers of liberty, so that it is probable they had in some degree maintained their independency, even when the power of the Moors was at the greatest. The history of Arragon, however, during its infancy, is much less known than that of any of the others hitherto mentioned. We are only assured, that about the year 1035, Don Sanchez, surname the *Great*, king of Navarre, erected Arragon into a kingdom in favour of his son Don Ramira, and afterwards it became very powerful. At this time, then, we may imagine the continent of Spain divided into two unequal parts by a straight line drawn from east to west, from the coasts of Valencia to a little below the mouth of the Duro. The country north of this belonged to the Christians, who, as yet, had the smallest and least valuable share, and all the rest to the Moors. In point of wealth and real power, both by land and sea, the Moors were greatly superior; however, their continual dissensions greatly weakened them, and every day facilitated the progress of the Christians. Indeed, had either of the parties been united, the other must soon have yielded; for though the Christians did not make war upon each other constantly as the Moors did, their mutual feuds were yet sufficient to have ruined them, had their adversaries made the least use of the advantages thus afforded them. But among the Moors almost every city was a kingdom; and as these petty sovereignties supported one another very indifferently, they fell a prey one after another to their enemies. In 1080, the king of Toledo was engaged in a war with the king of Seville, another Moorish potentate; which being observed by Alphonso king of Castile, he also invaded his territories; and in four years made himself master of the city of Toledo, with all the places of importance in its neighbourhood; from thenceforth making Toledo the capital of his dominions. In a short time the whole province of New Castile submitted; and Madrid, the present capital of Spain, fell into the hands of the Christians, being at that time but a small place.

The Moors were so much alarmed at these conquests, that they not only entered into a general confederacy against the Christians, but invited to their assistance Mahomet Ben Joseph the sovereign of Barbary. He accordingly came, attended by an incredible multitude; but was utterly defeated by the Christians in the desiles of the Black Mountain, or Sierra Morena, on the borders of Andalusia. This victory happened on the 16th of July 1212, and the anniversary is still celebrated at Toledo. This victory was not improved; the Christian army immediately dispersed themselves, while the Moors of Andalusia were strengthened by the remains of the African army;

36
Exploits of
Almanzor
a Saracen
general.

37
He is de-
fected, and
thruves him-
self to
death.

38
History of
the king-
dom of
Castile.

39
History of
Arragon.

40
State of
Spain in the
beginning
of the 11th
century.

41
Toledo and
Madrid taken
by the
Christians.

42
A signal
victory
gained over
the Moors.

Spain.

yet, instead of being taught, by their past misfortunes, to unite among themselves, their dissensions became worse than ever, and the conquests of the Christians became daily more rapid. In 1236, Don Ferdinand of Castile and Leon took the celebrated city of Cordova, the residence of the first Moorish kings; at the same time that James I. of Arragon dispossessed them of the island of Majorca, and drove them out of Valencia. Two years after, Ferdinand made himself master of Murcia, and took the city of Seville; and in 1303 Ferdinand IV. reduced Gibraltar.

43
England inter-
feres in
the Spanish
affairs.

In the time of Edward III. we find England, for the first time, interfering in the affairs of Spain, on the following occasion. In the year 1284 the kingdom of Navarre had been united to that of France by the marriage of Donna Joanna queen of Navarre with Philip the Fair of France. In 1328, however, the kingdoms were again separated, though the sovereigns of Navarre were still related to those of France. In 1350, Charles, surnamed the *Wicked*, ascended the throne of Navarre, and married the daughter of John king of France. Notwithstanding this alliance, and that he himself was related to the royal family of France, he secretly entered into a negotiation with England against the French monarch, and even drew into his schemes the dauphin Charles, afterwards surnamed the *Wife*. The young prince, however, was soon after made fully sensible of the danger and folly of the connections into which he had entered; and, by way of atonement, promised to sacrifice his associates. Accordingly he invited the king of Navarre, and some of the principal nobility of the same party, to a feast at Rouen, where he betrayed them to his father. The most obnoxious were executed, and the king of Navarre was thrown into prison. In this ex-

44
The king of
Navarre im-
prisoned by
John king
of France

† See France
no 44.

tremitary, the party of the king of Navarre had recourse to England. The prince of Wales, surnamed the *Black Prince*, invaded France, defeated king John at Poitiers, and took him prisoner †; which unfortunate event produced the most violent disturbances in that kingdom. The dauphin, now about 19 years of age, naturally assumed the royal power during his father's captivity; but possessed neither experience nor authority sufficient to remedy the prevailing evils. In order to obtain supplies, he assembled the states of the kingdom: but that assembly, instead of supporting his administration, laid hold of the present opportunity to demand limitations of the prince's power, the punishment of past malversations, and the liberty of the king of Navarre. Marcel provost of the merchants of Paris, and first magistrate of that city, put himself at the head of the unruly populace, and pushed them to commit the most criminal outrages against the royal authority. They detained the dauphin in a kind of captivity, murdered in his presence Robert de Clermont and John de Conflans, marshals of France; threatened all the other ministers with the like fate; and when Charles, who had been obliged to temporize and dissemble, made his escape from their hands, they levied war against him, and openly rebelled. The other cities of the kingdom, in imitation of the capital, shook off the dauphin's authority, took the government into their own hands, and spread the contagion into every province.

Amidst these disorders, the king of Navarre made

his escape from prison, and presented a dangerous leader to the furious malcontents. He revived his pretensions to the crown of France: but in all his operations he acted more like a leader of banditti than one who aspired to be the head of a regular government, and who was engaged by his station to endeavour the re-establishment of order in the community. All the French, therefore, who wished to restore peace to their country, turned their eyes towards the dauphin; who, though not remarkable for his military talents, daily gained, by his prudence and vigilance, the ascendant over his enemies. Marcel, the seditious provost of Paris, was slain in attempting to deliver that city to the king of Navarre. The capital immediately returned to its duty: the most considerable bodies of the mutinous peasants were dispersed or put to the sword; some bands of military robbers underwent the same fate; and France began once more to assume the appearance of civil government.

John was succeeded in the throne of France by his son Charles V. a prince educated in the school of adversity, and well qualified, by his prudence and experience, to repair the losses which the kingdom had sustained from the errors of his predecessors. Contrary to the practice of all the great princes of those times, who held nothing in estimation but military courage, he seems to have laid it down as a maxim, never to appear at the head of his armies; and he was the first European monarch that showed the advantage of policy and foresight over a rash and precipitate valour.

Before Charles could think of counterbalancing so great a power as England, it was necessary for him to remedy the many disorders to which his own kingdom was exposed. He accordingly turned his arms against the king of Navarre, the great disturber of France during that age; and he defeated that prince, and reduced him to terms, by the valour and conduct of Bertrand du Guesclin, one of the most accomplished captains of those times, whom Charles had the discernment to choose as the instrument of his victories. He also settled the affairs of Brittany, by acknowledging the title of Mountfort, and receiving homage for his dominions. But much was yet to do. On the conclusion of the peace of Bretigny, the many military adventurers who had followed the fortunes of Edward, being dispersed into the several provinces, and possessed of strong-holds, refused to lay down their arms, or relinquish a course of life to which they were now accustomed, and by which alone they could earn a subsistence. They associated themselves with the banditti, who were already inured to the habits of rapine and violence; and, under the name of *companies* or *companions*, became a terror to all the peaceable inhabitants. Some English and Gascon gentlemen of character were not ashamed to take the command of these ruffians, whose number amounted to near 40,000, and who bore the appearance of regular armies rather than bands of robbers. As Charles was not able by power to redress so enormous a grievance, he was led by necessity, as well as by the turn of his character, to correct it by policy; to discover some method of discharging into foreign countries this dangerous and intestine evil; and an occasion now offered.

Alphonso XI. king of Castile, who took the city of Algezira,

Spain.
45
Escapes, and
heads the French mal-
contents.

46
Is defeated
and obliged
to submit to
the terms
prescribed
by Char. V.
of France.

47
Account of
the banditti
called com-
panies or
companions.

Spain.

Algezira from the Moors, after a famous siege of two years, during which artillery are said first to have been used by the besieged, had been succeeded by his son Peter I. surnamed *the Cruel*; a prince equally perfidious, debauched, and bloody. He began his reign with the murder of his father's mistress Leonora de Guzman: his nobles fell every day the victims of his severity: he put to death his cousin and one of his natural brothers, from groundless jealousy; and he caused his queen Blanche de Bourbon, of the blood of France, to be thrown into prison, and afterwards poisoned, that he might enjoy in quiet the embraces of Mary de Padella, with whom he was violently enamoured.

Henry count of Trastamara, the king's natural brother, alarmed at the fate of his family, and dreading his own, took arms against the tyrant; but having failed in the attempt, he fled to France, where he found the minds of men much inflamed against Peter, on account of the murder of the French princes. He asked permission of Charles to enlist the *companies* in his service, and to lead them into Castile against his brother. The French king, charmed with the project, employed du Guesclin in negotiating with the leaders of these banditti. The treaty was soon concluded; and du Guesclin having completed his levies, led the army first to Avignon, where the Pope then resided, and demanded, sword in hand, absolution for his Russian soldiers, who had been excommunicated, and the sum of 200,000 livres for their subsistence. The first was readily promised him; but some difficulty being made with regard to the second, du Guesclin replied, "My fellows, I believe, may make a shift to do without your absolution, but the money is absolutely necessary." His Holiness then extorted from the inhabitants of the city and its neighbourhood the sum of 100,000 livres, and offered it to du Guesclin. "It is not my purpose," cried that generous warrior, "to oppress the innocent people. The Pope and his cardinals can spare me double the sum from their own pockets. I therefore insist, that this money be restored to the owners; and if I hear they are defrauded of it, I will myself return from the other side of the Pyrenees, and oblige you to make them restitution." The Pope found the necessity of submitting, and paid from his own treasury the sum demanded.

A body of experienced and hardy soldiers, conducted by so able a general, easily prevailed over the king of Castile, whose subjects were ready to join the enemy against their oppressor. Peter fled from his dominions, took shelter in Guienne, and craved the protection of the prince of Wales, whom his father had invested with the sovereignty of the ceded provinces, under the title of the *principality of Aquitaine*. The prince promised his assistance to the dethroned monarch; and having obtained his father's consent, he levied an army, and set out on his enterprise.

The first loss which Henry of Trastamara suffered from the interposition of the prince of Wales, was the recalling of the companies from his service; and so much reverence did they pay to the name of Edward, that great numbers of them immediately withdrew from Spain, and enlisted under his standard. Henry, however, beloved by his new subjects, and supported by the king of Arragon, was able to meet the enemy with

an army of 100,000 men, three times the number of those commanded by the Black Prince; yet du Guesclin, and all his experienced officers, advised him to delay a decisive action; so high was their opinion of the valour and conduct of the English hero! But Henry, trusting to his numbers, ventured to give Edward battle on the banks of the Ebro, between Najara and Navarrete; where the French and Spaniards were defeated, with the loss of above 20,000 men, and du Guesclin and other officers of distinction taken prisoners. All Castile submitted to the victor; Peter was restored to the throne, and Edward returned to Guienne with his usual glory; having not only overcome the greatest general of his age, but restrained the most blood-thirsty tyrant from executing vengeance on his prisoners.

This gallant warrior had soon reason to repent of his connections with a man like Peter, lost to all sense of virtue and honour. The ungrateful monster refused the stipulated pay to the English forces. Edward abandoned him: he treated his subjects with the utmost barbarity; their animosity was roused against him; and du Guesclin having obtained his ransom, returned to Castile with the count of Trastamara, and some forces levied anew in France. They were joined by the Spanish malcontents; and having no longer the Black Prince to encounter, they gained a complete victory over Peter in the neighbourhood of Toledo. The tyrant now took refuge in a castle, where he was soon after besieged by the victors, and taken prisoner in endeavouring to make his escape. He was conducted to his brother Henry; against whom he is said to have rushed in a transport of rage, disarmed as he was. Henry slew him with his own hand, in resentment of his cruelties; and, though a bastard, was placed on the throne of Castile, which he transmitted to his posterity.

After the death of Peter the Cruel, nothing remarkable happened in Spain for almost a whole century; but the debaucheries of Henry IV. of Castile roused the resentment of his nobles, and produced a most singular insurrection, which led to the aggrandisement of the Spanish monarchy.

This prince, surnamed the *Impotent*, though continually surrounded with women, began his unhappy reign in 1454. He was totally enervated by his pleasures; and every thing in his court conspired to fetter the Castilians an example of the most abject flattery and most abandoned licentiousness. The queen, a daughter of Portugal, lived as openly with her parasites and her gallants as the king did with his minions and his mistresses. Pleasure was the only object, and effeminacy the only recommendation to favour the affairs of the state went every day into disorder; till the nobility, with the archbishop of Toledo at their head, combining against the weak and flagitious administration of Henry, arrogated to themselves, as one of the privileges of their order, the right of trying and passing sentence on their sovereigns, which they executed in a manner unprecedented in history.

All the malcontent nobility were summoned to meet at Avila: a spacious theatre was erected in a plain without the walls of the town: an image, representing the king, was seated on a throne, clad in royal robes,

Spain.

The Spaniards defeated and Peter restored.

Is again driven out, defeated, and put to death.

Reign of Henry the Impotent.

He is formally deposed.

48
Reign of Peter the Cruel, king of Castile.

49
The Companies employed against him.

50
He is driven out, but assisted by the Black Prince.

Spain.

with a crown on its head, a sceptre in its hand, and the sword of justice by its side. The accusation against Henry was read, and the sentence of deposition pronounced, in presence of a numerous assembly. At the close of the first article of the charge, the archbishop of Toledo advanced, and tore the crown from the head of the image; at the close of the second, the Conde de Placentia snatched the sword of justice from its side; at the close of the third, the Conde de Benavente wrested the sceptre from its hand; and at the close of the last, Don Diego Lopez de Stuniga tumbled it headlong from the throne. At the same instant, Don Alphonso, Henry's brother, a boy of about twelve years of age, was proclaimed king of Castile and Leon in his stead.

This extraordinary proceeding was followed by a civil war, which did not cease till some time after the death of the young prince, on whom the nobles had bestowed the kingdom. The archbishop and his party then continued to carry on war in the name of Isabella, the king's sister, to whom they gave the title of *Infanta*; and Henry could not extricate himself out of these troubles, nor remain quiet upon his throne, till he had signed one of the most humiliating treaties ever extorted from a sovereign: he acknowledged his sister Isabella the only lawful heiress of his kingdom, in prejudice to the rights of his reputed daughter Joan, whom the malcontents affirmed to be the offspring of an adulterous commerce between the queen and Don la Cueva. The grand object of the malcontent party now was the marriage of the princess Isabella, upon which, it was evident, the security of the crown and the happiness of the people must in a great measure depend. The alliance was sought by several princes: the king of Portugal offered her his hand; the king of France demanded her for his brother, and the king of Arragon for his son Ferdinand. The malcontents very wisely preferred the Aragonian prince, and Isabella prudently made the same choice: articles were drawn up; and they were privately married by the archbishop of Toledo.

Henry was enraged at this alliance, which he foresaw would utterly ruin his authority, by furnishing his rebellious subjects with the support of a powerful neighbouring prince. He disinherited his sister, and established the rights of his daughter. A furious civil war desolated the kingdom. The names of Joan and Isabella resounded from every quarter, and were every where the summons to arms. But peace was at length brought about. Henry was reconciled to his sister and Ferdinand; though it does not appear that he ever renewed Isabella's right to the succession: for he affirmed in his last moments, that he believed Joan to be his own daughter. The queen swore to the same effect; and Henry left a testamentary deed, transmitting the crown to his princess, who was proclaimed queen of Castile at Placentia. But the superior fortune and superior arms of Ferdinand and Isabella prevailed: the king of Portugal was obliged to abandon his niece and intended bride, after many ineffectual struggles, and several years of war. Joan retired into a convent; and the death of Ferdinand's father, which happened about this time, added the kingdoms of Arragon and Sicily to those of Leon and Castile.

Ferdinand and Isabella were persons of great pr-

dence, and, as sovereigns, highly worthy of imitation; but they do not seem to have merited all the praises bestowed upon them by the Spanish historians. They did not live like man and wife, having all things in common under the direction of the husband; but like two princes in close alliance: they neither loved nor hated each other; were seldom in company together; had each a separate council; and were frequently jealous of one another in the administration. But they were inseparably united in their common interests; always acting upon the same principles, and forwarding the same ends. Their first object was the regulation of their government, which the civil wars had thrown into the greatest disorder. Rapine, outrage, and murder, were become so common, as not only to interrupt commerce, but in a great measure to suspend all intercourse between one place and another. These evils the joint sovereigns suppressed by their wife policy, at the same time that they extended the royal prerogative.

About the middle of the 13th century, the cities in the kingdom of Arragon, and after their example those in Castile, had formed themselves into an association, distinguished by the name of the *Holy Brotherhood*. They exacted a certain contribution from each of the associated towns; they levied a considerable body of troops, in order to protect travellers and pursue criminals; and they appointed judges, who opened courts in various parts of the kingdom. Whoever was guilty of murder, robbery, or any act that violated the public peace, and was seized by the troops of the Brotherhood, was carried before their judges; who, without paying any regard to the exclusive jurisdiction which the lord of the place might claim, who was generally the author or abettor of the injustice, tried and condemned the criminals. The nobles often murmured against this salutary institution; they complained of it as an encroachment on one of their most valuable privileges, and endeavoured to get it abolished. But Ferdinand and Isabella, sensible of the beneficial effects of the Brotherhood, not only in regard to the police of their kingdom, but in its tendency to abridge, and by degrees annihilate, the territorial jurisdiction of the nobility, countenanced the institution upon every occasion, and supported it with the whole force of royal authority; by which means the prompt and impartial administration of justice was restored, and with it tranquillity and order returned.

But at the same time that their Catholic majesties (for such was the title they now bore) were giving vigour to their civil government, and securing their subjects from violence and oppression, an intemperate zeal led them to establish an ecclesiastical tribunal, equally contrary to the natural rights of humanity and the mild spirit of the gospel. This was the court of inquisition; which decides upon the honour, fortune, and even the life, of the unhappy wretch who happens to fall under the suspicion of heresy, or a contempt of any thing prescribed by the church, without his knowing, being confronted with his accusers, or permitted either defence or appeal. Six thousand persons were burnt by order of this sanguinary tribunal, within four years after the appointment of Torquemada, the first inquisitor-general; and upwards of 100,000 felt its fury. The same zeal, however, which led to the de- population

Spain.

38

Admi-
stration of
Ferdinand
and Isabella

39

Institution
of the Holy
Brother-
hood.

55

Is obliged
to acknow-
ledge his
sister Is-
abella to be
heirs to the king-
dom.

56

She is mar-
ried to Fer-
dinand of
Aragon.

57

Union
of the king-
doms of
Arragon
and Sicily
with Leon
and Castile.

60

And of the
Inquisition.

Spain.

population, and the barbarizing of Spain, led also to its aggrandisement.

61
Conquest
of Granada.

The kingdom of Granada now alone remained of all the Mahometan possessions in Spain. Princes equally zealous and ambitious were naturally disposed to turn their eyes on that fertile territory, and to think of increasing their hereditary dominions, by expelling the enemies of Christianity, and extending its doctrines. Every thing conspired to favour their project: the Moorish kingdom was a prey to civil wars; when Ferdinand, having obtained the bull of Sixtus IV. authorizing a crusade, put himself at the head of his troops, and entered Granada. He continued the war with rapid success: Isabella attended him in several expeditions; and they were both in great danger at the siege of Malaga; an important city, which was defended with great courage, and taken in 1487. Baza was reduced in 1489, after the loss of 20,000 men. Guadix and Almeria were delivered up to them by the Moorish king Alazgel, who had first dethroned his brother-Alboacen, and afterwards been chased from his capital by his nephew Abdali. That prince engaged in the service of Ferdinand and Isabella; who, after reducing every other place of eminence, undertook the siege of Granada. Abdali made a gallant defence; but all communication with the country being cut off, and all hopes of relief at an end, he capitulated, after a siege of eight months, on condition that he should enjoy the revenue of certain places in the fertile mountains of Alpujarros; that the inhabitants should retain the undisturbed possession of their houses, goods, and inheritances; the use of their laws, and the free exercise of their religion. Thus ended the empire of the Arabs in Spain, after it had continued about 800 years. They introduced the arts and sciences into Europe at a time when it was lost in darkness; they possessed many of the luxuries of life, when they were not even known among the neighbouring nations; and they seem to have given birth to that romantic gallantry which so eminently prevailed in the ages of chivalry, and which, blending itself with the veneration of the northern nations for the softer sex, still particularly distinguishes ancient from modern manners. But the Moors, notwithstanding these advantages, and the eulogies bestowed upon them by some writers, appear always to have been destitute of the essential qualities of a polished people, humanity, generosity, and mutual sympathy.

62
Jews expelled
from Spain.

The conquest of Granada was followed by the expulsion, or rather the pillage and banishment, of the Jews, who had engrossed all the wealth and commerce of Spain. The inquisition exhaulted its rage against these unhappy people, many of whom pretended to embrace Christianity, in order to preserve their property. About the same time their Catholic majesties concluded an alliance with the emperor Maximilian, and a treaty of marriage for their daughter Joan with his son Philip, archduke of Austria and sovereign of the Netherlands. About this time also the contract was concluded with Christopher Columbus for the discovery of new countries; and the counties of Roussillon and Cerdagne were agreed to be restored by Charles VIII. of France, before his expedition into Italy. The discovery of America was soon followed by extensive conquests in that quarter, as is related

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63
Discovery
of America,
&c.

under the articles MEXICO, PERU, CHILI, &c. which tended to raise the Spanish monarchy above any other in Europe.

Spain.

On the death of Isabella, which happened in 1506, Philip archduke of Austria came to Castile in order to take possession of that kingdom as heir to his mother-in-law; but he dying in a short time after, his son Charles V. afterwards emperor of Germany, became heir to the crown of Spain. His father at his death left the king of France governor to the young prince, and Ferdinand at his death left cardinal Ximenes sole regent of Castile, till the arrival of his grandson. This man, whose character is no less singular than illustrious, who united the abilities of a great statesman with the abject devotion of a superstitious monk, and the magnificence of a prime minister with the severity of a mendicant, maintained order and tranquility in Spain, notwithstanding the discontents of a turbulent and high-spirited nobility. When they disputed his right to the regency, he coolly showed them the testament of Ferdinand, and the ratification of that deed by Charles; but these not satisfying them, and argument proving ineffectual, he led them insensibly towards a balcony, whence they had a view of a large body of troops under arms, and a formidable train of artillery. "Behold," said the cardinal, "the powers which I have received from his Catholic majesty: by these I govern Castile; and will govern it, till the king, your master and mine, shall come to take possession of his kingdom." A declaration so bold and determined silenced all opposition; and Ximenes maintained his authority till the arrival of Charles in 1517.

65
Disgrace
and death
of cardinal
Ximenes.

The young king was received with universal acclamations of joy; but Ximenes found little cause to rejoice. He was seized with a violent disorder, supposed to be the effect of poison; and when he recovered, Charles, prejudiced against him by the Spanish grandees and his Flemish courtiers, slighted his advice, and allowed him every day to sink into neglect. The cardinal did not bear this treatment with his usual fortitude of spirit. He expected a more grateful return from a prince to whom he delivered a kingdom more flourishing than it had been in any former age, and authority more extensive and better established than the most illustrious of his ancestors had ever possessed. Conscious of his own integrity and merit, he could not therefore refrain from giving vent, at times, to indignation and complaint. He lamented the fate of his country, and foretold the calamities to which it would be exposed from the insolence, the rapaciousness, and the ignorance of strangers. But in the mean time he received a letter from the king, dismissing him from his councils, under pretence of easing his age of that burden which he had so long and so ably sustained. This letter proved fatal to the minister; for he expired in a few hours after reading it.

While Charles was taking possession of the throne of Maximilian Spain, in consequence of the death of one grandfather, attempts to another was endeavouring to obtain for him the imperial crown. With this view Maximilian assembled a diet at Augsburg, where he cultivated the favour of the electors by many acts of beneficence, in order to engage them to choose that young prince as his successor. But Maximilian himself never having been crowned by the pope, a ceremony deemed essential in that age,

66
Maximilian
elected
emperor.

41 D

28

Spain.

as well as in the preceding, he was considered only as king of the Romans, or emperor elect; and no example occurring in history of any person being chosen successor to a king of the Romans, the Germans, always tenacious of their forms, obstinately refused to confer upon Charles a dignity for which their constitution knew no name.

But though Maximilian could not prevail upon the German electors to choose his grandson of Spain king of the Romans, he had disposed their minds in favour of that prince; and other circumstances, on the death of the emperor, conspired to the exaltation of Charles. The imperial crown had so long continued in the Austrian line, that it began to be considered as hereditary in that family; and Germany, torn by religious disputes, stood in need of a powerful emperor, not only to preserve its own internal tranquillity, but also to protect it against the victorious arms of the Turks, who under Selim I. threatened the liberties of Europe. This fierce and rapid conqueror had already subdued the Mamelukes, and made himself master of Egypt and Syria. The power of Charles appeared necessary to oppose that of Selim. The extensive dominions of the house of Austria, which gave him an interest in the preservation of Germany; the rich sovereignty of the Netherlands and Franche-Comté; the entire possession of the great and warlike kingdom of Spain, together with that of Naples and Sicily, all united to hold him up to the first dignity among Christian princes; and the new world seemed only to be called into existence that its treasures might enable him to defend Christendom against the infidels. Such was the language of his partisans.

Francis I. however, no sooner received intelligence of the death of Maximilian, than he declared himself a candidate for the empire; and with no less confidence of success than Charles. He trusted to his superior years and experience; his great reputation in arms; and it was farther urged in his favour, that the impetuosity of the French cavalry, added to the firmness of the German infantry, would prove irresistible, and not only be sufficient, under a warlike emperor, to set limits to the ambition of Selim, but to break entirely the Ottoman power, and prevent it from ever becoming dangerous again to Germany.

Both claims were plausible. The dominions of Francis were less extensive, but more united than those of Charles. His subjects were numerous, active, brave, lovers of glory, and lovers of their king. These were strong arguments in favour of his power, so necessary at this juncture: but he had no natural interest in the Germanic body; and the electors, hearing so much of military force on each side, became more alarmed for their own privileges than the common safety. They determined to reject both candidates, and offered the imperial crown to Frederic, surname the *Wise*, duke of Saxony. But he, dazzled by the splendour of an object connected with so much eagerness by two mighty monarchs, rejected it with a magnanimity no less singular than great.

68
Speech of
Frederic
duke of
Saxony in
favour of
Charles.

“Lu times of tranquillity,” said Frederic, “we wish for an emperor who has no power to invade our liberties; times of danger demand one who is able to secure our safety. The Turkish armies, led by a warlike and victorious monarch, are now assembling: they

are ready to pour in upon Germany with a violence unknown in former ages. New conjectures call for new expedients. The imperial sceptre must be committed to some hand more powerful than mine or that of any other German prince. We possess neither dominions, nor revenues, nor authority, which enable us to encounter such a formidable enemy. Recourse must be had, in this exigency, to one of the rival monarchs. Each of them can bring into the field forces sufficient for our defence. But as the king of Spain is of German extraction, as he is a member and prince of the empire by the territories which descend to him from his grandfather, and as his dominions stretch along that frontier which lies most exposed to the enemy, his claim, in my opinion, is preferable to that of a stranger to our language, to our blood, and to our country.” Charles was elected in consequence of this speech, in the year 1520.

Spain.

The two candidates had hitherto conducted their rivalry with emulation, but without enmity. They had even mingled their competition with many expressions of friendship and regard. Francis in particular, declared with his usual vivacity, that his brother Charles and he were fairly and openly suitors to the same mistress: “The most assiduous and fortunate,” added he, “will win her; and the other must rest contented.” But the preference was no sooner given to his rival, than Francis discovered all the passions natural to disappointed ambition. He could not suppress his chagrin and indignation at being balked in his favourite pursuit, and rejected, in the face of all Europe, for a youth yet unknown to fame. The spirit of Charles resented such contempt: and from this hatred jealousy, as much as from opposition of interests, arose that emulation between those two great monarchs which involved them in almost perpetual hostilities, and kept their whole age in movement.

Charles and Francis had many interfering claims in Italy; and the latter thought himself bound in honour to restore the king of Navarre to his dominions, unjustly seized by the crown of Spain. They immediately began to negotiate; and as Henry VIII. of England was the third prince of the age in power and dignity, his friendship was eagerly courted by each of the rivals. He was the natural guardian of the liberties of Europe. Sensible of the consequence which his situation gave him, and proud of his pre-eminence, Henry knew it to be his interest to keep the balance even between the contending powers, and to restrain both, by not joining entirely with either; but he was seldom able to reduce his ideas to practice. Vanity and resentment were the great springs of all his undertakings; and his neighbours, by touching these, found an easy way to draw him into their measures, and force him upon many rash and inconsiderate enterprises.

All the impolitic steps in Henry's government must not, however, be imputed to himself; many of them were occasioned by the ambition and avarice of his prime minister and favourite cardinal Wolsey. This man, who, by his talents and accomplishments, had risen from one of the lowest conditions in life to the highest employments both in church and state, enjoyed a greater degree of power and dignity than any English subject ever possessed, and governed the haughty, presumptuous, and untractable spirit of Henry with abso-

69
He is elect-
ed in conse-
quence of
this speech.

70
A mutual
Place be-
tween
Charles and
Francis.

71
Both court
the friend-
ship of Henry
VIII. of
England.

Spain.

absolute authority. Francis was equally well acquainted with the character of Henry and of his minister. He had successfully flattered Wolsey's pride, by honouring him with particular marks of his confidence, and bestowing upon him the appellations of *Father, Tutor, and Governor*; and he had obtained the reliction of Tournay, by adding a pension to those respectful titles. He now solicited an interview with the king of England near Calais; in hopes of being able, by familiar conversation, to attach him to his friendship and interest, while he gratified the cardinal's vanity, by affording him an opportunity of displaying his magnificence in the presence of two courts, and of discovering to the two nations his influence over their monarchs. Charles dreaded the effects of this projected interview between two gallant princes, whose hearts were no less susceptible of friendship than their manners were of inspiring it. Finding it impossible, however, to prevent a visit, in which the vanity of all parties was so much concerned, he endeavoured to defeat its purpose, and to pre-occupy the favour of the English monarch, and of his minister, by an act of complaisance still more flattering and more uncommon. Relying wholly upon Henry's generosity for his safety, he landed at Dover, in his way from Spain to the Low Countries. The king of England, who was on his way to France, charmed with such an instance of confidence, hastened to receive his royal guest; and Charles, during his short stay, had the address not only to give Henry favourable impressions of his character and intentions, but to detach Wolsey entirely from the interest of Francis. The tiara had attracted the eye of that ambitious prelate; and as the emperor knew that the papacy was the sole point of elevation, beyond his present greatness, at which he could aspire, he made him an offer of his interest on the first vacancy.

The day of Charles's departure, Henry went over to Calais with his whole court, in order to meet Francis. Their interview was in an open plain between Guisnes and Ardres; where the two kings and their attendants displayed their magnificence with such emulation and profuse expence, as procured it the name of the *Field of the Cloth of Gold*. Here Henry erected a spacious house of wood and canvas, framed in London, on which, under the figure of an English archer, was the following motto: "He prevails whom I favour;" alluding to his own political situation, as holding in his hands the balance of power among the potentates of Europe. Feats of chivalry, however, parties of gallantry, and such exercises as were in that age reckoned manly or elegant, rather than serious business, occupied the two courts during the time that they continued together, which was 18 days.

After taking leave of this scene of dissipation, the king of England paid a visit to the emperor and Margaret of Savoy at Gravelines, and engaged them to go along with him to Calais; where the artful and politic Charles completed the impression which he had begun to make on Henry and his favourite, and effaced all the friendship to which the frank and generous nature of Francis had given birth. He renewed his assurances of assisting Wolsey in obtaining the papacy; and he put him in present possession of the revenues belonging to the sees of Badajoz and Palencia in Spain. He flattered Henry's pride, by convincing

him of his own importance, and of the justness of the motto which he had chosen; offering to submit to his sole arbitration any difference that might arise between him and Francis.

This important point being secured, Charles repaired to Aix-la-Chapelle, where he was solemnly invested with the crown and sceptre of Charlemagne, in presence of a more splendid and numerous assembly than had appeared on any former inauguration. About the same time Solymán the Magnificent, one of the most accomplished, enterprising, and victorious of the Turkish princes, and a constant and formidable rival to the emperor, ascended the Ottoman throne.

The first act of Charles's administration was, to appoint a diet of the empire, to be held at Worms, in order to concert with the princes proper measures for checking the progress of "those new and dangerous opinions which threatened to disturb the peace of Germany, and to overturn the religion of their ancestors." The opinions propagated by Luther and his followers were here meant. But all his efforts for that purpose were insufficient, as is related under the articles LUTHER and REFORMATION.

In 1521 the Spaniards, dissatisfied with the departure of their sovereign, whose election to the empire they foresaw would interfere with the administration of his own kingdom, and incensed at the avarice of the Flemings, to whom the direction of public affairs had been committed since the death of cardinal Ximenes, several grandees, in order to shake off this oppression, entered into an association, to which they gave the name of the *Santa Junta*; and the sword was appealed to as the means of redress. This seemed to Francis a favourable juncture for reinstating the family of John d'Albret in the kingdom of Navarre. Charles was at a distance from that part of his dominions, and the troops usually stationed there had been called away to quell the commotions in Spain. A French army, under Andrew de Foix, speedily conquered Navarre; but that young and inexperienced nobleman, pushed on by military ardour, ventured to enter Calile. The Spaniards, though divided among themselves, united against a foreign enemy, routed his forces, took him prisoner, and recovered Navarre in a shorter time than he had spent in subduing it.

Hostilities thus begun in one quarter, between the rival monarchs, soon spread to another. The king of France encouraged the duke of Bouillon to make war against the emperor, and invade Luxembourg. Charles, after humbling the duke, attempted to enter France; but was repelled and worsted before Mezières, by the famous chevalier Bayard, distinguished among his contemporaries by the appellation of *The Knight without fear and without reproach*; and who united the talents of a great general to the punctilious honour and romantic gallantry of the heroes of chivalry. Francis broke into the Low Countries, where, by an excess of caution, an error not natural to him, he lost an opportunity of cutting off the whole imperial army; and, what was of still more consequence, he disgusted the constable Bourbon, by giving the command of the van to the duke of Alençon.

During these operations in the field, an unsuccessful congress was held at Calais, under the mediation of

Spain.

⁷⁵ Charles invested with the imperial crown at Aix-la-Chapelle.

⁷² An interview projected between Francis and Henry.

⁷³ Charles visits Henry in England.

⁷⁶ War between Francis and Charles.

⁷⁴ Henry visits Francis in France.

Spain.

Henry VIII. It served only to exasperate the parties which it was intended to reconcile. A league was soon after concluded, by the intrigues of Wolsey, between the pope, Henry, and Charles, against France. Leo had already entered into a separate league with the emperor, and the French were fast losing ground in Italy.

The infolence and exactions of Marechal de Lautrec, governor of Milan, had totally alienated the affections of the Milanese from France. They resolved to expel the troops of that nation, and put themselves under the government of Francis Sforza, brother to Maximilian their late duke. In this resolution they were encouraged by the pope, who excommunicated Lautrec, and took into his pay a considerable body of Swifs. The papal army, commanded by Prosper Colonna, an experienced general, was joined by supplies from Germany and Naples; while Lautrec, neglected by his court, and deserted by the Swifs in its pay, was unable to make head against the enemy. The city of Milan was betrayed by the inhabitants to the confederates; Parma and Placentia were united to the ecclesiastical state; and of their conquests in Lombardy, only the town of Cremona, the castle of Milan, and a few inconsiderable forts, remained in the hands of the French.

Leo X. received the accounts of this rapid success with such transports of joy, as are said to have brought on a fever, which occasioned his death. The spirit of the confederacy was broken, and its operations suspended by this accident. The Swifs were recalled; some other mercenaries disbanded for want of pay; and only the Spaniards, and a few Germans in the emperor's service, remained to defend the duchy of Milan. But Lautrec, who with the remnant of his army had taken shelter in the Venetian territories, destitute both of men and money, was unable to improve this favourable opportunity as he wished. All his efforts were rendered ineffectual by the vigilance and ability of Colonna and his associates.

Meantime much discord prevailed in the conclave. Wolsey's name, notwithstanding all the emperor's magnificent promises, was scarcely mentioned there. Julio de Medici, Leo's nephew, thought himself sure of the election; when, by an unexpected turn of fortune, cardinal Adrian of Utrecht, Charles's preceptor, who at that time governed Spain in the emperor's name, was unanimously raised to the papacy, to the astonishment of all Europe and the great disgust of the Italians.

Francis, roused by the rising consequence of his rival, resolved to exert himself with fresh vigour, in order to wrest from him his late conquests in Lombardy. Lautrec received a supply of money, and a recruit of 10,000 Swifs. With this reinforcement he was enabled once more to act offensively, and even to advance within a few miles of the city of Milan; when money again failing him, and the Swifs growing mutinous, he was obliged to attack the imperialists in their camp at Bicocca, where he was repulsed with great slaughter, having lost his bravest officers and best troops. Such of the Swifs as survived set out immediately for their own country; and Lautrec, despairing of being able to keep the field, retired into France. Genoa, which still remained

subject to Francis, and made it easy to execute any scheme for the recovery of Milan, was soon after taken by Colonna: the authority of the emperor and his faction was every where established in Italy. The citadel of Cremona was the sole fortress which remained in the hands of the French.

The affliction of Francis for such a succession of misfortunes was augmented by the unexpected arrival of an English herald, who in the name of his sovereign declared war against France. The courage of this excellent prince, however, did not forsake him; tho' his treasury was exhausted by expensive pleasures, no less than by hostile enterprises, he assembled a considerable army, and put his kingdom in a posture of defence for resisting this new enemy, without abandoning any of the schemes which he was forming against the emperor. He was surprised, but not alarmed, at such a denunciation.

Meanwhile Charles, willing to draw as much advantage as possible from so powerful an ally, paid a second visit to the court of England in his way to Spain, where his presence was become necessary. His success exceeded his most sanguine expectations. He not only gained the entire friendship of Henry, who publicly ratified the treaty of Bruges; but disarmed the resentment of Wolsey, by assuring him of the papacy on Adrian's death; an event seemingly not distant, by reason of his age and infirmities. In consequence of these negotiations an English army invaded France, under the command of the earl of Surrey; who, at the end of the campaign, was obliged to retire, with his forces greatly reduced, without being able to make himself master of one place within the French frontier. Charles was more fortunate in Spain: he soon quelled the tumults which had there arisen in his absence.

While the Christian princes were thus wasting each other's strength, Solymán the Magnificent entered Hungary, and made himself master of Belgrade, reckoned the chief barrier of that kingdom against the Turkish power. Encouraged by this success, he turned his victorious arms against the island of Rhodes, at that time the seat of the knights of St John of Jerusalem; and though every prince in that age acknowledged Rhodes to be the great bulwark of Christendom in the east, so violent was their animosity against each other, that they suffered Solymán without disturbance to carry on his operations against that city and island. Lisle Adam, the grand-master, made a gallant defence; but, after incredible efforts of courage, patience, and military conduct, during a siege of six months, he was obliged to surrender the place, having obtained an honourable capitulation from the sultan, who admired and respected his heroic qualities. See RHODES and MALTA. Charles and Francis were equally ashamed of having occasioned such a loss to Christendom by their contentions; and the emperor, by way of reparation, granted to the knights of St John the small island of Malta, where they fixed their residence, and continued long to retain their ancient spirit, though much diminished in power and splendour.

Adrian VI. though the creature of the emperor and devoted to his interest, endeavoured to assume the impartiality which became the common father of Christen-

77
Rapid conquests of Charles.

79
Charles visits England a second time.

80
Rhodes taken by Solymán.

78
Francis invades Italy.

Spain.

Christendom, and laboured to reconcile the contending princes, that they might unite in a league against Solymán, whose conquest of Rhodes rendered him more formidable than ever to Europe. The Italian states were no less desirous of peace than the pope : and so much regard was paid by the hostile powers to the exhortations of his holiness, and to a bull which he issued, requiring all Christian princes to consent to a truce for three years, that the imperial, the French, and the English ambassadors at Rome, were empowered to treat of that matter; but while they waited their time in fruitless negotiations, their masters were continuing their preparations for war; and other negotiations soon took place. The confederacy against France became more formidable than ever.

81
A powerful
confederacy
against
Francis.

The Venetians, who had hitherto adhered to the French interest, formed engagements with the emperor for securing Francis Sforza in the possession of the duchy of Milan; and the pope, from a persuasion that the ambition of the French monarch was the only obstacle to peace, acceded to the same alliance. The Florentines, the dukes of Ferrara and Mantua, and all the Italian powers, followed this example. Francis was left, without a single ally, to resist the efforts of a multitude of enemies, whose armies every where threatened, and whose territories encompassed his dominions. The emperor in person menaced France with an invasion on the side of Guienne; the forces of England and the Netherlands hovered over Picardy, and a numerous body of Germans was preparing to ravage Burgundy.

82
Francis
marches to-
wards Italy,
but is obli-
ged to re-
turn by a
domestic
conspiracy.

The dread of so many and such powerful adversaries, it was thought, would have obliged Francis to keep wholly on the defensive, or at least have prevented him from entertaining any thoughts of marching into Italy. But before his enemies were able to strike a blow, Francis had assembled a great army, with which he hoped to disconcert all the emperor's schemes, by marching it in person into Italy: and this bold measure, the more formidable because unexpected, could scarcely have failed of the desired effect, had it been immediately carried into execution. But the discovery of a domestic conspiracy, which threatened the destruction of his kingdom, obliged Francis to stop short at Lyons.

Charles duke of Bourbon, lord high constable of France, was a prince of the most shining merit: his great talents equally fitted him for the council or the field, while his eminent services to the crown entitled him to its first favour. But unhappily Louisa duchess of Angouleme, the king's mother, had contracted a violent aversion against the house of Bourbon, and had taught her son, over whom she had acquired an absolute ascendancy, to view all the constable's actions with a jealous eye. After repeated affronts he retired from court, and began to listen to the advances of the emperor's ministers. Meantime the duchess of Bourbon died; and as the constable was no less amiable than accomplished, the duchess of Angouleme, still susceptible of the tender passions, formed the scheme of marrying him. But Bourbon, who might have expected every thing to which an ambitious mind can aspire, from the doating fondness of a woman who governed her son and the kingdom, incapable of imitating Louisa in her sudden transition from hate to love, or of

meanly counterfeiting a passion for one who had so long pursued him with unprovoked malice, rejected the match with disdain, and turned the proposal into ridicule. At once despised and insulted by the man whom love only could have made her cease to persecute, Louisa was filled with all the rage of disappointed woman; she resolved to ruin, since she could not marry, Bourbon. For this purpose she commenced an iniquitous suit against him; and by the chicanery of chancellor du Prat, the constable was stripped of his whole family-estate. Driven to despair by so many injuries, he entered into a secret correspondence with the emperor and the king of England; and he proposed, as soon as Francis should have crossed the Alps, to raise an insurrection among his numerous vassals, and introduce foreign enemies into the heart of France.

Happily Francis got intimation of this conspiracy before he left the kingdom: but not being sufficiently convinced of the Constable's guilt, he suffered so dangerous a foe to escape; and Bourbon, entering into the emperor's service, employed all the force of his enterprising genius, and his great talents for war, to the prejudice of his prince and his native country.

In consequence of the discovery of this plot, and the escape of the powerful conspirator, Francis relinquished his intention of leading his army in person into Italy. He was ignorant how far the infection had spread among his subjects, and afraid that his absence might encourage them to make some desperate attempt in favour of a man so much beloved. He did not, however, abandon his design on the Milanese, but sent forward an army of 30,000 men, under the command of admiral Bonnavet. Colonna, who was entrusted with the

83
A French
army enters
Italy.

defence of that duchy, was in no condition to resist such a force; and the city of Milan, on which the whole territory depends, must have fallen into the hands of the French, had not Bonnavet, who possessed none of the talents of a general, waited his time in frivolous enterprises, till the inhabitants recovered from their consternation. The imperial army was reinforced. Colonna died; and Lannoy, viceroy of Naples, succeeded him in the command: but the chief direction of military operations was committed to Bourbon and the marquis de Pescara, the greatest generals of their age. Bonnavet, destitute of troops to oppose this new army, and still more of the talents which could render him a match for its leaders, after various movements and encounters, was reduced to the necessity of attempting a retreat into France. He was followed by the imperial generals, and routed at Biagrasa, where the famous chevalier Bayard was killed.

The emperor and his allies were less successful in their attempts upon France. They were baffled in every quarter: and Francis, though stripped of his Italian dominions, might still have enjoyed in safety the glory of having defended his native kingdom against one half of Europe, and have bid defiance to all his enemies; but understanding that the king of England, discouraged by his former fruitless enterprises, and disgusted with the emperor, was making no preparations for any attempt on Picardy, his ancient ardour seized him for the conquest of Milan, and he deter- mined, notwithstanding the advanced season, to march into Italy.

85
Francis de-
termines
to enter
Italy in per-
son.

The French army no sooner appeared in Piedmont, than

Spain.

than the whole Milanese was thrown into consternation. The capital opened its gates. The forces of the emperor and Sforza retired to Lodi: and had Francis been so fortunate as to pursue them, they must have abandoned that post, and been totally dispersed; but his evil genius led him to besiege Pavia, a town of considerable strength, well garrisoned, and defended by Antonio de Leyva, one of the bravest officers in the Spanish service; before which place he was defeated and taken prisoner, as related under the article FRANCE, n° 73.

86
Is defeated
and taken
prisoner at
Pavia.

The captivity of Francis filled all Europe with alarm. Almost the whole French army was cut off; Milan was immediately abandoned; and in a few weeks not a Frenchman was left in Italy. The power of the emperor, and still more his ambition, became an object of universal terror; and resolutions were every where taken to set bounds to it. Meanwhile Francis, deeply impressed with a sense of his misfortune, wrote to his mother Louisa, whom he had left regent of the kingdom, the following short, but expressive letter: "All, Madam, is lost but honour." The same courier that carried this letter, carried also dispatches to Charles; who received the news of the signal and unexpected success which had crowned his arms with the most hypocritical moderation. He would not suffer any public rejoicings to be made on account of it; and said, he only valued it, as it would prove the occasion of restoring peace to Christendom. Louisa, however, did not trust to those appearances; if she could not preserve what was yet left, she determined at least that nothing should be lost through her negligence or weakness. Instead of giving herself up to such lamentations as were natural to a woman so remarkable for maternal tenderness, she discovered all the foresight, and exerted all the activity of a consummate politician. She took every possible measure for putting the kingdom in a posture of defence, while she employed all her address to appease the resentment and to gain the friendship of England; and a ray of comfort from that quarter soon broke in upon the French affairs.

87
Hypocritical
conduct
of Charles.

Though Henry VIII. had not entered into the war against France from any concerted political views, he had always retained some imperfect idea of that balance of power which it was necessary to maintain between Charles and Francis; and the preservation of which he boasted to be his peculiar office. By his alliance with the emperor, he hoped to recover some part of those territories on the continent which had belonged to his ancestors; and therefore willingly contributed to give him the ascendancy above his rival; but having never dreamt of any event so decisive and fatal as the victory at Pavia, which seemed not only to have broken, but to have annihilated the power of Francis, he now became sensible of his own danger, as well as that of all Europe, from the loss of a proper counterpoise to the power of Charles. Instead of taking advantage of the distressed condition of France, Henry therefore determined to assist her in her present calamities. Some disputes also had taken place between him and Charles, and still more between Charles and Wolsey. The elevation of the cardinal of Medici to St Peter's chair, on the death of Adrian, under the name of Clement VII. had made the English minister sensible of the influence

89
France as-
sisted by
Henry VIII.

of the emperor's promises, while it extinguished all his hopes of the papacy; and he resolved on revenge. Charles, too, had so ill supported the appearance of moderation which he assumed, when first informed of his good fortune, that he had already changed his usual style to Henry; and instead of writing to him with his own hand, and subscribing himself "your affectionate son and cousin," he dictated his letters to a secretary, and simply subscribed himself "Charles." Influenced by all these motives, together with the glory of raising a fallen enemy, Henry listened to the flattering submissions of Louisa; entered into a defensive alliance with her as regent of France, and engaged to use his best offices in order to procure the deliverance of her son from a state of captivity.

Meanwhile Francis was rigorously confined; and Francis severely conditions being proposed to him as the price of his liberty, he drew his dagger, and, pointing it at his breast, cried, " 'Twere better that a king should die thus!" His hand was with-held; and flattering himself, when he grew cool, that such propositions could not come directly from Charles, he desired that he might be removed to Spain, where the emperor then resided. His request was complied with; but he languished long before he obtained a sight of his conqueror. At last he was favoured with a visit; and the emperor dreading a general combination against him, or that Francis, as he threatened, might, in the obstinacy of his heart, resign his crown to the dauphin, agreed to abate somewhat of his former demands. A treaty was accordingly concluded at Madrid; in consequence of which Francis obtained his liberty. The chief article in this treaty was, that Burgundy should be restored to Charles as the rightful inheritance of his ancestors, and that Francis's two eldest sons should be immediately delivered up as hostages for the performance of the conditions stipulated. The exchange of the captive monarch for his children was made on the borders between France and Spain. The moment that Francis entered his own dominions, he mounted a Turkish horse, and putting it to its speed, waved his hand, and cried aloud several times, "I am yet a king! I am yet a king!"

90
Is at last
released.

Francis never meant to execute the treaty of Madrid; he had even left a protest in the hands of notaries before he signed it, that his consent should be considered as an involuntary deed, and be deemed null and void. Accordingly, as soon as he arrived in France, he assembled the states of Burgundy, who protested against the article relative to their province; and Francis coldly replied to the imperial ambassadors, who urged the immediate execution of the treaty, that he would religiously perform the articles relative to himself, but in those affecting the French monarchy, he must be directed by the sense of the nation. He made the highest acknowledgments to the king of England for his friendly interposition, and offered to be entirely guided by his counsels. Charles and his ministers saw that they were over-reached in those very arts of negotiation in which they so much excelled, while the Italian states observed with pleasure, that Francis was resolved not to execute a treaty which they considered as dangerous to the liberties of Europe. Clement absolved him from the oath which he

89
Francis se-
verely used
by his con-
queror.

91
Refuses to
execute the
conditions
of his re-
lease.

Spain.

had taken at Madrid; and the kings of France and England, the Pope, the Swiss, the Venetians, the Florentines, and the duke of Milan, entered into an alliance, to which they gave the name of the *Holy League*, because his Holiness was at the head of it, in order to oblige the emperor to deliver up Francis's two sons on the payment of a reasonable ransom, and to re-establish Sforza in the quiet possession of the Milanese.

In consequence of this league, the confederate army took the field, and Italy once more became the scene of war. But Francis, who it was thought would have infused spirit and vigour into the whole body, had gone through such a scene of distress, that he was become diffident of himself, distrustful of his fortune, and desirous of tranquillity. He flattered himself, that the dread alone of such a confederacy would induce Charles to listen to what was equitable, and therefore neglected to send due reinforcements to his allies in Italy. Meantime the duke of Bourbon, who commanded the Imperialists, had made himself master of the whole Milanese, of which the emperor had promised him the investiture; and his troops beginning to mutiny for want of pay, he led them to Rome, and promised to enrich them with the spoils of that city. He was as good as his word; for though he himself was slain in planting a scaling ladder against the walls, his soldiers, rather enraged than discouraged by his death, mounted to the assault with the utmost ardour, animated by the greatness of the prize, and, entering the city sword in hand, plundered it for several days.

Never did Rome in any age suffer so many calamities, not even from the Barbarians, by whom she was often subdued, the Huns, Vandals, or Goths, as now from the subjects of a Christian and Catholic monarch. Whatever was respectable in modesty, or sacred in religion, seemed only the more to provoke the rage of the soldiery. Virgins suffered violation in the arms of their parents, and upon those altars to which they had fled for safety. Venerable prelates, after enduring every indignity and every torture, were thrown into dungeons, and menaced with the most cruel death, in order to make them reveal their secret treasures. Clement himself, who had neglected to make his escape in time, was taken prisoner, and found that the sacredness of his character could neither procure him liberty nor respect. He was confined till he should pay an enormous ransom imposed by the victorious army, and surrender to the emperor all the places of strength belonging to the church.

Charles received the news of this extraordinary event with equal surprise and pleasure; but in order to conceal his joy from his Spanish subjects, who were filled with horror at the insult offered to the sovereign pontiff, and to lessen the indignation of the rest of Europe, he expressed the most profound sorrow for the success of his arms. He put himself and his court into mourning; stopped the rejoicings for the birth of his son Philip, and ordered prayers to be put up in all the churches of Spain for the recovery of the Pope's liberty, which he could immediately have procured by a letter to his generals.

The concern expressed by Henry and Francis for the calamity of their ally was more sincere. Alarmed at the progress of the imperial arms, they had,

even before the taking of Rome, entered into a closer alliance, and agreed to invade the Low-Countries with a powerful army; but no sooner did they hear of the Pope's captivity, than they changed, by a new treaty, the scene of the projected war from the Netherlands to Italy, and resolved to take the most vigorous measures for restoring him to liberty. Henry, however, contributed only money. A French army entered Italy, under the command of Marshal Lautrec; Clement obtained his freedom; and war was for a time carried on by the confederates with success; but the death of Lautrec, and the revolt of Andrew Doria, a Genoese admiral in the service of France, entirely changed the face of affairs. The French army was utterly ruined; and Francis, discouraged and almost exalted by so many unsuccessful enterprises, began to think of peace, and of obtaining the release of his sons by concessions, not by the terror of his arms.

At the same time Charles, notwithstanding the advantages he had gained, had many reasons to wish for an accommodation. Sultan Solymán having over-run Hungary, was ready to break in upon the Austrian territories with the whole force of the East; and the progress of the Reformation in Germany threatened the tranquillity of the empire. In consequence of this situation of affairs, though pride made both parties conceal or dissemble their real sentiments, two ladies were permitted to restore peace to Europe. Margaret of Austria, Charles's aunt, and Louisa, Francis's mother, met in 1529 at Cambray, and settled the terms of accommodation between the French king and the emperor. Francis agreed to pay two millions of crowns as the ransom of his two sons, to resign the sovereignty of Flanders and Artois, and forego all his Italian claims; and Charles ceased to demand the restitution of Burgundy.

All the steps of this negotiation had been communicated to the king of England; and Henry was, on that occasion, so generous to his friend and ally Francis, that he sent him an acquittal of near six hundred thousand crowns, in order to enable him to fulfil his agreement with Charles. But Francis's Italian confederates were less satisfied with the treaty of Cambray. They were almost wholly abandoned to the will of the emperor; and seemed to have no other means of security left but his equity and moderation. Of these, from his past conduct, they had not formed the most advantageous idea. But Charles's present circumstances, more especially in regard to the Turks, obliged him to behave with a generosity inconsistent with his character. The Florentines alone, whom he reduced under the dominion of the family of Medici, had reason to complain of his severity. Sforza obtained the investiture of Milan and his pardon; and every other power experienced the lenity of the conqueror.

After having received the imperial crown from the hands of the Pope at Bologna, Charles proceeded on his journey to Germany, where his presence was become highly necessary; for although the conduct and valour of his brother Ferdinand, on whom he had conferred the hereditary dominions of the house of Austria, and who had been elected king of Hungary, had obliged Solymán to retire with infamy and loss, his return was to be feared, and the disorders of religion were daily increasing; an account of which, and

Spain.

96
A French army enters Italy, but is utterly ruined.

97
Peace concluded at Cambray.

98
Charles goes into Germany.

of.

92
Rome taken by the imperialists.

93
And most cruelly plundered.

94
The Pope confined.

95
Shameful hypocrisy of Charles.

Spain: of the emperor's transactions with the Protestants, is given under the article REFORMATION.

99 He undertakes an expedition against the state of Barbary. Charles having exerted himself as much as he could against the reformers, undertook his first expedition against the piratical states of Africa. Barbary, or that part of the African continent lying along the coast of the Mediterranean sea, was then nearly in the same condition which it is at present. Morocco, Algiers, and Tunis, were its principal states; and the two last were nests of pirates. Barbarossa, a famous Corsair, had succeeded his brother in the kingdom of Algiers, which he had formerly assisted him to usurp. He regulated with much prudence the interior police of his kingdom, carried on his piracies with great vigour, and extended his conquests on the continent of Africa; but perceiving that the natives submitted to his government with impatience, and fearing that his continual depredations would one day draw upon him a general combination of the Christian powers, he put his dominions under the protection of the grand seignor. Solymán, flattered by such an act of submission, and charmed with the boldness of the man, offered him the command of the Turkish fleet. Proud of this distinction, Barbarossa repaired to Constantinople, and made use of his influence with the sultan to extend his own dominion. Partly by force, partly by treachery, he usurped the kingdom of Tunis; and being now possessed of greater power, he carried on his depredations against the Christian states with more destructive violence than ever.

Daily complaints of the piracies and ravages committed by the galleys of Barbarossa were brought to the emperor by his subjects, both in Spain and Italy; and all Christendom seemed to look up to him, as its greatest and most fortunate prince, for relief from this new and odious species of oppression. At the same time Muley-Hascen, the exiled king of Tunis, finding none of the African princes able or willing to support him in recovering his throne, applied to Charles for assistance against the usurper. Equally desirous of delivering his dominions from the dangerous neighbourhood of Barbarossa, of appearing as the protector of an unfortunate prince, and of acquiring the glory annexed in that age to every expedition against the Mahometans, the emperor readily concluded a treaty with Muley-Hascen, and set sail for Tunis with a formidable armament. The Goletta, a sea-port town, fortified with 300 pieces of cannon, was taken, together with all Barbarossa's fleet: he was defeated in a pitched battle; and 10,000 Christian slaves, having knocked off their fetters, and made themselves masters of the citadel, Tunis was preparing to surrender; but while Charles was deliberating on the conditions, his troops fearing that they would be deprived of the booty which they had expected, broke suddenly into the town, and pillaged and massacred without distinction. Thirty thousand persons perished by the sword, and 10,000 were made prisoners. The sceptre was restored to Muley-Hascen, on condition that he should acknowledge himself a vassal of the crown of Spain, put into the emperor's hands all the fortified sea-ports in the kingdom of Tunis, and pay annually 12,000 crowns for the subsistence of the Spanish garrison in the Goletta. These

points being settled, and 20,000 Christian slaves freed from bondage either by arms or by treaty, Charles returned to Europe, where his presence was become necessary; while Barbarossa, who had retired to Bona, recovered new strength, and again became the tyrant of the ocean.

The king of France took advantage of the emperor's absence to revive his pretensions in Italy. The treaty of Cambray had covered up, but not extinguished, the flames of discord. Francis in particular, who waited only for a favourable opportunity of recovering the territories and reputation which he had lost, continued to negotiate against his rival with different courts. But all his negotiations were disconcerted by unforeseen accidents. The death of Clement VII. (whom he had gained by marrying his son the duke of Orleans, afterwards Hen. II. to Catharine of Medici, the niece of that pontiff), deprived him of all the support which he hoped to receive from the court of Rome. The king of England, occupied with domestic cares and projects, declined engaging in the affairs of the continent; and the Protestant princes, associated by the league of Smalkalde, to whom also Francis had applied, and who seemed disposed at first to listen to him, filled with indignation and resentment at the cruelty with which some of their reformed brethren had been treated in France, refused to have any connection with the enemy of their religion.

Francis was neither cruel nor bigotted: he was too indolent to concern himself about religious disputes; but his principles becoming suspected, at a time when the emperor was gaining immortal glory by his expedition against the Infidels, he found it necessary to vindicate himself by some extraordinary demonstration of reverence for the established faith. The indiscreet zeal of some Protestant converts furnished him with the occasion. They had affixed to the gates of the Louvre, and other public places, papers containing indecent reflections on the rites of the Romish church. Six of the persons concerned in this rash action were seized; and the king, pretending to be struck with horror at their blasphemies, appointed a solemn procession, in order to avert the wrath of heaven. The holy sacrament was carried through the city of Paris in great pomp: Francis walked uncovered before it, bearing a torch in his hand; the princes of the blood supported the canopy over it; the nobles walked behind. In presence of this numerous assembly, the king declared, that if one of his hands were infected with heresy, he would cut it off with the other; "and I would sacrifice," added he, "even my own children, if found guilty of that crime." As an awful proof of his sincerity, the six unhappy persons who had been seized were publicly burnt, before the procession was finished, and in the most cruel manner. They were fixed upon a machine which descended into the flames, and retired alternately, until they expired.—Little wonder that the Protestant princes were incensed at such barbarity!

But Francis, though unsupported by any ally, commanded his army to advance towards the frontiers of Italy, under pretence of chastising the duke of Milan for a breach of the law of nations, in putting to death his ambassador. The operations of war, however, soon took a new direction. Instead of marching directly

Spain;

107 Francis attempts in vain to revive his pretensions to Italy.

108 His barbarity to the Protestants.

100 Tunis taken, and the inhabitants cruelly massacred.

109 Causes an army march towards Italy.

Spain.

directly to the Milanese, Francis commenced hostilities against the duke of Savoy, with whom he had cause to be dissatisfied, and on whom he had some claims; and before the end of the campaign, that feeble prince saw himself stripped of all his dominions, except the province of Piedmont. To complete his misfortunes, the city of Geneva, the sovereignty of which he claimed, and where the reformed opinions had already got footing, threw off his yoke; and its revolt drew along with it the loss of the adjacent territory. Geneva was then an imperial city, and has ever since remained entirely free.

104
Geneva
throws off
the yoke of
the duke of
Savoy.

In this extremity, the duke of Savoy saw no resource but in the emperor's protection; and as his misfortunes were chiefly occasioned by his attachment to the imperial interest, he had a title to immediate assistance. But Charles, who was just returned from his African expedition, was not able to lend him the necessary support. His treasury was entirely drained, and he was obliged to disband his army till he could raise new supplies. Mean time the death of Sforza duke of Milan entirely changed the nature of the war, and afforded the emperor full leisure to prepare for action. The French monarch's pretext for taking up arms was at once cut off; but as the duke died without issue, all Francis's rights to the duchy of Milan, which he had yielded only to Sforza and his descendants, returned to him in full force. He instantly renewed his claim to it; and if he had ordered his army immediately to advance, he might have made himself master of it. But he unfortunately wasted his time in fruitless negotiations, while his more politic rival took possession of the duchy as a vacant fief of the empire; and though Charles seemed still to admit the equity of Francis's claim, he delayed granting the investiture under various pretences, and was secretly taking every possible measure to prevent his regaining footing in Italy.

105
Charles
takes pos-
session of
Milan.

During the time gained in this manner, Charles had recruited his finances, and of course his armies; and finding himself in a condition for war, he at last threw off the mask under which he had so long concealed his designs from the court of France. Entering Rome with great pomp, he pronounced before the pope and cardinals, assembled in full consistory, a violent invective against Francis, by way of reply to his propositions concerning the investiture of Milan. Yet Francis, by an unaccountable fatality, continued to negotiate, as if it had been still possible to terminate their differences in an amicable manner; and Charles, finding him so eager to run into the snare, favoured the deception, and, by seeming to listen to his proposals, gained yet more time for the execution of his ambitious projects.

106
Weakness
of Francis.

107
Charles at-
tempts to
subvert the
French
monarchy.

If misfortunes had rendered Francis too diffident, success had made Charles too sanguine. He presumed on nothing less than the subversion of the French monarchy; nay, he considered it as an infallible event. Having chafed the forces of his rival out of Piedmont and Savoy, he pushed forward at the head of 50,000 men, contrary to the advice of his most experienced ministers and generals, to invade the southern provinces of France; while other two armies were ordered to enter it, the one on the side of Picardy, the other on the side of Champagne. He thought it impossible that

Francis could resist so many unexpected attacks on such different quarters; but he found himself mistaken.

Spain.

108

The French monarch fixed upon the most effectual plan for defeating the invasion of a powerful enemy; and he prudently persevered in following it, though contrary to his own natural temper and to the genius of his people. He determined to remain altogether upon the defensive, and to deprive the enemy of subsistence by laying waste the country before them. The execution of this plan was committed to the marshal Montmorency its author, a man happily fitted for such a trust by the inflexible severity of his disposition. He made choice of a strong camp, under the walls of Avignon, at the confluence of the Rhone and Durance, where he assembled a considerable army; while the king, with another body of troops, encamped at Valence, higher up the Rhone. Marseilles and Arles were the only towns he thought it necessary to defend; and each of these he furnished with a numerous garrison of his best troops. The inhabitants of the other towns were compelled to abandon their habitations; the fortifications of such places as might have afforded shelter to the enemy were thrown down; corn, forage, and provisions of every kind were carried off or destroyed; the mills and ovens were ruined, and the wells filled up or rendered useless.

But is dis-
appointed
in his de-
signs.

This devastation extended from the Alps to Marseilles, and from the sea to the confines of Dauphiny; so that the emperor, when he arrived with the van of his army on the confines of Provence, instead of that rich and populous country which he expected to enter, beheld nothing but one vast and desert solitude. He did not, however, despair of success, though he saw that he would have many difficulties to encounter; and as an encouragement to his officers, he made them liberal promises of lands and honours in France. But all the land which any of them obtained was a grave, and their master lost much honour by this rash and presumptuous enterprise. After unsuccessfully investing Marseilles and Arles, after attempting in vain to draw Montmorency from his camp at Avignon, and not daring to attack it, Charles, having spent two inglorious months in Provence, and lost one half of his troops by disease or by famine, was under the necessity of ordering a retreat; and though he was some time in motion before the enemy suspected his intention, it was conducted with so much precipitation and disorder, as to deserve the name of a flight, since the light troops of France turned it into a perfect rout. The invasion of Picardy was not more successful; the imperial forces were obliged to retire without effecting any conquest of importance.

Charles had no sooner conducted the shattered remains of his army to the frontiers of Milan, than he set out for Genoa; and, unwilling to expose himself to the scorn of the Italians after such a reverse of fortune, he embarked directly for Spain.

109

Meanwhile Francis gave himself up to that vain resentment which had formerly disgraced the prosperity of his rival. They had frequently, in the course of their quarrels, given each other the lie, and mutual challenges had been sent; which, though productive of no serious consequences between the parties, had a powerful tendency to encourage the pernicious practice of duelling. Charles, in his invective pronounced

Violent ani-
mosity be-
tween him
and Francis.

Spain.

at Rome, had publicly accused Francis of perfidy and breach of faith; Francis now exceeded Charles in the indecency of his accusations. The Dauphin dying suddenly, his death was imputed to poison: Monteculi his cup-bearer was put to the rack; and that unhappy nobleman, in the agonies of torture, accused the emperor's generals, Gonzaga and de Leyva, of instigating him to the detestable act. The emperor himself was suspected; nay, this extorted confession, and some obscure hints, were considered as incontestable proofs of his guilt; though it was evident to all mankind, that neither Charles nor his generals could have any inducement to perpetrate such a crime, as Francis was still in the vigour of life himself, and had two sons besides the dauphin, grown up to a good age.

But the incensed monarch's resentment did not stop here. Francis was not satisfied with endeavouring to blacken the character of his rival by an ambiguous testimony which led to the most injurious suspicions, and upon which the most cruel constructions had been put; he was willing to add rebellion to murder. For this purpose he went to the parliament of Paris; where being seated with the usual solemnities, the advocate-general appeared, and accused Charles of Austria (so he affected to call the emperor) of having violated the treaty of Cambray, by which he was freed from the homage due to the crown of France for the counties of Artois and Flanders; adding, that this treaty being now void, he was still to be considered as a vassal of France, and consequently had been guilty of rebellion in taking arms against his sovereign. The charge was sustained, and Charles was summoned to appear before the parliament of Paris at a day fixed. The term expired; and no person appearing in the emperor's name, the parliament gave judgment, that Charles of Austria had forfeited, by rebellion and contumacy, the counties of Flanders and Artois, and declared these fiefs reunited to the crown of France.

Francis, soon after this vain display of his animosity, marched into the Low Countries, as if he had intended to execute the sentence pronounced by his parliament; but a suspension of arms took place, thro' the interposition of the queens of France and Hungary, before any thing of consequence was effected: and this cessation of hostilities was followed by a truce, concluded at Nice, through the mediation of the reigning pontiff Paul III. of the family of Farnese, a man of a venerable character and pacific disposition.

Each of these rival princes had strong reasons to incline them to peace. The finances of both were exhausted; and the emperor, the most powerful of the two, was deeply impressed with the dread of the Turkish arms, which Francis had drawn upon him by a league with Solymán. In consequence of this league, Barbarossa with a great fleet appeared on the coast of Naples; filled that kingdom with conflagration; landed without resistance near Taranto; obliged Castro, a place of some strength, to surrender; plundered the adjacent country; and was taking measures for securing and extending his conquests, when the unexpected arrival of Doria, the famous Genoese admiral, together with the pope's galleys and a squadron of the Venetian fleet, made it prudent for him to retire. The sultan's forces also invaded Hungary, where Mahmet the Turkish general, after gaining several inferior ad-

vantages, defeated the Germans in a great battle at Essek on the Drave. Happily for Charles and Europe, it was not in Francis's power, at this juncture, either to join the Turks or assemble an army strong enough to penetrate into the Milanese. The emperor, however, was sensible that he could not long resist the efforts of two such powerful confederates, nor expect that the same fortunate circumstances would concur a second time in his favour; he therefore thought it necessary, both for his safety and reputation, to give his consent to a truce: and Francis chose rather to run the risk of disobliging his new ally the sultan, than to draw on his head the indignation, and perhaps the arms of all Christendom, by obstinately obstructing the re-establishment of tranquillity, and contributing to the aggrandisement of the Infidels.

These considerations inclined the contending monarchs to listen to the arguments of the holy father; but he found it impossible to bring about a final accommodation between them, each inflexibly persisting in asserting his own claims. Nor could he prevail on them to see one another, though both came to the place of rendezvous: so great was the remains of distrust and rancour, or such the difficulty of adjusting the ceremonial! Yet, improbable as it may seem, a few days after signing the truce, the emperor, in his passage to Barcelona, being driven on the coast of Provence, Francis invited him to come ashore; frankly visited him on board his galley, and was received and entertained with the warmest demonstrations of esteem and affection. Charles, with an equal degree of confidence, paid the king next day a visit at Aigues-mortes; where these two hostile rivals and vindictive enemies, who had accused each other of every kind of baseness, conversing together with all the cordiality of brothers, seemed to vie with each other in expressions of respect and friendship.

Besides the glory of having restored tranquillity to Europe, the pope gained a point of much consequence to his family. He obtained for his grandson Margaret of Austria, the emperor's natural daughter, formerly wife of Alexander de Medici, whom Charles had raised to the supreme power in Florence. Lorenzo de Medici, the kinsman and intimate companion of Alexander, had assassinated him by one of the blackest treasons recorded in history. Under pretence of having secured him an assignation with a lady of the highest rank and great beauty, he drew him into a secret apartment of his house, and there stabbed him as he lay carelessly on a couch, expelling the embrace of the lovely fair, whom he had often solicited in vain. Lorenzo, however, did not reap the fruits of his crime; for though some of his countrymen extolled him as a third Brutus, and endeavoured to seize this occasion for recovering their liberties, the government of Florence passed into the hands of Cosmo II. another kinsman of Alexander. Cosmo was desirous of marrying the widow of his predecessor; but the emperor chose rather to oblige the pope, by bestowing his daughter upon Ottavio Farnese, son of the duke of Parma.

Charles had soon farther cause to be sensible of his obligations to the holy father for bringing about the treaty of Nice. His troops every where mutinied for

Spain.

112
A truce
concluded.

113
An interview
between
Francis and
Charles.

114
Advantage
gained by
the pope
from this
pacification.

115
Charles
distressed.

WENT.

110
Charles
summoned
to appear at
Paris.

111
Francis
leagues with
the Turks.

Spain.

want of pay, and the ability of his generals only could have prevented a total revolt. He had depended, as his chief resource for discharging the arrears due to his soldiers, upon the subsidies which he expected from his Castilian subjects. For this purpose he assembled the cortes of Castile at Toledo; and having represented to them the great expence of his military operations, he proposed to levy such supplies as the present exigency of affairs demanded, by a general excise on commodities; but the Spaniards, who already felt themselves oppressed by a load of taxes unknown to their ancestors, and who had often complained that their country was drained of its wealth and inhabitants, in order to prosecute quarrels in which they had no interest, determined not to add voluntarily to their own burdens. The nobles, in particular, inveighed with great vehemence against the imposition proposed, as an encroachment on the valuable and distinguishing privilege of their order, that of being exempted from the payment of any tax. After employing arguments and promises in vain, Charles dismissed the assembly with indignation; and from that period neither the nobles nor the prelates have been called to the Cortes, on pretence that such as pay no part of the public taxes should not claim a vote in laying them on. These assemblies have since consisted merely of the procurators or representatives of eighteen cities, two from each; in all thirty-six members, who are absolutely at the devotion of the crown.

117
Inhabitants
of Ghent
rebel.

The citizens of Ghent, still more bold, broke out not long after into open rebellion against the emperor's government, on account of a tax which they judged contrary to their ancient privileges, and a decision of the council of Mechlin in favour of the imperial authority. Enraged at an unjust imposition, and rendered desperate on seeing their rights betrayed by that very court which was bound to protect them, they flew to arms, seized several of the emperor's officers, and drove such of the nobility as resided among them out of the city. Sensible, however, of their inability to support what their zeal had prompted them to undertake, and desirous of securing a protector against the formidable forces with which they might expect soon to be attacked, they offered to acknowledge the king of France as their sovereign; and to put him into immediate possession of their city, and to assist him in recovering those provinces in the Netherlands which had anciently belonged to his crown. True policy directed Francis to comply with this proposal. The counties of Flanders and Artois were more valuable than the duchy of Milan, for which he had so long contended; and their situation in regard to France made it more easy to conquer or to defend them. But Francis over-rated the Milanese. He had lived in friendship with the emperor ever since their interview at Aigues-mortes, and Charles had promised him the investiture of that duchy. Forgetting, therefore, all his past injuries, and the deceitful promises by which he had been so often duped, the credulous, generous Francis, not only rejected the propositions of the citizens of Ghent, but communicated to the emperor his whole negotiation with the malcontents.

118
Extreme
credulity of
Francis.

Judging of Charles's heart by his own, Francis hoped by this seemingly disinterested proceeding to obtain at once the investiture of Milan; and the em-

peror, well acquainted with the weakness of his rival, flattered him in this apprehension, for his own selfish purposes. His presence being necessary in the Netherlands, he demanded a passage through France. It was immediately granted him; and Charles, to whom every moment was precious, set out, notwithstanding the remonstrances of his council and the fears of his Spanish subjects, with a small but splendid train of 100 persons. He was met on the frontiers of France by the dauphin and the duke of Orleans, who offered to go into Spain, and remain there as hostages, till he should reach his own dominions; but Charles replied, that the king's honour was sufficient for his safety, and prosecuted his journey without any other security. The king entertained him with the utmost magnificence at Paris, and the two young princes did not take leave of him till he entered the Low Countries; yet he still found means to evade his promise, and Francis continued to believe him sincere.

119
He allows
Charles to
pass thro'
his domi-
nions.

The citizens of Ghent, alarmed at the approach of the emperor, who was joined by three armies, sent ambassadors to implore his mercy, and offered to throw open their gates. Charles only condescended to reply, "that he would appear among them as a sovereign and a judge, with the sceptre and the sword." He accordingly entered the place of his nativity on the anniversary of his birth; and instead of that lenity which might have been expected, exhibited an awful example of his severity. Twenty-six of the principal citizens were put to death; a greater number were banished; the city was declared to have forfeited its privileges; a new system of laws and political administration was prescribed; and a large fine was imposed on the inhabitants, in order to defray the expence of erecting a citadel, together with an annual tax for the support of a garrison. They were not only despoiled of their ancient immunities, but made to pay, like conquered people, for the means of perpetuating their own slavery.

120
Severity of
Charles to
the city of
Ghent.

Having thus re-established his authority in the Low Countries, and being now under no necessity of continuing that scene of falsehood and dissimulation of which he had amused the French monarch, Charles began gradually to throw aside the veil under which he had concealed his intentions with respect to the Milanese, and at last peremptorily refused to give up a territory of such value, or voluntarily to make such a liberal addition to the strength of an enemy by diminishing his own power. He even denied that he had ever made any promise which could bind him to an action so foolish, and so contrary to his own interest.

121
His base
treatment
of Francis.

This transaction exposed the king of France to as much scorn as it did the emperor to censure. The credulous simplicity of Francis seemed to merit no other return, after experiencing so often the duplicity and artifices of his rival. He remonstrated, however, and exclaimed as if this had been the first circumstance in which the emperor had deceived him. The insult offered to his understanding affected him even more sensibly than the injury done to his interest; and he discovered such resentment as made it obvious that he would seize on the first opportunity of revenge, and that a new war would soon desolate the European continent.

Spain.

122
He is ob-
liged to
make con-
cessions to
the Prote-
stants.

Meanwhile Charles was obliged to turn his attention towards the affairs of Germany. The Protestants having in vain demanded a general council, pressed him earnestly to appoint a conference between a select number of divines of each party, in order to examine the points in dispute. For this purpose a diet was assembled at Ratibon : and such a conference, notwithstanding the opposition of the pope, was held with great solemnity in the presence of the emperor. But the divines chosen to manage the controversy, though men of learning and moderation, were only able to settle a few speculative opinions, all points relative to worship and jurisdiction serving only to inflame the minds of the disputants. Charles, therefore, finding his endeavours to bring about an accommodation ineffectual, and being impatient to close the diet, prevailed on a majority of the members to approve of the following edict of recess; viz. That the articles concerning which the divines had agreed, should be held as points decided; that those about which they had differed, should be referred to the determination of a general council, or if that could not be obtained, to a national synod; and should it prove impracticable also to assemble a synod of Germany, that a general diet of the empire should be called within 18 months, in order to give final judgment on the whole controversy; that, in the mean time, no innovations should be attempted, nor any endeavours employed to gain proselytes.

This diet gave great offence to the pope. The bare mention of allowing a diet, composed chiefly of laymen, to pass judgment in regard to articles of faith, appeared to him no less criminal and profane than the worst of those heresies which the emperor seemed so zealous to suppress. The Protestants also were dissatisfied with it, as it considerably abridged the liberty which they at that time enjoyed. They murmured loudly against it; and Charles, unwilling to leave any seeds of discontent in the empire, granted them a private declaration, exempting them from whatever they thought injurious or oppressive in the recess, and ascertaining to them the full possession of all their former privileges.

The situation of the emperor's affairs at this juncture made these extraordinary concessions necessary. He foresaw a rupture with France to be unavoidable, and he was alarmed at the rapid progress of the Turks in Hungary. A great revolution had happened in that kingdom. John Zapol Scæpus, by the assistance of Solymán, had wrested from the king of the Romans a considerable part of the country. John died, and left an infant son. Ferdinand attempted to take advantage of the minority, in order to repossess himself of the whole kingdom; but his ambition was disappointed by the activity and address of George Martinuzzi, bishop of Waradin, who shared the regency with the queen. Sensible that he was unable to oppose the king of the Romans in the field, Martinuzzi satisfied himself with holding out the fortified towns, all of which he provided with every thing necessary for defence: and at the same time he sent ambassadors to Solymán, beseeching him to extend towards the son that imperial protection which had so generously maintained the father on his throne. Ferdinand used his utmost endeavours to thwart this negotiation, and even meanly of-

fered to hold the Hungarian crown on the same ignominious condition by which John had held it, that of paying tribute to the porte. But the sultan saw such advantages from espousing the interest of the young king, that he instantly marched into Hungary; and the Germans, having formed the siege of Buda, were defeated with great slaughter before that city. Solymán, however, instead of becoming the protector of the infant-sovereign whom he had relieved, made use of this success to extend his own dominions: he sent the queen and her son into Transilvania, which province he allotted them, and added Hungary to the Ottoman empire.

Happily for the Protestants, Charles received intelligence of this revolution soon after the diet at Ratibon; and by the concessions which he made them, he obtained such liberal supplies, both of men and money, as left him under little anxiety about the security of Germany. He therefore hastened to join his fleet and army in Italy, in order to carry into execution a great and favourite enterprise which he had concerted against Algiers; though it would certainly have been more consistent with his dignity to have conducted the whole force of the empire against Solymán, the common enemy of Christendom, who was ready to enter his Austrian dominions. But many reasons induced Charles to prefer the African expedition: he wanted strength, or at least money, to combat the Turks in so distant a country as Hungary; and the glory which he had formerly acquired in Barbary led him to hope for the like success, while the cries of his Spanish subjects roused him to take vengeance on their ravagers. But the unfortunate event of this expedition has already been related under the article ALGIERES, n^o 14—20.

The loss which the emperor suffered in this calamitous expedition encouraged the king of France to begin hostilities, on which he had been for some time resolved; and an action dishonourable to civil society furnished him with too good a pretext for taking arms. The marquis del Guasto, governor of the Milanese, having got intelligence of the motions and destination of two ambassadors, Rincón and Fergoso, whom Francis had dispatched, the one to the Ottoman porte, the other to the republic of Venice; knowing how much his master wished to discover the intentions of the French monarch, and of what consequence it was to retard the execution of his measures, he employed some soldiers belonging to the garrison of Pavia to lie in wait for these ambassadors as they sailed down the Po, who murdered them and most of their attendants, and seized their papers. Francis immediately demanded reparation for this barbarous outrage; and as Charles endeavoured to put him off with an evasive answer, he appealed to all the courts of Europe, setting forth the heinousness of the injury, the iniquity of the emperor in disregarding his just request, and the necessity of vengeance. But Charles, who was a more profound negotiator, defeated in a great measure the effects of these representations: he secured the fidelity of the Protestant princes in Germany, by granting them new concessions; and he engaged the king of England to espouse his cause, under pretence of defending Europe against the Infidels; while Francis was only able to form an alliance with the kings of Denmark and Swe-

Spain.

123
Undertakes
an unsuccess-
ful ex-
pedition
against Al-
giers.

124
War be-
tween Fran-
cis and
Charles.

den,

Spain.

den, (who for the first time interested themselves in the quarrels of the more potent monarchs of the south), and to renew his treaty with Solymán, which drew on him the indignation of Christendom.

But the activity of Francis supplied all the defects of his negotiation. Five armies were soon ready to take the field, under different generals, and with different destinations. Nor was Charles wanting in his preparations. He and Henry a second time made an ideal division of the kingdom of France. But as the hostilities which followed terminated in nothing decisive, and were distinguished by no remarkable event, except the battle of Cerifoles (gained by count d'Enguieu over the imperialists, and in which 10,000 of the emperor's best troops fell), at last Francis and Charles, mutually tired of harassing each other, concluded at Crespy a treaty of peace, in which the king of England was not mentioned; and from being implacable enemies, became once more, to appearance, cordial friends, and even allies by the ties of blood.

115
Peace con-
cluded at
Crespy.

The chief articles of this treaty were, that all the conquests which either party had made since the truce of Nice should be restored; that the emperor should give in marriage to the duke of Orleans, either his own eldest daughter, with the Low Countries, or the second daughter of his brother Ferdinand, with the investiture of the Milanese; that Francis should renounce all pretensions to the kingdom of Naples, as well as to the sovereignty of Flanders and Artois, and Charles give up his claim to the duchy of Burgundy; and that both should unite in making war against the Turks.

The emperor was chiefly induced to grant conditions so advantageous to France, by a desire of humbling the Protestant princes in Germany. With the papal jurisdiction, he foresaw they would endeavour to throw off the imperial authority; and he determined to make his zeal for the former a pretence for enforcing and extending the latter. However, the death of the duke of Orleans before the consummation of his marriage, disentangled the emperor from the most troublesome stipulation in the treaty of Crespy; and that the French monarch, being still engaged in hostilities with England, was unable to obtain any reparation for the loss which he suffered by this unforeseen event. These hostilities, like those between Charles and Francis, terminated in nothing decisive. Equally tired of a struggle attended with no glory or advantage to either, the contending princes concluded, at Campe, near Ardies, a treaty of peace; in which it was stipulated, that France should pay the arrears due by former treaties to England. But these arrears did not exceed one-third of the sums expended by Henry on his military operations; and Francis being in no condition to discharge them; Boulogne (a chargeable pledge) was left in the hands of the English as a security for the debt.

126
Charles ob-
liged to
conclude a
disadvan-
tageous peace
with the
Turks and
Protestants.

In consequence of the emperor's resolution to humble the Protestant princes, he concluded a dishonourable peace with the Pope, stipulating that his brother Ferdinand should pay tribute for that part of Hungary which he still possessed; while the sultan enjoyed the imperial and undisturbed possession of all the rest. At the same time he entered into a league with pope

Spain.

Paul III. for the extirpation of heresy; but in reality with a view to oppress the liberties of Germany. Here, however, his ambition met with a severe check; for though he was successful at first, he was obliged, in 1552, to conclude a peace with the Protestants on their own terms; as has been related under the article REFORMATION, n° 26—32.

By the peace concluded on this occasion the emperor lost Metz, Toul, and Verdun, which had formed the barrier of the empire on that quarter; and therefore soon after put himself at the head of an army, in order to recover these three bishoprics. In order to conceal the destination of his army, he gave out, that he intended to lead it into Hungary, to second Maurice in his operations against the Infidels; and as that pretext failed him, when he began to advance towards the Rhine, he propagated a report that he was marching first to chastise Albert of Brandenburg, who had refused to be included in the treaty of Passau, and whose cruel exactions in that part of Germany called loudly for redress.

127
Attempts
to recover
some of his
provinces.

The French, however, were not deceived by these arts. Henry immediately guessed the true object of Charles's armament, and resolved to defend his conquests with vigour. The defence of Metz, against which it was foreseen the whole weight of the war would be turned, was committed to Francis of Lorraine, duke of Guise, who possessed in an eminent degree all the qualities that render men great in military command. He repaired with joy to the dangerous station; and many of the French nobility, and even princes of the blood, eager to distinguish themselves under such a leader, entered Metz as volunteers. The city was of great extent, ill fortified, and the suburbs large. For all these defects the duke endeavoured to provide a remedy. He repaired the old fortifications with all possible expedition, labouring with his own hands; the officers imitated his example; and the soldiers, thus encouraged, cheerfully submitted to the most severe toils; he erected new works, and he levelled the suburbs with the ground. At the same time he filled the magazines with provisions and military stores, compelled all useless persons to leave the place, and laid waste the neighbouring country; yet such were his popular talents, as well as his arts of acquiring an ascendant over the minds of men, that the citizens not only refrained from murmuring, but seconded him with no less ardour than the soldiers in all his operations—in the ruin of their estates, and in the havoc of their public and private buildings.

128
Is obliged
to raise the
siege of
Metz.

Meanwhile the emperor continued his march towards Lorraine, at the head of 60,000 men. On his approach, Albert of Brandenburg, whose army did not exceed 20,000, withdrew into that principality, as if he intended to join the French king; and Charles, notwithstanding the advanced season, it being towards the end of October, laid siege to Metz, contrary to the advice of his most experienced officers.

The attention of both the besiegers and the besieged was turned for some time towards the motions of Albert, who still hovered in the neighbourhood, undetermined which side to take, though resolved to sell his service. Charles at last came up to his price, and he joined the imperial army. The emperor now

bat-

Spain.

flattered himself that nothing could resist his force; but he found himself deceived. After a siege of almost 60 days, during which he had attempted all that was thought possible for art or valour to effect, and had lost upwards of 30,000 men by the inclemency of the weather, diseases, or the sword of the enemy, he was obliged to abandon the enterprise.

129
Miserable
condition of
his army.

When the French failed out to attack the enemy's rear, the imperial camp was filled with the sick and wounded, with the dead and the dying. All the roads by which the army retired were strewn with the same miserable objects; who, having made an effort beyond their strength to escape, and not being able to proceed, were left to perish without assistance. Happily that, and all the kind offices which their friends had not the power to perform, they received from their enemies. The duke of Guise ordered them all to be taken care of, and supplied with every necessary; he appointed physicians to attend, and direct what treatment was proper for the sick and wounded, and what refreshments for the feeble; and such as recovered he sent home, under an escort of soldiers, and with money to bear their charges. By these acts of humanity, less common in that age, the duke of Guise completed that heroic character which he had justly acquired by his brave and successful defence of Metz.

130
His further
misfortunes

The emperor's misfortunes were not confined to Germany. During his residence at Villach, he had been obliged to borrow 200,000 crowns of Cosmo de Medici; and so low was his credit, that he was obliged to put Cosmo in possession of the principality of Piombino as a security for that considerable sum; by which means he lost the footing he had hitherto maintained in Tuscany. Much about the same time he lost Siena. The citizens, who had long enjoyed a republican government, rose against the Spanish garrison, which they had admitted as a check upon the tyranny of the nobility, but which they found was meant to enslave them; forgetting their domestic animosities, they recalled the exiled nobles; they demolished the citadel, and put themselves under the protection of France.

To these unfortunate events one still more fatal had almost succeeded. The severe administration of the viceroy of Naples had filled that kingdom with murmuring and dissatisfaction. The prince of Salerno, the head of the malcontents, fled to the court of France. The French monarch, after the example of his father, applied to the grand seignior; and Solyman, at that time highly incensed against the house of Austria on account of the proceedings in Hungary, sent a powerful fleet into the Mediterranean, under the command of the corsair Dragut, an officer trained up under Barbarossa, and scarce inferior to his master in courage, talents, or in good fortune. Dragut appeared on the coast of Calabria at the time appointed; but not being joined by the French fleet according to concert, he returned to Constantinople, after plundering and burning several places, and filling Naples with consternation.

131
Is successful in
the Low Coun-
tries.

Highly mortified by so many disasters, Charles retired into the Low Countries, breathing vengeance against France: and here the war was carried on with considerable vigour. Impatient to efface the

Spain.

stain which his military reputation had received before Metz, Charles laid siege to Terouane; and the fortifications being in disrepair, that important place was carried by assault. Hefdin also was invested, and carried in the same manner. The king of France was too late in assembling his forces, to afford relief to either of these places; and the emperor afterwards cautiously avoided an engagement.

The imperial arms were less successful in Italy. But not so the viceroy of Naples failed in an attempt to recover ¹³² ^{other places.} Siena; and the French not only established themselves more firmly in Tuscany, but conquered part of the island of Corsica. Nor did the affairs of the house of Austria go on better in Hungary during the course of this year. Isabella and her son appeared once more in Transylvania, at a time when the people were ready for revolt, in order to revenge the death of Martinuzzi, whose loss they had severely felt. Some noblemen of eminence declared in favour of the young king; and the bashaw of Belgrade, by Solyman's order, espousing his cause, in opposition to Ferdinand, Castaldo, the Austrian general, was obliged to abandon Transylvania to Isabella and the Turks.

In order to counterbalance these and other losses, ¹³³ ^{Marriage between Philip of Spain and Mary of England.} the emperor, in 1554, concerted a marriage between his son Philip and Mary of England, in hopes of adding that kingdom to his other dominions. Meanwhile the war between Henry and Charles was carried on with various success in the Low Countries, and in Italy much to the disadvantage of France. The French, under the command of Strozzi, were defeated in the battle of Merciano; Siena was reduced by Medicino, the Florentine general, after a siege of ten months; and the gallant Siense were subjected to the Spanish yoke. Much about the same time a plot was formed by the Franciscans, but happily discovered before it could be carried into execution, to betray Metz to the Imperialists. The father-guardian, and twenty other monks, received sentence of death on account of this conspiracy; but the guardian, before the time appointed for his execution, was murdered by his incensed accomplices, whom he had seduced; and six of the youngest were pardoned.

While war thus raged in Italy and the Low Countries, Germany enjoyed such profound tranquillity, as afforded the diet full leisure to confirm and perfect the plan of religious pacification agreed upon at Passau, and referred to the consideration of the next meeting of the Germanic body. During the negotiation of this treaty, an event happened which astonished all Europe, and confounded the reasonings of the wisest politicians. The emperor Charles V. though no more than 56, an age when objects of ambition operate with full force on the mind, and are generally pursued with the greatest ardour, had for some time formed the resolution of resigning his hereditary dominions to his son Philip. He now determined to put it in execution. Various have been the opinions of historians concerning a resolution so singular and unexpected; but the most probable seem to be, the disappointments which Charles had met with in his ambitious hopes, and the daily decline of his health. He had early in life been attacked with the gout; and the fits were now become so frequent and severe, that not only the vigour of his constitution was broken, but the cal-
¹³⁴ ^{Charles resigns his dominions to his son Philip.}

Spain.

culties of his mind were sensibly impaired. He therefore judged it more decent to conceal his infirmities in some solitude, than to expose them any longer to the public eye; and as he was unwilling to forfeit the fame, or lose the acquisitions of his better years, by attempting to guide the reins of government when he was no longer able to hold them with steadiness, he prudently determined to seek in the tranquillity of retirement, that happiness which he had in vain pursued amid the tumults of war and the intrigues of state.

In consequence of this resolution, Charles, who had already ceded to his son Philip the kingdom of Naples and the duchy of Milan, assembled the states of the Low Countries at Brussels; and seating himself for the last time in the chair of state, he explained to his subjects the reasons of his resignation, and solemnly devolved his authority upon Philip. He recounted with dignity, but without ostentation, all the great things which he had undertaken and performed since the commencement of his administration. "I have dedicated," observed he, "from the 17th year of my age, all my thoughts and attention to public objects, reserving no portion of my time for the indulgence of ease, and very little for the enjoyment of private pleasure. Either in a pacific or hostile manner, I have visited Germany nine times, Spain six times, France four times, Italy seven times, the Low Countries ten times, England twice, Africa as often; and while my health permitted me to discharge the duty of a sovereign, and the vigour of my constitution was equal in any degree to the arduous office of governing such extensive dominions, I never shunned labour, nor repined under fatigue; but now, when my health is broken, and my vigour exhausted by the rage of an incurable distemper, my growing infirmities admonish me to retire; nor am I so fond of reigning, as to retain the sceptre in an impotent hand, which is no longer able to protect my subjects. Instead of a sovereign worn out with diseases," continued he, "and scarce half alive, I give you one in the prime of life, already accustomed to govern, and who adds to the vigour of youth all the attention and sagacity of maturer years." Then turning towards Philip, who fell on his knees, and kissed his father's hand, "It is in your power," said Charles, "by a wise and virtuous administration, to justify the extraordinary proof which I give this day of my paternal affection, and to demonstrate that you are worthy of the extraordinary confidence which I repose in you. Preserve," added he, "an inviolable regard for religion; maintain the catholic faith in its purity; let the laws of your country be sacred in your eyes; encroach not on the rights of your people; and if the time should ever come when you shall wish to enjoy the tranquillity of private life, may you have a son to whom you can resign your sceptre with as much satisfaction as I give up mine to you." A few weeks after, he resigned to Philip the sovereignty of Spain and America; reserving nothing to himself out of all these vast possessions but an annual pension of 100,000 crowns.

Charles was now impatient to embark for Spain, where he had fixed on a place of retreat; but by the advice of his physicians, he put off his voyage for some months, on account of the severity of the season;

and, by yielding to their judgment, he had the satisfaction, before he left the Low Countries, of taking a considerable step towards a peace with France. This he ardently longed for; not only on his son's account, whose administration he wished to commence in quietness, but that he might have the glory, when quitting the world, of restoring to Europe that tranquillity which his ambition had banished out of it, almost from the time that he assumed the reins of government.

The great bar to such a pacification, on the part of France, was the treaty which Henry had concluded with the Pope; and the emperor's claims were too numerous to hope for adjusting them suddenly. A truce of five years was therefore proposed by Charles; during which term, without discussing their respective pretensions, each should retain what was in his possession; and Henry, through the persuasion of the confident Montmorency, who represented the imprudence of sacrificing the true interests of his kingdom to the rash engagements that he had come under with Paul, authorised his ambassadors to sign at Vaucelles a treaty, which would insure to him, for so considerable a period, the important conquest which he had made on the German frontier, together with the greater part of the duke of Savoy's dominions.

The Pope, when informed of this transaction, was no less filled with terror and astonishment than rage and indignation. But he took equal care to conceal his fear and his anger. He affected to approve highly of the truce; and he offered his mediation, as the common father of Christendom, in order to bring about a definitive peace. Under this pretext, he appointed cardinal Rebibio his nuncio to the court of Brussels, and his nephew cardinal Caffara to that of Paris. The public instructions of both were the same; but Caffara, besides these, received a private commission, to spare neither intreaties, promises, nor bribes, in order to induce the French monarch to renounce the truce and renew his engagements with the holy see. He flattered Henry with the conquest of Naples; he gained by his address the Guises, the queen, and even the famous Diana of Poitiers, duchess of Valentinois, the king's mistress; and they easily swayed the king himself, who already leaned to that side towards which they wished to incline him. All Montmorency's prudent remonstrances were disregarded; the nuncio (by powers from Rome) absolved Henry from his oath of truce; and that weak prince signed a new treaty with the Pope; which rekindled with fresh violence the flames of war, both in Italy and the Low Countries.

No sooner was Paul made acquainted with the success of this negotiation, than he proceeded to the most violent exertions against Philip. He ordered the Spanish ambassador to be imprisoned; he excommunicated the Colonnas, because of their attachment to the imperial house; and he considered Philip as guilty of high-treason, and to have forfeited his right to the kingdom of Naples, which he was supposed to hold of the holy see, for afterward affording them a retreat in his dominions.

Alarmed at a quarrel with the pope, whom he had been taught to regard with the most superstitious veneration, as the viceregent of Christ and the com-

Spain.

¹³⁸
A truce of
five years
concluded
with France.

¹³⁹
Quarrel be-

twixt the
pope and
King Philip.

mon.

Spain.

mon father of Christendom, Philip tried every gentle method before he made use of force. He even consulted some Spanish divines on the lawfulness of taking arms against a person so sacred. They decided in his favour; and Paul continuing inexorable, the duke of Alva, to whom the negotiations as well as the war had been committed, entered the ecclesiastical state at the head of 10,000 veterans, and carried terror to the gates of Rome.

The haughty pontiff, though still inflexible and undaunted in himself, was forced to give way to the fears of the cardinals, and a truce was concluded for 40 days. Meantime the duke of Guise arriving with a supply of 20,000 French troops, Paul became more arrogant than ever, and banished all thoughts from his mind but those of war and revenge. The duke of Guise, however, who had precipitated his country into this war, chiefly from a desire of gaining a field where he might display his own talents, was able to perform nothing in Italy worthy of his former fame. He was obliged to abandon the siege of Civitella; he could not bring the duke of Alva to a general engagement; his army perished by diseases; and the Pope neglected to furnish the necessary reinforcements. He begged to be recalled; and France stood in need of his abilities.

Philip, though willing to have avoided a rupture, was no sooner informed that Henry had violated the truce of Vaucelles, than he determined to act with such vigour, as should convince Europe that his father had not erred in resigning to him the reins of government. He immediately assembled in the Low Countries a body of 50,000 men, and obtained a supply of 10,000 from England, which he had engaged in his quarrel; and as he was not ambitious of military fame, he gave the command of his army to Emanuel Philibert duke of Savoy, one of the greatest generals of that warlike age.

The duke of Savoy kept the enemy for some time in suspense with regard to his destination; at last he seemed to threaten Champagne; towards which the French drew all their troops; then turning suddenly to the right, he advanced by rapid marches into Picardy, and laid siege to St Quintin. It was deemed in those times a town of considerable strength; but the fortifications had been much neglected, and the garrison did not amount to a fifth part of the number requisite for its defence: it must therefore have surrendered in a few days, if the admiral de Coligny had not taken the gallant resolution of throwing himself into it with such a body of men as could be collected on a sudden. This he effected in spite of the enemy, breaking through their main body. The place, however, was closely invested; and the constable Montmorency, anxious to extricate his nephew out of that perilous situation, in which his zeal for the public had engaged him, as well as to save a town of such importance, rashly advanced to its relief with forces one half inferior to those of the enemy. His army was cut in pieces, and he himself made prisoner.

The cautious temper of Philip on this occasion saved France from desolation, if not ruin. The duke of Savoy proposed to overlook all inferior objects, and march speedily to Paris, which, in its present consternation, he could not have failed to make

himself master of; but Philip, afraid of the consequences of such a bold enterprise, desired him to continue the siege of St Quintin, in order to secure a safe retreat in case of any disastrous event. The town, long and gallantly defended by Coligny, was at last taken by storm; but not till France was in a state of defence.

Philip was now sensible that he had lost an opportunity which could never be recalled, of distressing his enemy, and contented himself with reducing Horn and Catelet; which petty towns, together with St Quintin, were the sole fruits of one of the most decisive victories gained in the 16th century. The Catholic king, however, continued in high exultation on account of his success; and as all his passions were tinged with superstition, he vowed to build a church, a monastery, and a palace, in honour of St Laurence, on the day sacred to whose memory the battle of St Quintin had been fought. He accordingly laid the foundation of an edifice, in which all these were included, and which he continued to forward at vast expence, for 22 years. The same principle which dictated the vow directed the building. It was so formed as to resemble a gridiron—on which culinary instrument, according to the legendary tale, St Laurence had suffered martyrdom. Such is the origin of the famous escorial near Madrid, the royal residence of the kings of Spain.

The first account of that fatal blow which France had received at St Quintin, was carried to Rome by the courier whom Henry had sent to recal the duke of Guise. Paul remonstrated warmly against the departure of the French army; but Guise's orders were peremptory. The arrogant pontiff therefore found it necessary to accommodate his conduct to the exigency of his affairs, and to employ the mediation of the Venetians, and of Cosmo de Medici, in order to obtain peace. The first overtures of this nature were eagerly listened to by the Catholic king, who still doubted the justice of his cause, and considered it as his greatest misfortune to be obliged to contend with the pope. Paul agreed to renounce his league with France; and Philip stipulated on his part, that the duke of Alva should repair in person to Rome, and after asking pardon of the holy father in his own name and in that of his master, for having invaded the patrimony of the church, should receive absolution from that crime.—Thus Paul, through the superstitious timidity of Philip, only finished an unpropitious war not without any detriment to the apostolic see, but saw his conqueror humbled at his feet: and so excessive was the veneration of the Spaniards in that age for the papal character, that the duke of Alva, the proudest man perhaps of his time, and accustomed from his infancy to converse with princes, acknowledged, that when he approached Paul, he was so much overawed, that his voice failed, and his presence of mind forsook him.

But though this war, which at its commencement threatened mighty revolutions, was terminated without occasioning any alteration in those states which were its immediate object, it produced effects of considerable consequence in other parts of Italy. In order to detach Octavio Farnese, duke of Parma, from the French interest, Philip restored to him the city of Placentia and its territory, which had been seized by Charles V. and he granted to Cosmo de Medici the

Spain.

* 37
The French
entirely de-
feated at
St Quintin.

138
Peace con-
cluded.

139
Consequen-
ces of the
war in Italy.

in.

Spain. investiture of Sienna, as an equivalent for the fums due to him. By these treaties, the balance of power among the Italian states was poised with more equality, and rendered less variable than it had been since it received the first violent shock from the invasion of Charles VIII. and Italy henceforth ceased to be the theatre on which the monarchs of Spain, France, and Germany, contended for fame and dominion. Their hostilities, excited by new objects, flained other regions of Europe with blood, and made other states feel, in their turn, the miseries of war.

¹⁴⁰
The French
unsuccessful
in the Low
Countries.

The duke of Guise, who left Rome the same day that his adversary the duke of Alba made his humiliating submission to the pope, was received in France as the guardian-angel of the kingdom. He was appointed lieutenant-general in chief, with a jurisdiction almost unlimited; and, eager to justify the extraordinary confidence which the king had reposed in him, as well as to perform something suitable to the high expectations of his countrymen, he undertook, in winter, the siege of Calais. Having taken that place, he next invested Thionville in the duchy of Luxembourg, one of the strongest towns on the frontiers of the Netherlands; and forced it to capitulate, after a siege of three weeks. But the advantages on this quarter were more than balanced by an event which happened in another part of the Low Countries. The marshal de Termes governor of Calais, who had penetrated into Flanders and taken Dunkirk, was totally routed near Gravelines, and taken prisoner by count Egmont. This disaster obliged the duke of Guise to relinquish all his other schemes, and hasten towards the frontiers of Picardy, that he might there oppose the progress of the enemy.

The eyes of all France were now turned towards the duke of Guise, as the only general on whose arms victory always attended, and in whose conduct as well as good fortune they could confide in every danger. His strength was nearly equal to the duke of Savoy's, each commanding about 40,000 men. They encamped at the distance of a few leagues from one another; and the French and Spanish monarchs having joined their respective armies, it was expected that, after the vicissitudes of war, a decisive battle would at last determine which of the rivals should take the ascendant for the future in the affairs of Europe. But both monarchs, as if by agreement, stood on the defensive; neither of them discovering any inclination, though each had it in his power, to rest the decision of a point of such importance on the issue of a single battle.

¹⁴¹
Peace con-
cluded be-
tween Hen-
ry and
Philip.

During this state of inaction, peace began to be mentioned in each camp, and both Henry and Philip discovered an equal disposition to listen to any overture that tended to re-establish it. The private inclinations of both kings concurred with their political interests and the wishes of their people. Philip languished to return to Spain, the place of his nativity; and peace only could enable him, either with decency or safety, to quit the Low Countries. Henry was now desirous of being freed from the avocations of war, that he might have leisure to turn the whole force of his government towards suppressing the opinions of the reformers, which were spreading with such rapidity in Paris and the other great towns, that they began to grow formidable to the established church. Court-in-

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trigues conspired with these public and avowed motives to hasten the negotiation, and the abbey of Cerpamp was fixed on as the place of congress.

While Philip and Henry were making these advances towards a treaty which restored tranquillity to Europe, Charles V. whose ambition had so long disturbed it, but who had been for some time dead to the world, ended his days in the monastery of St Justus in Eltre madura, which he had chosen as the place of his retreat, as is particularly related under the article CHARLES V.

¹⁴²
Death of
Charles V.

After the death of Charles, the kingdom of Spain soon lost great part of its consequence. Though Charles had used all his interest to get his son Philip elected emperor of Germany, he had been totally disappointed; and thus the grandeur of Philip II. never equalled that of his father. His dominions were also considerably abridged by his tyrannical behaviour in the Netherlands.

In consequence of this, the United Provinces revolted; and after a long and bloody war obtained their liberty*. In this quarrel Elizabeth of England took part against Philip, which brought on a war with Spain. The great losses he sustained in these wars exhausted the kingdom both of men and money, notwithstanding the great fums imported from America. Indeed, the discovery and conquest of that country hath much impoverished, instead of enriching, Spain; for thus the inhabitants have been rendered lazy and averse from every kind of manufacture or traffic, which only can be a durable source of riches and strength to any nation. The ruin of the kingdom in this respect, however, was completed by Philip III. of who, at the instigation of the inquisition, and by the advice of his prime minister the duke of Lerma, expelled from the kingdom all the Moreos or Moors, descendants of the ancient conquerors of Spain. Thirty days only were allowed them to prepare for their departure, and it was death to remain beyond that time. The reason for this barbarous decree was, that these people were still Mahometans in their hearts, though they conformed externally to the rites of Christianity, and thus might corrupt the true faith. The Moreos, however, chose themselves a king, and attempted to oppose the royal mandate; but, being almost entirely unprovided with arms, they were soon obliged to submit, and all banished the kingdom. By this violent and impolitic measure, Spain lost almost a million of industrious inhabitants; and as the kingdom was already depopulated by bloody wars, by repeated emigrations to America, and enervated by luxury, it now sunk into a state of languor from whence it has never recovered.

¹⁴³
Revolt of
the United
Provinces.
* See United
Provinces.

In consequence of this languor and the mal-administration of the Spanish governors, Portugal, which had been reduced by Philip II. revolted, and has ever since been an independent kingdom†. However, the memory of what Spain once was, remained for a considerable time, and the power of that kingdom long continued to be feared after it had ceased to be powerful. In the time of queen Anne, a British army was seen for the first time in Spain, in order to support Charles of Austria against Philip the grandson of Louis XIV. The ill success of that attempt is related under the article BRITAIN n° 353—359; and thus the crown of Spain fell to a branch of the house of Bourbon, in consequence of

¹⁴⁴
Revolt of
Portugal,
&c.
† See Por-
tugal, n° 18,
et seq.

41 F

which

Spain.

which the courts of France and Spain have ever since acted in concert. Their wars with Britain are related under that article, n° 398. *et seq*; and these, with a late unsuccessful attempt on Algiers, constitute the most important part of the Spanish history to the present time.

146
Air and climate of Spain.

The air of Spain, during the months of June, July, and August, is excessively hot in the day-time; but the rest of the year it is pleasant and temperate. Even during the above months it is very cool in the shade; and so cold in the night, that it makes a traveller shiver; and in the day-time the violent heat continues only for about four or five hours. In the north, on the mountains, and near the sea-coast, the air is much less sultry in summer than in the south, especially in the lower parts of the country, and at a distance from the sea. It seldom rains here, except about the equinoxes: the frosts are very gentle towards the south but on the mountains in the north and north-east, the air is very sharp in winter.

147
Soil and produce.

Though there are some sandy barren deserts in the south, and many barren mountains in the north, yet in the greater part of the country, particularly in the valleys and plains, the soil is good, producing a great variety of rich wines, oil, and fruits; such as oranges, lemons, prunes, citrons, almonds, raisins, dates, figs, chestnuts, pomegranates, capers, pears, and peaches; but not a sufficiency of grain, which is chiefly owing to the neglect of tillage. Wheat and barley are the most common grain; the former of which is said by some to be the best in Europe. There is not much flax, hemp, oats, or hay, in Spain: but there is plenty of honey, salt, fine wool, silk, and cotton; and, in some places, of rice and sugar-canes. Here also are abundance of mules, and, in some provinces, of horses, together with deer, wild-fowl, and other game, chamois and other goats, but few horned cattle. Wolves are almost the only wild beasts in the country. The herb kali, which is used in making salt, soap, and glass, grows in great plenty on the sea-shore. The wild bulls, used in their bull-fights, are bred in Andalusia. The seas about Spain are well stored with fish; among which is the anchovy, in the Mediterranean. We may guess at the number of sheep here by that of the shepherds, which is said to be about forty thousand. The sheep that bear the fine wool move regularly, every summer, from south to north, along the mountains, which yield a great variety of sweet-herbs and plants, and return again towards winter. During this progress, large quantities of salt are distributed among them, and all possible care is taken both of their health and fleeces.

148
Mountains, minerals, &c.

The chief mountains are the Pyrenæes, which stretch from the Mediterranean to the Atlantic Ocean, but not in a direct line, for near 200 miles: their breadth is, in some places, not less than 80. That called the *Pic de Midi* is of a prodigious height. Over these mountains there are only about five passages out of Spain into France, and these also narrow; even the valleys between the mountains are covered with thick and lofty woods. The other chains in Spain are the Sierra d'Occa, Sierra Molino, Sierra Moreno, and Sierra Novada or the snowy mountains. Near Gibraltar, opposite to Mount Abyla in Africa, stands the celebrated Mount Calpe: these were anciently called

Heracles's pillars. The mountains yield great quantities of timber for shipping, which are conveyed by the Ebro and other rivers to the Mediterranean. According to the ancient and modern writers, they abound also with gold, silver, iron, lead, tin, cinnabar, quick-silver, alum, vitriol, copperas, lapis calaminaris, &c. besides gems, and mineral waters both hot and cold. The gold and silver mines are not worked at present, but those of iron are. The neglect of the former is owing partly to the indolence of the Spaniards, and partly to the gold and silver imported from America. Besides the rivers Minho, Douro, Tagus, Monda, Lima, and Guadiana, mentioned in Portugal, but which have their sources in Spain, the most considerable are the Ebro, Olim Iberus, Guadalquivir or Turiro, Guadalquivir, Olim Perea Bactis and Tartessus, Segura, and Zucar.

149
Religion.

The Spaniards are jealous Romanists. Nowhere is there more pomp, farce, and parade, in what regards religion; and no where less true Christianity. Their zeal and their superstition exceed that of any other Roman-Catholic country, unless perhaps we should except Portugal. Nowhere did the inquisition reign with greater terror; there being no subject who was not liable to be prosecuted by the *holy office*, as it is called; however, the powers of that tribunal are now greatly diminished even in Spain. There are eight archbishops in Spain, seven in America, and one in Asia, at Manilla; each of which has his suffragan bishops. The archbishop of Toledo is primate, chancellor of Castile, and, by virtue of his office, privy-counsellor. He is said to have a revenue of 100,000 l. Sterling *per annum*, or more. The king nominates all archbishops and bishops; and, since 1753, all small benefices are also in his gift. He has also lately obtained a power to tax ecclesiastical possessions, according to his pleasure and the exigency of affairs. Though the rest of the nation is poor, the clergy are immensely rich, and their revenues of all kinds amazingly great. Most of the towns and estates belong to them, and are exempt from all public burdens; yet their avarice is insatiable, especially that of the Mendicant friars, though they profess poverty. Their commerce, which is free from all duties and imposts, is also a rich fund to them. Though the Spaniards are naturally men of wit and an elevated genius, yet little progress in the sciences is to be expected from them, while the clergy use their utmost efforts to keep them in ignorance, branding all literary researches with the name of heresy, and inveighing against the seats of the muses, as the schools of hell, where the devil teaches sorcery. There are 22 universities, and several academies, in Spain; but so constituted, and under such restrictions, that they can never attain to any measure of true learning. There are few printing-houses in Spain, and most of the books in that language are published in other countries.

In regard to trade and manufactures, the Spaniards Trade and are far from making such a figure as might be expected. Most of the laborious work in their husbandry, manufactures, and handicrafts, is performed by the French, especially in the two Castiles and the midland provinces, the natives being either too lazy or too proud to stoop to such employments. By these means, the French usually return with large fortunes to their

OWN.

Spain.

own country. The chief manufactures of Spain are those of silk, wool, iron, copper, and other hardwares; but these fall far short of the flourishing condition they might be brought to: hence a great part of the treasures of America go to the foreign merchants, who supply them with goods for that part of the world. However, it is certain, that Spain, since it hath had princes of the house of Bourbon upon the throne, hath improved its revenues, increased its forces by sea and land, and applied itself more than it did before to manufactures and husbandry; having shaken off, in some measure, that idle indolent disposition which rendered it so contemptible in the eyes of other nations; but it will be a long time before they will be able to supply the wants of their own country, and those of America, in any great degree. Spain is extremely well situated for trade: but most of its produce is exported by foreigners, except what is carried to the Indies; and even with regard to that trade, they are little better than factors to the English, French, Dutch, and Italians. Smuggling, which was formerly carried to a great height, is now in a great measure suppressed. Since the year 1750, the exportation of silver hath been allowed on the payment of 3 per cent. From 1735 almost to 1756, the flotas and galleons were discontinued, and the trade to America carried on in register-ships, which any merchant might send, on permission obtained from the council of the Indies: but then the flotas and galleons were restored. The *Asfogue ships* are two vessels which carry quicksilver on the king's account to Vera Cruz. There is a company which has an exclusive grant for trading to the Caracas; and another for trading to Porto Rico, the Bay of Honduras, the province of Guatimala and Hispaniola; but the Spanish part of the last, it is said, hath been lately ceded to the French. One ship, and sometimes two, sails annually from Manilla, in the island of Luconia, one of the Philippines, for Acapulco, in Mexico: her cargo, which belongs to the convents, consists of the principal commodities of that part of the world; but the return from Acapulco is, for the most part, made in money, and amounts to a vast sum, as appeared from the treasure found on board the Acapulco ship taken by Lord Anfon. In return for the manufactures sent to America, the Spaniards receive gold, silver, cochineal, indigo, the cocoa or chocolate nut, logwood and other dyeing woods, sugar, tobacco, snuff, and other productions of that part of the world; supplying most part of Europe and Asia with the silver they bring from thence in their galleons. In the time of the Moors and Goths, this kingdom was exceedingly populous. It is said to have then contained between twenty and thirty millions; whereas now it does not contain above seven or eight: and this, among other causes, is owing to the pride and laziness of the inhabitants, want of manufactures and good regulations, neglect of the mines and agriculture, the expulsion of the Moors, the peopling of America, heavy taxes, the great number of convents, excessive venery, and the consequent infecundity of both sexes. Their debauchery and sterility are partly occasioned by their way of living; for they make great use of spices, and drink a great deal of chocolate, and strong wine mixed with brandy. The causes assigned for the want of

Spain.

people in Spain will account, in some measure, for its poverty; notwithstanding it is computed that it receives one year with another, setting aside other sums, above twenty-six millions of pieces of eight, in registered gold and silver. As most of the manufactures that are sent to America are furnished by Britain, France, Italy, and Holland, to a great part of the treasure brought home by the galleons is paid to the merchants of those nations.

The constitution of Spain is at present an absolute hereditary monarchy, where the females inherit in default of the males. The king, in his title, enumerates most of the provinces and particular parts of the dominions he has been or is possessed of. In speaking of him, he is commonly called his *Catholic Majesty*, or the *Catholic King*. The hereditary prince is commonly styled *Prince of Asturias*, and the other royal children *Infants*. The kings of Spain are never crowned; they seem to have a power to dispose of the crown to what branch of the royal family they please. For the administration of the government and of justice, here are several councils and tribunals; as the *junto* or cabinet-council, the *privy-council*, the council of war, the council of Castile, the council of the inquisition, the council of the Indies, the seven courts of royal audiences, &c. Since the beginning of the 17th century, and the reign of Philip III. the cortes, or parliaments of this kingdom, have been discontinued. The higher nobility here consist of counts, marquises, and dukes. The grandees, who have precedence of all others, next the king and princes of the blood, are named out of these. They have the privilege of being covered in the king's presence, who styles them in his letters *Illustrious*; and in speaking to them or of them, their *Eminences*; but there are others beside the grandees who are covered in the king's presence; as cardinals, nuncios, archbishops, the grand prior of Castile and the grand prior of Malta, the generals of the orders of St Dominic and St Francis, ambassadors of crowned heads, the knights of the golden-fleece, and of the three military orders of St James, Calatrava, and Alcantara, when the king assists at their respective chapters in quality of grand-master. No grandee can be apprehended for any crime but by the express order of the king; and they have many other privileges besides these. The inferior nobility style themselves *Cavalleros* and *Hidalgos*.

Of the orders in Spain, that of the golden fleece is the principal; which was instituted in 1430 by Philip the Good duke of Burgundy, and is common now to the kings of Spain and the house of Austria. The order of St Jago de Compostella was instituted in the year 1175 by Ferdinand II. king of Leon. The order of Calatrava was founded by Sancho III. of Castile. The order of Alcantara owes its institution to Ferdinand II. king of Leon. The three last orders have large commanderies or estates annexed to them. The masters of them were once so powerful, that they disputed the king's authority over them; whereupon the king procured those master-ships to be conferred on himself by the Pope, that they might no longer assume an independency of the state. The knights of these three orders are esteemed noblemen.

In the last century, the revenues of Spain amounted to 32 or 33 millions of livres; but afterwards they

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Constitution and government.

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Orders of knighthood.

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Revenues.

Span,
Spanheim.Spaniel,
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were so reduced, that they did not exceed seven or eight millions. At present, the revenues of the crown arising in Spain are computed at five millions Sterling *per annum*, besides what arises from America. The silver mines there are inexhaustible; and of the produce of these a fifth belongs to the king. The taxes in Spain are numerous and heavy. The land-forces, in time of peace, are computed at about 80,000; and in time of war, must be much more numerous. Their navy at present cannot be ascertained.

154
Language.

The language of this country, especially that spoken in Castile, which is by far the purest, approaches the nearest to the Latin of any language in Europe, mixed with Arabic words and terminations introduced by the Moors. In some provinces, the vulgar tongue is a dialect of the old French, or rather Gascon, which is little understood in the others. In Biscay, the language is said to be a dialect of the Gothic or Celtic, and to have some analogy with the Welch and Irish. As to what regards the character of the Spaniards, they do not want either an inclination or capacity for the sciences; but have hardly an opportunity of acquiring any true learning or knowledge, at least in their schools and universities. They are admired for their secrecy, constancy, gravity, patience in adversity, and loyalty. They are also said to be true to their word, great enemies to lying, and so nice and jealous in point of honour, that they will stick at nothing to wipe off any stain that is cast upon it. Among their vices and defects are reckoned their pride and contempt of foreigners, their indolence, laziness, lust, bigotry, and credulity in believing the feigned miracles and legends of their monks. They are also said to be extremely passionate, jealous, and vindictive; and are noted, above any other European nation, for their contempt of and aversion to agriculture, arts, and manufactures.

New Spain. See MEXICO.

SPAN, a measure taken from the space between the thumb and the tip of the little finger when both are stretched out. The span is estimated at three hand's breadths or nine inches.

SPANHEIM (Ezekiel), a most learned writer in the 17th century, was born at Geneva in 1629; and in 1642 went to Leyden to study. Here he distinguished himself to great advantage; and, his reputation spreading, Charles Lewis elector palatine sent for him to be tutor to his only son. This task our author discharged to the entire satisfaction of the elector; by whom he was also employed in divers negotiations at foreign courts. He afterward entered into the service of the elector of Brandenburg, who, in 1680, sent him envoy-extraordinary to the court of France, and soon after made him a minister of state. After the peace of Ryfwic, he was again sent on an embassy to France, where he continued from the year 1697 to 1702. The elector of Brandenburg having during that interval assumed the title of *king of Prussia*, conferred on him the title and dignity of a baron. In 1702, he left France; and went ambassador to England, where he had been several times. Here he died in 1710, aged 81 years. It is surprising, that in discharging the duties of a public minister with so much exactness, and amidst so many different journeys, he could find time enough to write the several books

published by him. It may be said of him, that he acquitted himself in his negotiations like a person who had nothing else in his thoughts; and that he wrote like a man who had spent his whole time in his study. The principal of his works are, 1. *De præstantia et usu numismatum antiquorum*; the best edition of which is in two volumes folio. 2. Several letters or dissertations on scarce and curious medals. 3. A preface and notes to the edition of the Emperor Julian's works, printed at Leipzig in 1696, folio.

SPANIEL, in zoology. See CANIS.

SPAR, in natural history, a class of fossils not inflammable nor soluble in water: when pure, it is pellucid, and colourless; emulating the appearance of crystal, but wanting its distinguishing characteristics; composed of plane and equable plates; not flexible nor elastic; not giving fire with steel; readily calcining in a small fire; fermenting violently with acids, and totally soluble in them.—The spars in general are found in the fissures of stones, and about mines. Vast quantities are found in the German mines, and in those of Derbyshire in England.

SPARROW, in ornithology. See FRINGILLA.

SPARROW-HAWK, in ornithology. See FALCO.

SPARTA, or LACEDÆMON, the capital of the country of Laconia in Greece, an ancient and most renowned state, the inhabitants of which have been in all ages celebrated for their military and other virtues.—The history of Sparta for many ages is entirely fabulous; and the authentic accounts commence only with the celebrated lawgiver Lycurgus, who flourished about 870 B. C. See the article LYCURGUS.

The history of Sparta mostly fabulous till the time of Lycurgus.

After his death, the first material transaction which we find mentioned in the Spartan history is the Messenian war, which commenced in the year 752 B. C. and ended in the total reduction of the Messenian territory, as related under the article MESSENIA. During this period, according to some authors, a great change took place in the government of Sparta. This was the creation of the ephori, which is ascribed to one of the kings named *Theopompus*. This man perceiving that there was a necessity for leaving magistrates to execute the laws, when the kings were obliged to be in the field, appointed the magistrates above-mentioned, who afterwards made so great a figure in the state. See EPHORI. One great privilege of the ephori was, that they did not rise up at the preference of the kings, as all other magistrates did: another was, that if the kings offended against the laws, the ephori took cognizance of the offence, and inflicted a suitable punishment. From the first election of the ephori, the year was denominated, as at Athens, from the first of the archons.

The conquest of Messenia gave Sparta the superiority over the rest of the states, excepting only that of Athens, which for a long time continued to be a very troublesome rival; but the contests between these two rival states have been so fully related under the article ATTICA, that nothing more is requisite to be added in this place.—In the time of the Persian war, Leo- Leonidas the Spartan king distinguished himself in such a manner, as to become the admiration not only of that but of every succeeding age. It being resolved in a general council to defend the straits of Thermopylae against the Persians, 6000 foot were put under the

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command of Leonidas; of whom, however, only 300 were Spartans. Leonidas did not think it practicable to defend the pass against such multitudes as the Persian king commanded; and therefore privately told his friends, that his design was to devote himself to death for his country.

Xerxes advancing near the straits was strangely surprised to find that the Greeks were resolved to dispute his passage; for he had always flattered himself that on his approach they would betake themselves to flight, and not attempt to oppose his innumerable forces. However, Xerxes, entertaining still some hopes of their flight, waited four days without undertaking any thing, on purpose to give them time to retreat. During this time, he used his utmost endeavours to gain and corrupt Leonidas, promising to make him master of all Greece if he would come over to his interest. His offers being rejected with contempt and indignation, the king ordered him by an herald to deliver up his arms. Leonidas, in a style and with a spirit truly laconical, answered, "Come thyself, and take them." Xerxes, at this reply, transported with rage, commanded the Medes and Cissians to march against them, take them all alive, and bring them to him in fetters. The Medes, not able to stand the shock of the Greeks, soon betook themselves to flight; and in their room Hydarnes was ordered to advance with that body which was called *Immortal*, and consisted of 10,000 chosen men: but when these came to close with the Greeks, they succeeded no better than the Medes and Cissians, being obliged to retire with great slaughter. The next day the Persians, reflecting on the small number of their enemies, and supposing so many of them to be wounded that they could not possibly maintain a second fight, resolved to make another attempt; but could not by any efforts make the Greeks give way: on the contrary, they were themselves put to a shameful flight. The valour of the Greeks exerted itself on this occasion in a manner so extraordinary, that Xerxes is said to have three times leaped from his throne, apprehending the entire destruction of his army.

Xerxes having lost all hopes of forcing his way through troops that were determined to conquer or die, was extremely perplexed and doubtful what measures he should take in this posture of affairs; when one Epialtes, in expectation of a great reward, came to him, and discovered a secret passage to the top of the hill which overlooked and commanded the Spartan forces. The king immediately ordered Hydarnes thither with his select body of 10,000 Persians; who marching all night, arrived at break of day, and possessed themselves of that advantageous post. The Phocians, who defended this pass, being overpowered by the enemy's numbers, retired with precipitation to the very top of the mountain, prepared to die gallantly. But Hydarnes neglecting to pursue them, marched down the mountain with all possible expedition, in order to attack those who defended the straits in the rear. Leonidas being now apprised that it was impossible to bear up against the enemy, obliged the rest of his allies to retire: but he staid himself, with the Thebians, Thebans, and 300 Lacedæmonians, all resolved to die with their leader; who being told by the oracle, that either Sparta should be destroyed or the king lose his

Sparta.

life, determined without the least hesitation to sacrifice himself for his country. The Thebans indeed remained against their inclination, being detained by Leonidas as hostages; for they were suspected to favour the Persians. The Thebians, with their leader Demophilus, could not by any means be prevailed upon to abandon Leonidas and the Spartans. The augur Megistias, who had foretold the event of this enterprise, being pressed by Leonidas to retire, sent home his only son; but remained himself, and died by Leonidas. Those who staid did not feed themselves with any hopes of conquering or escaping, but looked upon Thermopylæ as their graves; and when Leonidas, exhorting them to take some nourishment, said, that they should all sup together with Pluto, with one accord they set up a shout of joy, as if they had been invited to a banquet.

Xerxes, after pouring out a libation at the rising of the sun, began to move with the whole body of his army, as he had been advised by Epialtes. Upon their approach, Leonidas advanced to the broadest part of the passage, and fell upon the enemy with such undaunted courage and resolution, that the Persian officers were obliged to stand behind the divisions they commanded, in order to prevent the flight of their men. Great numbers of the enemy falling into the sea, were drowned; others were trampled under foot by their own men, and a great many killed by the Greeks; who, knowing they could not avoid death upon the arrival of those who were advancing to fall upon their rear, exerted their utmost efforts. In this action fell the brave Leonidas; which Abrocomes and Hyperanthes, two of the brothers of Xerxes, observing, advanced with great resolution to seize his body, and carry it in triumph to Xerxes. But the Lacedæmonians, more eager to defend it than their own lives, repulsed the enemy four times, killed both the brothers of Xerxes, with many other commanders of distinction, and rescued the body of their beloved general out of the enemy's hands. But in the mean time, the army that was led by the treacherous Epialtes, advancing to attack their rear, they retired to the narrowest place of the passage, and drawing all together except the Thebans, posted themselves on a rising ground. In this place they made head against the Persians, who poured in upon them on all sides, till at length, not vanquished, but oppressed and overwhelmed by numbers, they all fell, except one who escaped to Sparta, where he was treated as a coward and traitor to his country; but afterwards made a glorious reparation in the battle of Platæa, where he distinguished himself in an extraordinary manner. Some time after, a magnificent monument was erected at Thermopylæ, in honour of those brave defenders of Greece, with two inscriptions; the one general, and relating to all those who died on this occasion, importing, that the Greeks of Peloponnesus, to the number only of 4000, made head against the Persian army, consisting of 3,000,000. The other related to the Spartans in particular, and was composed by the poet Simonides, to this purport: "Go, passenger, and acquaint the Spartans that we died here in obedience to their just commands." At those tombs a funeral oration was yearly pronounced in honour of the dead heroes, and public games performed with great solemnity, wherein none but the Lacedæmonians and Theb-

The Persians repulsed with great slaughter.

They are shown a way over the hill altes, to surround the Greeks.

Sparta.

Thebians had any share, to show that they alone were concerned in the glorious defence of Thermopylae.

6
A dreadful
earthquake
in Sparta.

At the end of the 77th Olympiad, a most dreadful earthquake happened at Sparta, in which, according to Diodorus, 20,000 persons lost their lives; and Plutarch tells us, that only five houses were left standing in the whole city. On this occasion the Helotes or slaves, whom the Spartans had all along treated with the utmost cruelty, attempted to revenge themselves by taking up arms, and marching directly to the ruins of the city, in hopes of cutting off at once those who had escaped from the earthquake. But in this they were prevented by the prudence of the Spartan king Archidamus; for he, observing that the citizens were more desirous of preserving their effects than taking care of their own lives, caused an alarm to be sounded, as if he had known that an enemy was at hand. On this the citizens armed themselves in haste with such weapons as they could come at; and having marched a little way from the city, met the Helotes, whom they soon compelled to retire. The latter, however, knowing that they had now no mercy to expect from those who had already treated them with such cruelty, resolved to defend themselves to the last. Having therefore seized a sea-port town in Messenia, they from thence made such incursions into the Spartan territories, that they compelled those imperious masters to ask assistance from the Athenians. This was immediately granted; but when the Spartans saw that the skill of the Athenians in besieging towns was much greater than their own, they became jealous, and dismissed their allies, telling them, that they had now no farther occasion for their services. On this the Athenians left them in disgust; and as the Helotes and Messenians did not choose to come to an engagement with a Spartan army in the field, but took shelter in their fortified places, the war was protracted to ten years and upwards. At last the Helotes were reduced to their former misery; and the Messenians were obliged to leave Peloponnesus, on pain of being made slaves also. These poor people were then received by the Athenians, who granted them Naupactus for their residence, and afterwards brought them back to a part of their own country, from whence in the course of the Peloponnesian war they had driven the Spartans.

8
With the
Athenians
and Per-
sians.

In the year 431 B. C. the Peloponnesian war commenced; of which a full account has been given under the article *ATTICA*, n° 108—165. It ended most unfortunately for the Athenians; their city being taken and dismantled, as related in the article above mentioned. Thus were the Spartans raised to the highest pitch of glory; and, in the reign of Agésilas, they seemed to be on the point of subverting the Persian empire, as related under the article *PERSIA*, n° 30. But here their good fortune and their views of empire were suddenly checked. Agésilas had carried on the war in Asia with the greatest success; and as he would hearken to no terms of accommodation, a Persian governor named *Tithraustes*, having first attempted in vain to bribe the king, dispatched Timocrates the Rhodian with 50 talents into Greece, in order to try whether he could there meet with any persons less incorruptible than the Spartan monarch. This agent found many who inclined to accept his offers; particularly in Thebes, Corinth, and Argos. By distribu-

ting the money in a proper manner, he inflamed the inhabitants of these three cities against the Spartans; and of all others the Thebans came into his terms with the greatest readiness. They saw that their antagonists would not of their own accord break with any of the states of Greece, and did not choose to begin the war themselves, because the chiefs of the Persian faction were unwilling to be accountable for the event. For this reason they persuaded the Locrians to invade a small district which lay in dispute betwixt the Phocians and themselves. On this the Phocians invaded Locris; the Locrians applied to the Thebans, and the Phocians to the Spartans. The latter were glad of an opportunity of breaking with the Thebans; but met with a much warmer reception than they expected. Their old general Lyfander, who had reduced Athens, was defeated and killed, with the loss of 1000 men: on which disaster Agésilas was recalled, and obliged to relinquish all hopes of conquering the Persians. His return changed the fortune of the war so much, that all the states began to grow weary of a contest from which nobody derived any advantage except the king of Persia. In a short time a treaty was concluded, known in history by the name of the *peace of Antaleidas*. The terms of this treaty were highly disadvantageous and dishonourable to the Greeks; for even the Spartans, though successful in Greece, had lost a great battle at sea with the Persian fleet under Conon the Athenian, which entirely broke their power in Asia.

By the peace of Antaleidas, the government of Bœotia was taken from the Thebans, which they had for a long time enjoyed; and by this they were so much provoked, that at first they absolutely refused to accede to the treaty; but as Agésilas made great preparations to invade them, they thought proper at last to comply. However, it was not long before a new war commenced, which threatened the total subversion of the Spartan state. As, by the peace of Antaleidas, the king of Persia had in a manner guaranteed the sovereignty of Greece to Sparta, this republic very soon began to exercise its power to the utmost extent. The Mantineans were the first who felt the weight of their resentment, although they had been their allies and confederates. In order to have a pretence for making war against them, they commanded them to quit their city, and to retire into five old villages which, they said, had served their forefathers, and where they would live in peace themselves, and give no umbrage to their neighbours. This being refused, an army was sent against them to besiege their city. The siege was continued through the summer with very little success on the part of the Spartans; but having during the winter season dammed up the river on which the city stood, the water rose to such an height, as either to overflow or throw down the houses; which compelled the Mantineans to submit to the terms prescribed to them, and to retire into the old villages. The Spartan vengeance fell next on the Philiatians and Olynthians, whom they forced to come into such measures as they thought proper. After this they fell on the Thebans; and, by attempting to seize on the Piræum, drew the Athenians also into the quarrel. But here their career was stopped: the Thebans had been taught the art of war by Chabrias the Athenian; so that even

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9
A general
combina-
tion against
Sparta.

10
Peace of
Antaleidas,
† See Per-
sia, n° 23.

11
Hostilities
recommen-
ced.

Age-

Sparta.

12
The power
of Sparta
entirely
broken.

Ageläus himself took the command of the Spartan army in vain. At sea they were defeated by Timotheus the son of Conon; and by land the battle of Leuctra put an end to the superiority which Sparta had held over Greece for near 500 years. See LEUCTRA.

After this dreadful defeat, the Spartans had occasion to exert all their courage and resolution. The women, and nearest relations of those who were killed in battle, instead of spending their time in lamentations, shook each other by the hand, while the relations of those who had escaped from the battle hid themselves among the women; or if they were obliged to go abroad, they appeared in tattered cloaths, with their arms folded, and their eyes fixed on the ground. It was a law among the Spartans, that such as fled from battle should be degraded from their honours, should be constrained to appear in garments patched with divers colours, to wear their beards half-shaved, and to suffer any to beat them who pleased, without resistance. At present, however, this law was dispensed with; and Ageläus by his prudent conduct kept up the spirits of the people, at the same time that by his skill in military affairs he checked the progress of the enemy. Yet, during the lifetime of Epaminondas the Theban general, the war went on greatly to the disadvantage of the Spartans; but he being killed at the battle of Mantinea, all parties became quickly desirous of peace. Ageläus did not long survive; and with him, we may say, perished the glory of Sparta. Soon after this all the states of Greece fell under the power of Alexander the Great; and the Spartans, as well as the rest, having become corrupt, and lost their martial spirit, became a prey to domestic tyrants, and to foreign invaders. They maintained their ground, however, with great resolution against the celebrated Pyrrhus king of Epirus; whom they repulsed for three days successively, though not without assistance from one of the captains of Antigonus. Soon after this one of the kings of Sparta named Agis, perceiving the universal degeneracy that had taken place, made an attempt to restore the laws and discipline of Lycurgus, by which he supposed the state would be restored to its former glory. But though at first he met with some appearance of success, he was in a short time tried and condemned by the ephori as a traitor to his country.—Cleomenes, however, who ascended the throne in 216 B. C. accomplished the reformation which Agis had attempted in vain. He suppressed the ephori; cancelled all debts; divided the lands equally, as they had been in the time of Lycurgus; and put an end to the luxury which prevailed among the citizens. But at last he was overborne by the number of enemies which surrounded him; and being defeated in battle by Antigonus, he fled to Egypt, where he put an end to his own life. With him perished every hope of retrieving the affairs of Sparta: the city for the present fell into the hands of Antigonus; after which a succession of tyrants took place; till at last all disturbances were ended by the Romans, who reduced MACEDON and GREECE to provinces of their empire, as has been related under these articles.

14
Institutions
of Lycur-
gus.

It remains now only to say something concerning the character, manners, and customs of the Spartans, which, as they were founded on the laws of Lycurgus, may best be learned from a view of these laws.

The institutions of Lycurgus were divided into 12 twelve tables.—The first comprehended such of the Spartan laws as regarded religion. The statues of all the gods and goddesses were represented in armour, even to Venus herself; the reason of which was, that the people might conceive a military life the most noble and honourable, and not attribute, as other nations did, sloth and luxury to the gods. As to sacrifices, they consisted of things of very small value; for which Lycurgus himself gave this reason, That want might never hinder them from worshipping the gods. They were forbidden to make long or rash prayers to the heavenly powers, and were enjoined to ask no more than that they might live honestly and discharge their duty. Graves were permitted to be made within the bounds of the city, contrary to the custom of most of the Greek nations; nay, they buried close by their temples, that all degrees of people might be made familiar with death, and not conceive it such a dreadful thing as it was generally esteemed elsewhere: on the same account the touching of dead bodies, or assisting at funerals, made none unclean, but were held to be as innocent and honourable duties as any other. There was nothing thrown into the grave with the dead body; magnificent sepulchres were forbidden; neither was there so much as an inscription, however plain or modest, permitted. Tears, sighs, outcries, were not allowed in public, because they were thought dishonourable in Spartans, whom their lawgiver would have to bear all things with equanimity. Mournings were limited to 11 days; on the 12th the mourner sacrificed to Ceres, and threw aside his or her weeds. In favour of such as were slain in the wars, however, and of women who devoted themselves to a religious life, there was an exception allowed as to the rules before-mentioned; for such had a short and decent inscription on their tombs. When a number of Spartans fell in battle, at a distance from their country, many of them were buried together under one common tomb; but if they fell on the frontiers of their own state, then their bodies were carefully carried back to Sparta, and interred in their family-sepulchres.

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15
His laws
concerning
religion.

II. Lycurgus divided all the country of Laconia into 30,000 equal shares: the city of Sparta he divided into 9,000, as some say; into 6000, as others say; and, as a third party will have it, into 4500. The intent of the legislator was, that property should be equally divided amongst his citizens, so that none might be powerful enough to oppress his fellows, or any be in such necessity, as to be therefrom in danger of corruption. With the same view he forbade the buying or selling these possessions. If a stranger acquired a right to any of these shares, he might quietly enjoy it, provided he submitted to the laws of the republic. The city of Sparta was unwall'd; Lycurgus trusting it rather to the virtue of its citizens than to the art of masons. As to the houses, they were very plain; for their ceilings could only be wrought by the ax, and their gates and doors only by the saw; and their utensils were to be of a like stamp, that luxury might have no instruments among them.

III. The citizens were to be neither more nor less than the number of city-lots; and if at any time there happened to be more, they were to be led out in colonies. As to children, their laws were equally harsh and

16

Concerning
the division
of land.

17

the children,
&c.

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and unreasonable; for a father was directed to carry his new-born infant to a certain place, where the gravest men of his tribe looked upon the infant; and if they perceived its limbs straight, and thought it had a wholesome look, then they returned it to its parents to be educated; otherwise it was thrown into a deep cavern at the foot of the mountain Taygetus. This law seems to have had one very good effect, viz. making women very careful, when they were with child, of either eating, drinking, or exercising, to excess: it made them also excellent nurses; for which they were in mighty request throughout Greece. Strangers were not allowed to reside long in the city, that they might not corrupt the Spartans by teaching them new customs. Citizens were also forbid to travel for the same reason, unless the good of the state required it. Such as were not bred up in their youth according to the law, were not allowed the liberty of the city, because they held it unreasonable, that one who had not submitted to the laws in his youth should receive the benefit of them when a man. They never preferred any stranger to a public office; but if at any time they had occasion for a person not born a Spartan, they first made him a citizen, and then preferred him.

18
Of celibacy
and marriage.

IV. Celibacy in men was infamous, and punished in a most extraordinary manner; for the old bachelor was constrained to walk naked, in the depth of winter, through the market-place: while he did this, he was obliged to sing a song in disparagement of himself; and he had none of the honours paid him which otherwise belonged to old age, it being held unreasonable, that the youth should venerate him who was resolved to leave none of his progeny behind him, to revere them when they grew old in their turns. The time of marriage was also fixed; and if a man did not marry when he was of full age, he was liable to an action; as were such also as married above or below themselves. Such as had three children had great immunities; such as had four were free from all taxes whatsoever. Virgins were married without portions; because neither want should hinder a man, nor riches induce him, to marry contrary to his inclinations. When a marriage was agreed on, the husband committed a kind of rape upon his bride. Husbands went, for a long time, secretly and by stealth, to the beds of their wives, that their love might not be quickly and easily extinguished. Husbands were allowed to lend their wives; but the kings, however, were forbid to take this liberty. Some other laws of the like nature there were, which as they were evidently against modesty, so they were far from producing the ends for which Lycurgus designed them; since, though the men of Sparta were generally remarkable for their virtue, the Spartan women were as generally decried for their boldness and contempt of decency.

19
Education
of their
children.

V. It was the care of Lycurgus, that, from their very nonage and infancy, the Lacedæmonians should be inured to conquer their appetites: for this reason he directed, that nurses should accustom their children to spare meals, and now-and-then to fasting; that they should carry them, when 12 or 13 years old, to those who should examine their education, and who should carefully observe whether they were able to be in the dark alone, and whether they had got over all

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other follies and weaknesses incident to children. He directed, that children of all ranks should be brought up in the same way; and that none should be more favoured in food than another, that they might not, even in their infancy, perceive any difference between poverty and riches, but consider each other as equals, and even as brethren, to whom the same portions were assigned, and who, through the course of their lives, were to fare alike: Only youths were allowed to eat flesh; older men eat their black broth and pulse; the lads slept together in chambers, and after a manner somewhat resembling that still in use in Turkey for the Janizaries: their beds, in the summer, were very hard, being composed of the reeds plucked by the hand from the banks of the Eurotas: in winter their beds were softer, but by no means downy, or fit to indulge immoderate sleep. They eat altogether in public; and in case any abstained from coming to the tables, they were fined. It was likewise strictly forbidden for any to eat or drink at home before they came to the common meal; even then each had his proper portion, that every thing might be done there with gravity and decency. The black broth was the great rarity of the Spartans, which was composed of salt, vinegar, blood, &c.; so that, in our times, it would be esteemed a very unfavourable soup. If they were moderate in their eating, they were so in their drinking also; thirst was the sole measure thereof; and never any Lacedæmonian thought of drinking for pleasure: as for drunkenness, it was both infamous and severely punished; and, that young men might perceive the reason, slaves were compelled to drink to excess, that the baseness of the vice might appear. When they retired from the public meal, they were not allowed any torches or lights, because it was expected, that men who were perfectly sober should be able to find their way in the dark; and, besides, it gave them a facility of marching without light; a thing wonderfully useful to them in time of war.

19
Of their
diet, clothing, &c.

VI. As the poor eat as well as the rich, so the rich could wear nothing better than the poor: they neither changed their fashion nor the materials of their garments; they were made for warmth and strength, not for gallantry and show: and to this custom even their kings conformed, who wore nothing gaudy in right of their dignity, but were contented that their virtue should distinguish them rather than robes. The young lads wore a tunic till they were twelve years old; afterwards they had a cloak given them, which was to serve them a year: and their clothing was, in general, so thin, that a Lacedæmonian vest became proverbial. Boys were always used to go without shoes; but when they grew up, they were indulged to them, if the manner of life they led required it; but they were always inured to run without them, as also to climb up and slip down steep places with bare feet: nay, the very shoe they used was of a particular form, plain and strong, and from the place of its invention, Laconic. Boys were not permitted to wear their hair; but when they grew up, they did not cut it. Baths and anointing were not much in use among the Lacedæmonians; the river Eurotas supplied the former, and exercise the latter. In the field, however, their sumptuary laws did not take place so strictly as in the city; for when they went to war, they wore purple habits;

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habits; they put on crowns when they were about to engage the enemy; they had also rings, but they were of iron; which metal was most esteemed by this nation. Young women wore their vests or jerkins only to their knees, or, as some think, not quite so low; a custom which both Greek and Roman authors censure as indecent. Gold, precious stones, and other costly ornaments, were permitted only to common women; which permission was the strongest prohibition to women of virtue, or who affected to be thought virtuous. Virgins went abroad without veils, with which married women, on the contrary, were always covered. In certain public exercises, in which girls were admitted as well as boys, they were both obliged to perform naked. Plutarch apologizes for this custom, urging, that there could be no danger from nakedness to the morals of youth whose minds were fortified by and habituated to virtue. One of Lycurgus's principal views in his institutions, was to eradicate the very seeds of civil dissensions in his republic. Hence proceeded the equal divisions of estates enjoined by him; hence the contempt of wealth, and the neglect of other distinctions, as particularly birth, he considering the people of his whole state as one great family; distinctions which, in other commonwealths, frequently produce tumults and confusions that shake their very foundation.

20
Obedience
to their su-
periors.

VII. Though the Spartans were always free, yet it was with this restriction, that they were subservient to their own laws, which bound them as strictly in the city as soldiers, in other states, were bound by the rules of war in the camp. In the first place, strict obedience to their superiors was the great thing required in Sparta. This they looked upon as the very basis of government; without which neither laws nor magistrates availed much. Old age was an indubitable title to honour in Sparta; to the old men the youth rose up whenever they came into any public place; they gave way to them when they met them in the streets, and were silent whenever their elders spoke. As all children were looked upon as the children of the state, so all the old men had the authority of parents: they reprehended whatever they saw amiss, not only in their own, but in other peoples children; and by this method Lycurgus provided, that as youth are every where apt to offend, they might be nowhere without a monitor. The laws went still further: if an old man was present where a young one committed a fault, and did not reprove him, he was punished equally with the delinquent. Amongst the youths there was one of their own body, or at most two years older than the rest, who was styled *iren*: he had authority to question all their actions, to look strictly to their behaviour, and to punish them if they did amiss; neither were their punishments light, but, on the contrary, very severe; whereby the youth were made hardy, and accustomed to bear stripes and rough usage. Silence was a thing highly commended at Sparta, where modesty was held to be a most becoming virtue in young people; nor was it restrained only to their words and actions, but to their very looks and gestures; Lycurgus having particularly directed, that they should look forward, or on the ground, and that they should always keep their hands within their robes. A stupid inconsiderate person, one who would

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not listen to instruction, but was careless of whatever the world might say of him, the Lacedæmonians treated as a scandal to human nature; with such an one they would not converse, but threw him off as a rotten branch and worthless member of society.

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21

Learning.

VIII. The plainness of their manners, and their being so very much addicted to war, made the Lacedæmonians less fond of the sciences than the rest of the Greeks. A soldier was the only reputable profession in Sparta; a mechanic or husbandman was thought a low fellow. The reason of this was, that they imagined professions which required much labour, some constant posture, being continually in the house, or always about a fire, weakened the body and depressed the mind; whereas a man brought up hardily, was equally fit to attend the service of the republic in time of peace, and to fight its battles when engaged in war. Such occupations as were necessary to be followed for the benefit of the whole, as husbandry, agriculture, and the like, were left to their slaves the Helotes; but for curious arts, and such as served only to luxury, they would not so much as suffer them to be introduced in their city; in consequence of which, rhetoricians, augurs, bankers, and dealers in money, were shut out. The Spartans admitted not any of the theatrical diversions among them; they would not bear the representation of evil even to produce good; but other kinds of poetry were admitted, provided the magistrates had the perusal of pieces before they were handed to the public.

Above all things, they affected brevity of speech, and accustomed their children, from their very infancy, never to express themselves in more words than were strictly necessary; whence a concise and sententious oratory is to this day styled *Laconic*. In writing they used the same conciseness; of which we have a signal instance in a letter of Archidamus to the Eleans, when he understood that they had some thoughts of assisting the Arcadians. It ran thus: "Archidamus to the Eleans: It is good to be quiet." And therefore Epaminondas thought that he had reason to glory in having forced the Spartans to abandon their monosyllables and to lengthen their discourses.

The greatest part of their education consisted in giving their youth right ideas of men and things: the iren or master proposed questions, and either commended the answers that were made him, or reproved such as answered weakly. In these questions, all matters, either of a trivial or abstruse nature, were equally avoided; and they were confined to such points as were of the highest importance in civil life; such as, Who was the best man in the city? Wherein lay the merit of such an action? and, Whether this or that hero's fame was well founded? Harmless raillery was greatly encouraged; and this, joined to their short manner of speaking, rendered laconic replies universally admired.

Music was much encouraged; but in this, as in other things, they adhered to that which had been in favour with their ancestors; nay, they were so strict therein, that they would not permit their slaves to learn either the tune or the words of their most admired odes; or, which is all one, they would not permit them to sing them if they had learned them. The youth of the male sex were much cherished and be-

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loved,

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loved, as those that were to build up and continue the future glory of the state, yet in Sparta it was a virtuous and modest affection, untinged with that sensuality which was so scandalous at Athens. The good effects of this part of Lycurgus's institutions were seen in the union that reigned among his citizens; and which was so extraordinary, that even in cases of competition, it was hardly known that rivals bore ill-will to each other; but, on the contrary, their love to the same person begat a secondary friendship among themselves, and united them in all things which might be for the benefit of the person beloved.

Some authors have accused this great lawgiver of encouraging theft in his institutions; which, they say, was not held scandalous among the Spartans, if it were so dexterously managed as that the person was not detected in it. But this is certain, and seems to be a strong contradiction of the heinous charge, that when a theft was discovered, it was punished with the utmost severity: a person even suspected of it would endure the heaviest punishments rather than acknowledge it, and be branded with so base a crime.

22
Exercises.

IX. The exercises instituted by law fall under the ninth table. In these all the Greeks were extremely careful; but the Lacedæmonians in a degree beyond the rest: for if a youth, by his corpulence, or any other means, became unfit for these exercises, he underwent public contempt at least, if not banishment. Hunting was the usual diversion of their children; nay, it was made a part of their education, because it had a tendency to strengthen their limbs, and to render those who practised it supple and fleet: they likewise bred up dogs for hunting with great care. They had a kind of public dances, in which they exceedingly delighted, and which were common alike to virgins and young men: indeed, in all their sports, girls were allowed to divert themselves with the youths; in so much that, at darting, throwing the quoit, pitching the bar, and such-like robust diversions, the women were as dexterous as the men. For the manifest oddity of this proceeding, Lycurgus assigned no other reason, than that he sought to render women, as well as men, strong and healthy, that the children they brought forth might be so too. Violent exercises, and a laborious kind of life, were only enjoined the youth; for when they were grown up to mens estate, that is, were upwards of 30 years old, they were exempted from all kinds of labour, and employed themselves wholly either in affairs of state or in war. They had a method of whipping, at a certain time, young lads in the temple of Diana, and about her altar; which, however palliated, was certainly unnatural and cruel. It was esteemed a great honour for lads to sustain these flagellations without weeping, groaning, or showing any sense of pain; and the thirst of glory was so strong in these young minds, that they very frequently suffered death without shedding a tear or breathing a sigh. A desire of overcoming all the weaknesses of human nature, and thereby rendering his Spartans not only superior to their neighbours, but to their species, runs through many of the institutions of Lycurgus; which principle, if well attended to, thoroughly explains them, and without attending to which it is impossible to give any account of them at all.

23.
Money, &c.

X. Gold and silver were, by the constitutions of

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Lycurgus, made of no value in Sparta. He was so well apprised of the danger of riches, that he made the very possession of them venal; but as there was no living without some sort of money, that is, some common measure or standard of the worth of things, he directed an iron coinage, whereby the Spartans were supplied with the useful money, and at the same time had no temptation to covetousness afforded them; for a very small sum was sufficient to load a couple of horses, and a great one must have been kept in a barn or warehouse. The coming in of all foreign money was also prohibited, that corruption might not enter under the name of commerce. The most ancient method of dealing, viz. by barter, or exchange of one commodity for another, was preferred by law in Sparta long after it had been out of date every where else. Interest was a thing forbid in the Spartan commonwealth; where they had also a law against alienation of lands, accepting presents from foreigners, even without the limits of their own country, and when their authority and character might well seem to excuse them.

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XI. Such of the laws of Sparta as related to courts of justice may be brought under the 11th table. Thirty years must have passed over the head of him who had a right to concern himself in juridical proceedings. Young men were thought unfit for them; and it was even held indecent, and of ill report, for a man to have any fondness for law-suits, or to be busying himself at the tribunals, when he had no affairs there of his own. By these rules Lycurgus thought to shut out litigiousness, and to prevent that multiplicity of suits which is always scandalous in a state. As young people were not permitted to inquire about the laws of other countries, and as they were hindered from hearing judicial proceedings in their courts, so they were likewise forbidden to ask any questions about, or to endeavour to discover, the reasons of the laws by which themselves were governed. Obedience was their duty; and to that alone they would have them kept. Men of abandoned characters, or who were notoriously of ill fame, lost all right of giving their votes in respect of public affairs, or of speaking in public assemblies; for they would not believe that an ill man in private life could mean his country better than he did his neighbour.

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XII. Till a man was 30 years old, he was not capable of serving in the army, as the best authors agree; though some think that the military age is not well ascertained by ancient writers. They were forbidden to march at any time before the full-moon; the reason of which law is very hard to be discovered, if indeed it had any reason at all, or was not rather founded on some superstitious opinion, that this was a more lucky conjuncture than any other. They were likewise forbidden to fight often against the same enemy; which was one of the wisest maxims in the political system of Lycurgus: and Agesilaus, by offending against it, destroyed the power of his country, and lost her that authority which for many ages he maintained over the rest of Greece; for, by continually warring against the Thebans, to whom he had an inveterate hatred, he at last beat them into the knowledge of the art of war, and enabled them, under the command of Epaminondas, to maintain for a time the prin-

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principality of Greece. Maritime affairs they were forbidden to meddle with; though the necessity of things compelled them, in process of time, to transgress this institution, and by degrees to transfer to themselves as well the dominion at sea as land: but, after the Peloponnesian war they again neglected naval affairs, from a persuasion that sailors and strangers corrupted those with whom they conversed. As they never fortified Sparta, they were not ready to undertake sieges: fighting in the field was their proper province, and, while they could overcome their enemies there, they rightly conceived, that nothing could hurt them at home. In time of war, they relaxed somewhat of their strict manner of living, in which they were singular. The true reason for this was, in all probability, that war might be less burdensome to them; for, as we have more than once observed, a strong desire to render them bold and warlike was the reigning passion of their legislator. They were forbidden to remain long encamped in the same place, as well to hinder their being surprised, as that they might be more troublesome to their enemies, by wasting every corner of their country. They slept all night in their armour; but their outguards were not allowed their shields, that, being unprovided of defence, they might not dare to sleep. In all expeditions they were careful in the performance of religious rites; and, after their evening-meal was over, the soldiers sung together hymns to their gods. When they were about to engage, the king sacrificed to the muses, that, by their assistance, they might be enabled to perform deeds worthy of being recorded to latest times. Then the army advanced in order to the sound of flutes, which played the hymn of Castor. The king himself sung the psalm, which was the signal to charge. This was done with all the solemnity imaginable; and the soldiers were sure either to die or conquer: indeed they had no other choice; for if they fled they were infamous, and in danger of being slain, even by their own mothers, for disgracing their families. In this consisted all the excellency of the Spartan women, who, if possible, exceeded in bravery the men, never lamenting over husbands or sons, if they died honourably in the field; but deploring the shame brought on their house, if either the one or the other escaped by flight. The throwing away a shield also induced infamy; and, with respect to this, mothers, when they embraced their departing sons, were wont to caution them, that they should either return armed as they were, or be brought back so when they were dead; for, as we have observed, such as were slain in battle were nevertheless buried in their own country. When they made their enemies fly, they pursued no longer than till victory was certain; because they would seem to fight rather for the honour of conquering, than of putting their enemies to death. According to their ancient rules of war, they were bound not to spoil the dead bodies of their enemies; but in process of time, this, and indeed many other of their most excellent regulations, fell into desuetude. He who overcame by stratagem, offered up an ox to Mars; whereas he who conquered by force, offered up only a cock; the former being esteemed more manly than the latter. After 40 years service, a man was, by law, no longer required to go into the field; and consequently if the

military age was 30, the Spartans were not held in-
valids till they were 70.

SPARTIANUS (Ælius), a Latin historian, who wrote the lives of Adrian, Caracalla, and four other Roman emperors. He lived under the reign of Dioclesian, about the year 290.

SPARTIUM, broom; a genus of the decandria order, belonging to the diadelphia class of plants. There are 10 species, all of them of shrubby growth. Of these one is the common broom, which grows naturally in this country; the rest are exotics, chiefly from Spain, Portugal, Italy, and other southern parts of Europe, and the Levant. Three of these, viz. the scoparium, or common broom; the junceum, or yellow Spanish broom; and the radiatum, or starry Italian broom, are hardy; but all the rest require the shelter of a green-house in severe winters.—They are all propagated by seeds.—The young flowers of the common broom are sometimes preserved as pickles; and the plant when burnt affords a tolerably pure alkaline salt. Dr Mead relates, that a dropical patient, who had taken the usual remedies, and been tapped three times without effect, was cured by taking half a pint of the decoction of green broom tops, with a spoonful of whole mustard-seed every morning and evening. “An infusion of the seeds drank freely (says Mr Withering) has been known to produce similar happy effects; but whoever expects these effects to follow in every dropical case, will be greatly deceived. I knew them succeed in one case that was truly deplorable; but out of a great number of cases in which the medicine had a fair trial, this proved a single instance. The branches or stalks of common broom being dried in the sun, and treated like hemp, produce threads which may be spun, and worked into a coarse linen-cloth. The wood of a West Indian species of broom, called by Millar the *spartium arborescens*, and frequently known by the name of *American ebony*, is of a fine greenish brown colour, hard, durable, and takes an exceeding fine polish.

SPARUS, the GILTHEAD; a genus of fishes belonging to the order of thoracici. The fore-teeth and dog-teeth are very strong; the grinders are obtuse and thick set; the lips are folded over; there are five rays in the gill membrane; and the opercula are scaly; the body is compressed; the lateral line is crooked behind; and the pectoral fins are roundish.

There are 26 species, three of which are natives of the British seas. The lunulated gilthead grows to the weight of ten pounds, and takes its name from the predominant colour; that of the fore-head and sides being as if gilt; but the latter are tinged with brown. It is one of the *pisces saxatiles*, or fish that haunts deep waters on bold rocky shores. They feed chiefly on shell-fish, which they comminute with their teeth before they swallow; the teeth of this genus in particular being adapted for that purpose: the grinders are flat and strong, like those of certain quadrupeds; besides which, there are certain bones in the lower part of the mouth that assist in grinding their food. They are but a coarse fish: they were known to the Romans, who did not esteem them unless they were fed with Lucrine oysters, as Martial informs us.

Non omnis laudem pretiungit AURATA mercuri

Sed cui solus erit concha Lærina cibis. Lib. xiii. Ep. 90.

In the account of captain Cook's voyage published

Spasim
||
Specifics.

by Mr Forster, we are informed, that the gilthead is sometimes poisonous, owing to their feeding on certain species of the raja, which have an extremely acrid and stimulating property.

SPASM, a convulsion. See MEDICINE, n° 135, 191.

SPATHA, in botany, a sheath; a species of calix which bursts lengthwise, and protrudes a stalk supporting one or more flowers, which commonly have no perianthium or flower-cup.

SPATHACEÆ, (from *spatha*, a "sheath"), the name of the ninth order in Linnæus's Fragments of a Natural Method, consisting of plants whose flowers are protruded from a spatha or sheath. See BOTANY, p. 1306.

SPAWN, in natural history, the eggs of fishes or frogs. See FISH, and RANA.

SPAVIN, in the manege, a disease in horses, being a swelling or stiffness, usually in the ham, occasioning a lameness. See FARRIER, § xxvii. and xxxii. 2, 3.

SPAYING, or SPADING, the operation of castrating the females of several kinds of animals, as sows, bitches, &c. to prevent any further conception, and promote their fattening. It is performed by cutting them in the mid flank, on the left side, with a sharp knife or lancet, taking out the uterus and cutting it off, and so stitching up the wound, anointing the part with tar, and keeping the animal warm for two or three days. The usual way is to make the incision oblique, two inches and a half long; that the fore-finger may be put in towards the back, to feel for the ovaries, which are two kernels as big as acorns on both sides of the uterus, one of which is drawn to the wound, and thus both taken out.

SPEAKER of the House of Commons, a member of the house elected by a majority of votes thereof to act as chairman or president in putting questions, reading briefs, or bills, keeping order, reprimanding the refractory, adjourning the house, &c. See PARLIAMENT.

SPEAKING, the art or act of expressing one's thoughts in articulate sounds or words. See GRAMMAR, LANGUAGE, READING, n° vi. vii. and ORATORY, part iv.

SPEAKING-Trumpet. See ACOUSTICS, n° 26.

SPECIAL, something that is particular, or has a particular designation; from the Latin *species*, in opposition to the *general*, from *genus*.

SPECIES, in logic, a relative term expressing an idea which is comprised under some general one called a *genus*. See LOGIC, n° 18. &c.

SPECIES, in commerce, are the several pieces of gold, silver, copper, &c. which having passed their full preparation and coinage, are current in public. See MONEY.

SPECIFIC, in philosophy, that which is peculiar to any thing, and distinguishes it from all others.

SPECIFICS, in medicine. By specifics is not meant such as infallibly and in all patients produce salutary effects. Such medicines are not to be expected, because the operations and effects of remedies are not formally inherent in them, but depend upon the mutual action and reaction of the body and medicine upon each other; hence the various effects of the same medicine in the same kind of disorders in different patients, and in the same patient at different times.

By specific medicines we understand such medicines as are more infallible than any other in any particular disorder.

Spectacles
||
Speedwell

SPECTACLES, in dioptrics, a machine consisting of two lenses set in silver, horn, &c. to assist the defects of the organ of sight. Old people, and others who have flat eyes, use convex spectacles, which cause the rays of light converge so as to fall upon the retina; whereas myopes, or short-sighted people, use concave lenses for spectacles, which causes the rays to diverge, and prevent their meeting ere they reach the retina. See OPTICS, n° 66.

SPECULARIS LAPIS, in natural history, a genus of talcs, composed of large plates visibly separate, and of extreme thinness; and each fissile again separated into a number of plates still finer. See TALC. Of this genus there are three species: 1. The white shining species, with large and broad leaves, commonly called *Isinglass* and *Muscovy-glass*: its lamellæ, or leaves, are extremely thin, elastic, and transparent; it makes not the least effervescence with aqua-fortis, and is not easily calcined in the fire. It is imported in great quantities; the miniature-painters cover their pictures with it; the lantern-makers sometimes use it instead of horn; and minute objects are usually preserved between two plates of it, for examination by the microscope. 2. The bright brown specularis, with broad leaves; a very valuable species, though inferior to the former. 3. The purple bright specularis, with broad leaves; which is the most elegant of all the talcs, and not less beautifully transparent than the first kind.

SPECULATIVE, something relating to the theory of some art or science, in contradistinction to practical.

SPECULUM, a LOOKING-GLASS, or *Mirror*, capable of reflecting the rays of the sun, &c. See OPTICS, n° 160, 161. p. 5575. 5576.

SPECULUM, in surgery, an instrument for dilating a wound, or the like, in order to examine it attentively. See SURGERY.

SPECULUMS, for reflecting telescopes. See OPTICS, p. 5603, 5610.

SPEECH, in general, the art or act of expressing a person's thoughts by means of articulate sounds, which we call words. See LANGUAGE, GRAMMAR, READING, n° vi. vii. and ORATORY, part iv.

SPEED (John), an eminent English historian, was born at Farington, in Cheshire, in 1552. He was by profession a taylor, and free of the company of merchant-tailors in the city of London. In 1606, he published his Theatre of Great Britain, which was afterwards reprinted in folio, under the title of the Theatre of the Empire of Great Brittain. His Genealogies of Scripture were first bound up with the Bible in 1611, which was the first edition of the present translation. In 1614, appeared his *History of Great Brittain*, which has been translated into Latin; and in 1616 he published his *Cloud of Witnesses*, in octavo. He lived in marriage 57 years with his wife, by whom he had twelve sons and six daughters; and died in 1629. He was interred in the church of St Giles's, Cripplegate, London, where a monument was erected to his memory.

SPEEDWELL, in botany. See VERONICA.

SPELL,

Spell
Spelman.

Spelter,
Spenser.

SPELL, in general, denotes the same with **CHARM** or **ANULET**.

SPELLING, in grammar, that part of orthography which teaches the true manner of resolving words into their syllables.

All words are either simple or compound, as *use*, *disuse*; *done*, *undone*; and the rules for dividing each, must be such as are derived from the analogy of language in general, or from the established custom of speaking; which, for the English language, are reduced to the following rules: 1. A consonant between two vowels must be joined with the latter in spelling, as *na-ture*, *ve-ri-ty*, *ge-ne-rous*: except, however, the letter *x*, which is joined to the first, as in *flux-en*, *ox-en*, &c. and compound words, as in *up-on*, *un-used*, &c. 2. A double consonant must be divided, as in *let-ter*, *man-ner*, &c. 3. Those consonants which can begin a word, must not be parted in spelling, as in *de-fraud*, *re-prove*, *di-strict*: however, this rule is found sometimes to fail; for though *gn* begins a word, as *gnaw* *gnat*, &c. yet it must be divided in spelling, as in *cog-ni-zance*, *ma-lig-ni-ty*, &c. 4. Those consonants which cannot begin a word must be divided, as *ld* in *fel-dom*, *lt* in *mul-ti-tude*, *mp* in *tem-per*, *rd* in *ar-dent*; but in final syllables there are exceptions, as *tl* in *ti-tle*, *dl* in *han-dle*, &c. 5. When two vowels come together, and are both of them distinctly founded, they must be separated in spelling, as in *co-e-val*, *mu-tu-al*, &c. 6. The grammatical terminations or endings, must be separated in spelling, as in *ed* in *wing-ed*, *edst* in *de-li-ver-edst*, *ing* in *hear-ing*, *ance* in *de-li-ver-ance*, &c. 7. Compound words must be resolved into their simple or component words, as *up-on*, *in-to*, *never-the-less*, *not-with-stand-ing*, &c.

SPELMAN, (Sir Henry) an eminent English antiquarian, was descended from an ancient family, and born at Cengham, near Lynn in Norfolk, about the year 1561. He was knighted by king James I. who had a particular esteem for him on account of his known capacity for business; and he employed him several times in Ireland on public affairs. When he was about 50 years of age, he went to reside in London; where falling into a study to which his own genius had always inclined him, he collected all such books and Mss. as concerned the subject of antiquities, either foreign or domestic. In 1626, he published the first part of his well-known Glossary, which he never carried beyond the letter L; because, as some have suggested, he had said things under "Magna charta," and "Maximum consilium," that could not then have appeared without giving offence. Upon his death all his papers came into the hands of his son Sir John Spelman, a gentleman who had abilities to have completed his father's design, if death had not prevented him. The second part was afterwards published by Sir William Dugdale; but with all the marks of a scanty unfinished performance. The next work he entered upon, was an edition of the English Councils, of which he published the first volume about two years before his death; leaving the second volume, as well of this as of his Glossary, to be published by Sir William Dugdale. Sir Henry wrote several other things, all relating to ancient laws and customs; and died in 1641. His Posthumous Works were published in folio, 1698, under the inspection of Mr Gibson,

afterwards bishop of London.

SPELTER, in metallurgy, the same with **ZINC**.

SPENSER (Edmund), was born in London; in the year 1553, and descended from an ancient family of the Spensers in Northamptonshire. All we know concerning his education is, that he was admitted a sizer of Pembroke-hall in Cambridge, and matriculated in 1569. At this time began his intimacy with Mr Gabriel Harvey, a man of genius and a poet. In 1576, having completed his degrees in arts, he left the university, as it is conjectured, for want of subsistence, and retired to the north of England. Here he had the misfortune to become enamoured of his Rosalind, who, after flattering his passion for a time, at length preferred his happier rival. Spenser continued in the country till the year 1578, when, at the persuasion of his friend Mr Harvey, he removed to London, where that gentleman introduced him to Mr Sidney, (afterward Sir Philip). Concerning his first introduction to Sir Philip, there is indeed a different story, which was first told by the writer of his life, prefixed to his works in 1679, and transcribed by Hughes, Cibber, and several others; which, nevertheless, is certainly not true. The purport of it is, that Spenser, being unknown to this Mæcenas of the age, went to Leicester house, and sent in the 9th canto of the first book of the Fairy Queen; that, on reading part of it, Sir Philip ordered his steward to give the bearer 50 l.; on reading a little farther, 50 l. more; then 200 l. bidding him to make haste and pay the money, lest he should give the poet his whole estate. The story tells prettily enough; but it is very certain, that the Fairy Queen was begun long after his acquaintance with Sir Philip. By this universal patron of genius, however, he was presented to queen Elizabeth, who honoured him with the place of poet-laureat. About this time he finished his Shepherd's Calendar, which was first printed in 1579; and in the following year, being recommended by his patron to the earl of Leicester, he went to Ireland as secretary to the lord Grey of Wilton, then appointed lord lieutenant of that kingdom. Lord Grey was recalled in 1582, and with him Spenser returned to London, where he continued till after the death of Sir Philip Sidney in 1586; a loss which he bewailed to the end of his life. The following year, our poet, having obtained a royal grant of 3000 acres of forfeited lands in the county of Cork in Ireland, set out for that kingdom, took possession of his estate, and fixed his residence in the castle of Kilmolan, which had belonged to the earl of Desmond. In this retirement he resumed his great work of the Fairy Queen, and continued in Ireland till, being visited by his old friend Sir Walter Raleigh in 1589, he came over with him to England; but returned to Ireland the year following, where he fell in love with a country-girl, and married her. Soon after his marriage, he paid another visit to his native country, where we also find him in 1596. In the following year he returned once more to Kilmolan; but on the rebellion of Lord Tyrone, who ravaged the whole county of Cork, he was obliged to fly for safety with his family to England, where, in the year 1599, he died in extreme poverty. He was buried in Westminster Abbey, according to his request, near Chaucer. A monument was erected to his memory by Ann coun-

teils

Spenser
||
Spermaceti.

tefs of Dorset. We know but little of his character as a man; as a poet, considering the age in which he lived, he deserves our utmost veneration. He wrote various pieces besides those above-mentioned. His whole works, with his life by Hughes, were published in fix volumes 12mo, in 1715 and 1750.

SPENSER (Dr John), a very ingenious and learned English divine, born in Kent in 1630; who became master of Corpus Christi College, Cambridge, and afterwards dean of Ely. He published a Discourse on Prodigies, which is a truly philosophical and learned work; and another famous work *De legibus Hæbreorum ritualibus, et eorum rationibus*: and after a life spent in the closest application to his studies, died in 1695.

SPERGULA, SPURREY; a genus of the pentagynia order, belonging to the decandria class of plants. There are five species; of which the most remarkable is the arvensis, or corn-spurrey, which grows in this country in gravelly soil and corn-fields. In Holland it is cultivated as food for cattle, and has the advantage of growing on the very poorest soils; but does not afford a great deal of food. Poultry are fond of the seeds; and the inhabitants of Finland and Norway make bread of them when their crops of corn fail. Horses, sheep, goats, and swine, eat it. Cows refuse it.

SPERM, the seed whereof an animal is formed.

See SEMEN.

SPERMACETI, a white flaky substance, prepared from the brain of a species of whale called *physeter microps*. See PHYSETER.

One of these fishes affords some tuns of brains; which are first grossly freed from the oil by draining and pressing, and afterwards more perfectly purified by steeping them in a ley of alkaline salt and quick-lime, which dissolves the remains of the oily matter into a saponaceous liquid. The brains being then washed with water, appear of a silver whiteness; and nothing more is required to complete the preparation than to cut them in shivers with wooden knives, and spreading them abroad to dry. Such is the simple process by which this profitable commodity is prepared. It has been said that spermaceti is a natural concrete, found floating on the surface of the northern seas; but this is plainly a false report, perhaps calculated to prevent inquiry into the manner of its preparation. Good spermaceti is in fine white flakes, glossy and semitransparent, soft and unctuous to the touch, yet dry and easily friable; in taste somewhat like butter; of a faint smell like that of tallow. It is apt, in keeping, if not carefully secured from the air, to grow yellowish, and contract a rancid fishy smell. The more perfectly it has been purified at first, the less susceptible it is of these alterations; and after it has been changed, it may be rendered white and sweet again, by steeping it afresh in a ley of alkaline salt and quick-lime. It melts in a small degree of heat, and congeals again as it cools. Laid on burning coals, it emits a fetid smell like that of the snuff of a candle. The contact of flame does not set it on fire, but with a wick it burns equally with common tallow-candles. In distillation it totally arises, leaving no coal or *caput mortuum* behind. From four ounces were obtained three ounces and a half of oil, and a dram and a half of phlegm; the other two drams and a half having been

waisted or dissipated in the process. The oil is not a brown or black fetid empyreumatic one, like those of other animal substances, but clear, yellowish, of a butyraceous consistence, in smell like oil of wax, like which also it coagulates in the cold. Rectified spirit of wine, digested and boiled with spermaceti, takes up about half a dram out of half an ounce: greatest part settles to the bottom, and the finer particles float in the liquor, in appearance like flowers of benzoine. Water long digested or boiled with it extracts nothing. By grinding it with sugar or almonds, it becomes miscible with water, but not near so perfectly as the vegetable resins do by the same treatment: on standing for a little time, the spermaceti separates and floats on the surface. Yolks of eggs unite it more thoroughly with watery liquors; but when dissolved by these also, it soon separates and falls to the bottom. Even caustic alkaline ley does not dissolve nor unite with it into soap, as it does with all other fats; and hence the use of this ley in its preparation and purification. It mingles sufficiently with oils, fats, balsams, resins, butter, wax, &c.

SPERMATIC, in anatomy, something belonging to the sperm or seed.

SPEY, a river of Scotland, rising from a lake of the same name in Badenoch, and, after a serpentine course of 76 miles, passes by Rothes castle, and falls into the German sea at Garioch near Elgin. Mr Pennant tells us, that the Spey is a dangerous neighbour to Castle Gordon, overflowing frequently in a dreadful manner, as appears by its ravages far beyond its banks. The bed of the river is wide and full of gravel, and the channel very shifting. In 1746 the duke of Cumberland passed this river at Belly church, near Castle Gordon, when the channel was so deep as to take an officer, from whom Mr Pennant had the account, and who was six feet four inches high, up to the breast. The banks are here very high and steep; so that had not the rebels been infatuated in such a manner as to neglect opposition, the passage must have been attended with considerable loss. On this river there is a great salmon-fishery; about 1700 barrels full are caught in the season, and the shore is rented for about 1200 l. per annum.

SPHACELUS, in surgery and medicine, an absolute and perfect corruption or death of the parts.

SPHAGNUM, Bog-moss; a genus of the order of musci belonging to the cryptogamia class of plants. There are three species; the most remarkable of which is the palustris, or common bog-moss, which grows on our bogs in wide patches, so that it frequently covers a large portion of their surface. The stalks are from two inches to two feet long, irregularly surrounded with numerous, conical, pendant branches, and terminated with a rosetaceous cluster of erect short ones. It is generally believed, that the roots and decayed stalks of this moss constitute a principal part of that useful bituminous substance called *peat*, which is the chief fuel of the northern regions.—The Lapland matrons are well acquainted with this moss. They dry and lay it in their cradle, to supply the place of bed, bolster, and every covering; and, being changed night and morning, it keeps the infant remarkably clean, dry, and warm. It is sufficiently soft of itself; but the tender mother, not satisfied with this, frequently

Spermatic
||
Sphagnum.

covers

Sphenoides covers the mole with the downy hairs of the reindeer; and by that means makes a most delicate nest for the young babe.

|| Spike.

Os SPHENOIDES, the seventh bone of the cranium or skull. See ANATOMY, n° 15.

SPHERE, is a solid contained under one uniform round surface, such as would be formed by the revolution of a circle about one of its own diameters as an axis. See GEOMETRY.

Projection of the SPHERE. See PROJECTION.

SPHERE, in astronomy, that concave orb or expanse which invests our globe, and in which the heavenly bodies appear to be fixed, and at an equal distance from the eye.

The better to determine the places of the heavenly bodies in the sphere, several circles are supposed to be described on the surface thereof, hence called the *circles of the sphere*: of these some are called *great circles*, as the equinoctial, ecliptic, meridian, &c. and others *small circles*, as the tropics, parallels, &c. See GEOGRAPHY and ASTRONOMY, *passim*.

Armillary SPHERE. See GEOGRAPHY, sect. ii.

Sphere of Activity of a Body, is that determinate space or extent to which, and no farther, the effluvia continually emitted from that body reach; and where they operate according to their nature.

SPHERES, in optics, the same with metalline mirrors for telescopes or other purposes. See OPTICS, p. 5613, 5619.

SPHEROID, in geometry, a solid approaching to the figure of a sphere. It is generated by the entire revolution of a semi-ellipse about its axis.

SPHINCTER, in anatomy, a term applied to a kind of circular muscles, or muscles in form of rings, which serve to close and draw up several orifices of the body, and prevent the excretion of the contents.

SPHINX, in sculpture, &c. a figure or representation of a monster of that name, famed among the ancients, now mostly used as an ornament in gardens, terraces, &c. It is represented with the head and breasts of a woman, the wings of a bird, the claws of a lion, and the rest of the body like a dog. It is supposed to have been engendered by Typhon, and sent by Juno to be revenged on the Thebans. Its office, they say, was to propose dark enigmatical questions to all passers-by; and if they did not give the explication thereof, to devour them. It made horrible ravages, as the story goes, on a mountain near Thebes; and could not by any means be destroyed, till after Oedipus had solved the following riddle, "What animal is it that in the morning walks on four legs, at noon on two, and at night on three?" The answer was "Man."

Among the Egyptians, the sphinx was the symbol of religion, by reason of the obscurity of its mysteries: and on the same account the Romans placed a sphinx in the porch of their temples.

SPICE, any kind of aromatic drug that has hot and pungent qualities: such are pepper, nutmeg, ginger, cinnamon, cloves, &c.

Spice-Islands, in the East Indies. See BANDA, MOLOCCA *Islands*, and CEYLON.

SPIDER, in zoology. See ARANEÆ.

SPIDERWORT, in botany. See PHALANGIUM.

SPIKE, or *Oil of SPIKE*, a name given to an essen-

tial oil distilled from lavender, and much used by the varnish-makers and the painters in enamel.

SPIKENARD, in botany. See NARDUS.

|| Spinet.

SPINA VENTOSA, in surgery, that species of corruption of the bones which takes its rise in the internal parts, and by degrees enlarges the bone, and raises it into a tumour. See SURGERY.

SPINACHIA, SPINACH; a genus of the pentandria order, belonging to the dioecia class of plants. There are two species. The common species intended for winter use should be sown on an open spot of ground in the latter end of July; observing to do it if possible when the weather is rainy. When the young plants are come up, the weeds must be destroyed, and the plants left at about five inches asunder. The ground being kept clear of weeds, the spinach will be fit for use in October. The way of gathering it to advantage is only to take off the longest leaves, leaving those in the centre to grow bigger; and at this rate a bed of spinach will furnish the table for a whole winter, till the spinach sown in spring is become fit for use, which is common in April.

SPINAGE, or SPINACH. See SPINACHIA.

SPINÆ, in botany, thorns, rigid prickles: a species of *aræa*, growing on various parts of certain plants for their defence; *spina ramorum arcent pecora*. On the branches we find examples in the pyrus, prunus, citrus, hippophaes, gmelina, rhamnus, lycium, &c.; on the leaves in the aloe, agave, yucca, ilex, hippomane, theophrasta, carlina, &c.; on the calyx, in the carduus, cnicus, centaurea, moluccella, galeopsis, &c.; on the fruit, in the trapa, tribulus, murex, spinacia, agremonia, datura, &c.

SPINAL MARROW. See ANATOMY, n° 5. 396—399.

SPINALIS, in anatomy, the name of several muscles, &c. of the spine.

SPINE, SPINA DORSI. See ANATOMY, n° 29.

SPINE, in botany. See SPINÆ.

SPINELLO, a Tuscan painter, of great repute in his time. He painted a picture of the fallen angels, in which he drew so horrid a picture of Lucifer, that it frightened him so much as to affect his senses ever after. He flourished about the year 1380.

SPINET, or SPINNETH, a musical instrument ranked in the second or third place among harmonious instruments. It consists of a chest or belly made of the most porous and resinous wood to be found, and a table of fir glued on slips of wood called *flummers*, which bear on the sides. On the table is raised two little prominences or bridges, wherein are placed so many pins as there are chords or strings to the instrument. It is played on by two ranges of continued keys, the former range being the order of the diatonic scale, and that behind the order of the artificial notes or semi-tones. The keys are so many flat pieces of wood, which, touched and pressed down at the end, make the other raise a jack which strike and sound the strings by means of the end of a crow's quill, where-with it is armed. The 30 first strings are of brass, the other more delicate ones of steel or iron-wire; they are all stretched over the two bridges already mentioned. The figure of the spinet is a long square or parallelogram; some call it an *harp-couched*, and the harp an *inverted spinet*. See the article HARP.

Spinning
||
Spinozism.

This instrument is generally tuned by the ear, which method of the practical musicians is founded on a supposition that the ear is a perfect judge of an octave and a fifth. The general rule is to begin at a certain note, as C, taken towards the middle of the instrument, and tuning all the octaves up and down, and also the fifths, reckoning seven semi-tones to each fifth, by which means the whole is tuned. Sometimes to the common or fundamental play of the spinet is added another similar one in unison, and a third in octave to the first, to make the harmony the fuller; they are either played separately or together by means of a stop; these are called *double* or *triple spinets*; sometimes a play of violins is added, by means of a bow, or a few wheels parallel to the keys, which press the strings and make the sound last as long as the musician pleases, and heighten and soften them more or less, as they are more or less pressed. The harpsichord is a kind of spinet, only with another disposition of the keys. See the article *HARPSICHORD*. The instrument takes its name from the small quill ends which touch the strings, resembling *spine*, or thorns.

SPINNING, in commerce, the art or art of reducing silk, flax, hemp, wool, hair, or other matters, into thread. Spinning is either performed on the wheel with a distaff and spindle, or with other machines proper for the several kinds of working. Hemp, flax, nettle-thread, and the like vegetable matters, are to be wetted in spinning; silks, wools, &c. are to be spun dry, and do not need water; but there is a way of spinning silk as it comes off the cafes or balls, where hot and even boiling water is to be used. See the articles *SILK*, *THREAD*, &c.

SPINOSUS CAULIS, in botany; a stem covered with strong woody prickles, whose roots are not superficial, but proceeding from the body of the stem. When applied to a leaf, *spinosum folium*, it indicates the margin running out into rigid points or prickles, *quod margine exit in acumina duriora, rigida, pungentia*.

SPINOUS, in botany. See **SPINOSUS**.

SPINOUS Fishes, such as have some of the rays of the back-fins running out into thorns or prickles, as the perch, &c.

SPINOZA (Benedict de), the son of a Portuguese Jew settled at Amsterdam, where he was born in 1633. He commenced philosopher early in life; publicly embraced Christianity, for which the Jews attempted to assassinate him; and in the end made a great noise in the world by his atheistical principles and writings. He was probably the first who reduced Atheism to a system; but in other respects his doctrine was the same with that of several philosophers both ancient and modern. He retired into the country that he might not be interrupted in his speculations, and was sometimes three months without going out of his lodgings. This retired life did not hinder his name from spreading. The free-thinkers came to him from all parts. The palatine count offered him the place of professor of philosophy at Heidelberg; but he refused it. He died at the Hague in 1677, aged about 44 years. He is said to have been honest, obliging, and very regular in his morals; which we need not be more surprised at than to see people live an irregular life though fully persuaded of the truths of the Gospel.

SPINOZISM, or **SPINOISM**, the doctrine of Spi-

noza, or Atheism and Pantheism propofed after the manner of Spinoza. See **SPINOZA**.

The great principle of Spinozism is, That there is nothing properly and absolutely existing besides matter and the modifications of matter; among which are even comprehended thought, abstract and general ideas, comparisons, relations, combinations of relations, &c.

The chief articles in Spinoza's system are reducible to these. That there is but one substance in nature, and that this only substance is endued with an infinite number of attributes, among which are extension and cogitation: that all the bodies in the universe are modifications of this substance considered as it is extended; and that all the souls of men are modifications of the same substance considered as cogitative: that God is a necessary and infinitely perfect being, and is the cause of all things that exist, but not a different being from them: that there is but one being and one nature, and that this nature produces within itself, by an immanent act, all those which we call *creatures*; and that this being is at the same time both agent and patient, efficient cause and subject; but that he produces nothing but modifications of himself.

SPIRÆA, in botany, a genus of the pentagynia order, belonging to the icofandria class of plants.—There are 12 species; of which the most remarkable are, 1. The *salicifolia*, or common *spiræa frutex*, rises with several shrubby stalks, to the height of six or eight feet. The branches are terminated by spikes of pale flowers, the lower parts of the spikes are branched out into small spikes, but the upper parts are close and obtuse. When the flowers are past, the germen changes to pointed capsules; but they seldom come to perfection. 2. The *silpendula*, or common dropwort, grows in mountainous pastures in several parts of England and Scotland. It rises about a foot and an half high, with an erect stalk, and but few leaves upon it; terminated with a loose umbel of white flowers often tinged with red. 3. The *ulmaria*, or meadow-sweet; grows naturally on the sides of waters, and in low moist meadows, in most of the northern counties of Europe. The stalks are angular, red, and rise three or four feet high; garnished with winged leaves, and terminated by large loose bunches of white flowers.—The first species is propagated by suckers, which are sent forth in plenty from the roots of the old stems, or by laying down the tender branches. The second and third species are not cultivated. However, the tuberous pea-like roots of the second, dried and reduced to powder, make a kind of bread which in times of scarcity is not to be despised. Hogs are very fond of these roots. Cows, goats, sheep, and swine, eat the plant; but horses refuse it. The flowers of the *ulmaria* have a fragrant scent, which rises in distillation. The whole plant indeed is extremely fragrant, so that the common people of Sweden threw their floors with it on holidays. It has also an astringent quality, and thus has been found useful in dysenteries, ruptures, and in tanning of leather. Goats are extremely fond of it; cows and horses refuse it.

SPIRAL, in geometry, a curve line of the circular kind, which in its progress recedes from its centre.

SPIRE, in architecture, was used by the ancients

Spiræ
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Spire.

for

Spirit
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Splicing.

for the base of a column, and sometimes for the affrugal or tore; but among the moderns it denotes a fceptle that continually diminishes as it ascends, whether conically or pyramidally.

SPIRIT, in metaphysics, an incorporeal being or intelligence; in which sense God is said to be a spirit, as are angels and the human soul. See **METAPHYSICS**, n° 5, 106, 109.

SPIRIT, in chemistry and pharmacy, a name applied to every volatile liquid which is not insipid like phlegm or water; and hence the distinction into acid, alkaline, and vinous spirits. See (*Index to*) **PHARMACY**.

SPIRIT of Wine. See **DISTILLATION**; and **PHARMACY**, n° 446, 682.

SPIRITS, or **ANIMAL SPIRITS**; in physiology. See **ANATOMY**, n° 400.

Acid SPIRITS. See **PHARMACY**, p. 6078.

Alkaline SPIRITS, solutions of volatile alkaline salt in water, sometimes with a portion of empyreumatic oil; in which case they receive different appellations, as *spirit of hartshorn*, of *wine*, &c. If the volatile alkali contained in these solutions be united with a considerable quantity of fixed air, the spirit effervesces with an acid, and is called a *mild spirit*; but if the alkali is deprived of its fixed air, the spirit is said to be *caustic*, and raises no effervescence. The mild spirits, though to the smell they appear much weaker than the caustic, are in reality stronger, as containing a larger proportion of alkali than the latter commonly do. However, there is no alkaline spirit perfectly mild, or it would be entirely neutralized by the fixed air, so that no alkaline smell or taste could be perceived. All mild spirits therefore are partly caustic, to which they owe that degree of smell and pungent taste which they retain. However, being already partly neutralized, they are much less apt to imbibe fixed air than such as have none at all; the solution of the neutral salt composed of volatile alkali and fixed air also is much more apt to retain the alkaline air or caustic salt than pure water; and hence the mild alkaline spirits preserve a much more equable degree of strength than the caustic ones, which partly by the attraction of fixed air, and partly by evaporation, unless very firmly secured, very soon become sensibly weaker both in taste and smell than when originally made.

SPIRITUAL, in general, something belonging to or partaking of the nature of spirit. See **SPIRIT**.

SPIRITUALITIES of a Bishop, are the profits he receives as a bishop, and not as a baron of parliament; such are the duties of his visitation, presentation-money, what arises from the institution and ordination of priests, the income of his jurisdiction, &c.

SPITHEAD, a road between Portsmouth and the Isle of Wight, where the royal navy of Great Britain frequently rendezvous.

SPITTLE, in physiology. See **SALIVA**.

SPITZBERGEN. See **GROENLAND**.

SPLEEN, in anatomy. See there, n° 360.

Spleen Wort. See **ASPENIUM**.

SPLENETIC, a person afflicted with an obstruction of the spleen.

SPLINT, or **SPLINT**, among farriers, a callous insensible excrescence, breeding on the shank-bone of horses. See **FARRIER**, § xxix.

SP LICING, in the sea-language, is the untwisting

the ends of two cables or ropes, and working the several strands into one another by a sidd, so that they become as strong as if they were but one rope.

SPOILS, whatever is taken from the enemy in time of war. Among the ancient Greeks, the spoils were divided among the whole army; only the general's share was largest: but, among the Romans, the spoils belonged to the republic.

SPOLETO, a duchy of Italy, bounded on the north by the Marche of Ancona and duchy of Urbino, on the east by Farther Abruzzo, on the south by Sabina and the patrimony of St Peter, and on the west by Orvietano and Perruggino. It is about 55 miles in length and 40 in breadth. It was anciently a part of Umbria, and now belongs to the Pope.—The name of the capital city is also *Spoletto*. It was formerly a large place, but in 1703 was ruined by an earthquake; from whence it has never recovered itself.

SPOILIATION, in ecclesiastical law, is an injury done by one clerk or incumbent to another, in taking the fruits of his benefice without any right thereunto, but under a pretended title. It is remedied by a decree to account for the profits so taken. This injury, when the *jus patronatus*, or right of advowson, doth not come in debate, is cognizable in the spiritual court: as if a patron first presents A to a benefice, who is instituted and inducted thereto; and then, upon pretence of a vacancy, the same patron presents B to the same living, and he also obtains institution and induction. Now if A disputes the fact of the vacancy, then that clerk who is kept out of the profits of the living, whichever it be, may sue the other in the spiritual court for spoliation, or taking the profits of his benefice. And it shall there be tried, whether the living were or were not vacant; upon which the validity of the second clerk's pretensions must depend. But if the right of patronage comes at all into dispute, as if one patron presented A, and another patron presented B, there the ecclesiastical court hath no cognizance, provided the tithes sued for amount to a fourth part of the value of the living, but may be prohibited at the instance of the patron by the king's writ of *indicavit*. So also if a clerk, without any colour of title, ejects another from his parsonage, this injury must be redressed in the temporal courts: for it depends upon no question determinable by the spiritual law, (as plurality of benefices or no plurality, vacancy or no vacancy), but is merely a civil injury.

SPON (James), was the son of Charles Spon, an eminent French physician, and born at Lyons in 1647. After an education of great care, he was admitted a doctor of physic at Montpellier in 1667, and a member of the college of physicians at Lyons in 1669. Mr Vailant, the king's antiquary, passing through Lyons to Italy in quest of medals and other antiquities, Mr Spon accompanied him. He afterward, in the years 1675 and 1676, made a voyage to Dalmatia, Greece, and the Levant, in company with Sir George Wheeler an English gentleman: but whether his constitution was naturally weak, or he had hurt himself in this tour, does not appear, but he never after enjoyed his health. Being of the reformed religion, he was forced to leave France on the revocation of the edict of Nantz; and died at Vevay, a town on the lake Lemane, in 1686. He was the author of many valuable works which

Spoils
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Spon.

Spondanus were printed at Lyons; the principal of which are,
 1. His travels into Italy, Dalmatia, Greece, and the
 Levant. 2. An answer to M. Guillet's Criticisms on
 his Travels. 3. Curious antiquities, in quarto. 4. A
 history of Geneva; all the above are in French.
 5. *Miscellanea eruditae antiquitatis*, folio, &c.

SPONDANUS (Henricus), or *Henry de SPONDE*,
 was born in 1568, and educated at Ortez, where the
 reformed had a college, and where he distinguished
 himself early by his facility in acquiring the Latin and
 Greek languages. He applied himself to the study of
 the civil and canon law; and in the mean time read
 the controversial works of Bellarmine and Perron with
 such eagerness, that, after the example of his brother
 John, he forsook the Protestant religion. He made
 his abjuration at Paris in 1595, took priest's orders at
 Rome in 1606, and was made bishop of Pamiers by
 Lewis XIII. in 1626. His intimacy with Baronius
 while he was in Italy, suggested to him the design of
 abridging his *Annales ecclesiastici*; which he executed
 with the author's consent, and continued them from
 the year 1197, where Baronius left off, to the year
 1640. He published also, in folio, *Annales sacri à
 mundi creatione ad ejusdem redemptionem*; with some
 smaller works; and died in 1643.

SPONDEE, in ancient poetry, a foot consisting of
 two long syllables, as *omnes*.

SPONDIAS, the **JAMAICA PLUM**; a genus of the
 pentagynia order, belonging to the decandria class of
 plants. There are two species: 1. The purpurea, or
 purple myrabolin plum, is a native of the West In-
 dies, where it rises to the height of 12 or 14 feet, but
 in this country is seldom found more than half that
 height. The flowers terminate the branches in a ra-
 cemus, and are of a whitish yellow colour. Some of
 them are succeeded by oblong fleshy berries of a pale
 yellow colour, covered with a mealy farina; the flesh
 of which is thin, but of a sweet luscious taste. The
 inclosed nut appears as if composed of many ligneous
 fibres. 2. The lutea, with neat leaves and yellow
 fruit, is a native of the warmest parts in America,
 where it rises to the height of 30 feet, sending out
 many irregular branches, which are destitute of leaves
 for some months. The flowers come out before the
 leaves appear, and are succeeded by yellow plums
 an inch and an half long. Both these species are pro-
 pagated by fruit or by cuttings. The fruit is much
 esteemed, but the plums yield little meat; however,
 the wild hogs are very fond of them, and they are
 their principal food during the season of their ripen-
 ing.

SPONGIA, **SPURGE**; a genus belonging to the
 order of vermes zoophyta. The whole texture is a
 congeries of bibulous cells. There are six species, all
 found in the bottom of the sea, and on submarine
 rocks. Sponges are much used by surgeons and others
 for sucking up superfluous moisture, which they easily
 part with by pressure.

SPONSORS, among Christians, are those persons
 who, in the office of baptism, answer or are surer-
 ties for the persons baptized.

SPONTANEOUS, a term applied to such mo-
 tions of the body and operations of the mind as we
 perform of ourselves without any constraint.

SPOON-BILL, in ornithology. See **PLATEA**.

SPOONING, in the sea-language, is said of a
 ship, which being under fail in a storm at sea, is un-
 able to bear it, and consequently forced to go right
 before the wind.

SPORADES, among ancient astronomers, a name
 given to such stars as were not included in any con-
 stellation.

SPORADIC DISEASES, among physicians, are
 such as seize particular persons at any time or season,
 and in any place; in which sense they are distinguished
 from epidemical and endemical diseases.

SPOTS, in astronomy, certain places of the sun's
 or moon's disk, observed to be either more bright or
 dark than the rest; and accordingly called *pecula* or
maculae. See **ASTRONOMY**, n° 33—39.

SPOTSWOOD (John), archbishop of St An-
 drew's in Scotland, was descended from the lairds of
 Spotswood in the Merse, and was born in the year
 1565. He was educated in the university of Glasgow,
 and succeeded his father in the parsonage of Calder when
 but 18 years of age. In 1601 he attended Lodowick
 duke of Lenox as his chaplain, in an embassy to the
 court of France for confirming the ancient amity be-
 tween the two nations, and returned in the ambassa-
 dor's retinue through England. When he entered
 into the archbishopric of Glasgow, he found there was
 not 100 l. Sterling of yearly revenue left; yet such
 was his care for his successors, that he greatly im-
 proved it, and much to the satisfaction of his diocese.
 After having filled this see eleven years, he was raised
 to that of St Andrew's in 1615, and made primate
 and metropolitan of all Scotland. He presided in fe-
 deral assemblies for restoring the ancient discipline, and
 bringing the church of Scotland to some sort of uni-
 formity with that of England. He continued in high
 esteem with king James I. nor was he less valued by
 king Charles I. who was crowned by him in 1633,
 in the abbey-church of Holyroodhouse. In 1635,
 upon the death of the earl of Kinnoul chancellor of
 Scotland, our abbot was advanced to that post; but
 had scarcely held it four years, when the confusions
 beginning in Scotland, he was obliged to retire into
 England; and being broken with age, grief, and
 sickness, died at London in 1639, and was interred
 in Westminster-abbey. He wrote a history of the
 church of Scotland, from the year 203 to the reign of
 king James VI. in folio.

SPOUT, or **Water-SPOUT**. See **WATER-SPOUT**.

SPRANGHER (Bartholomew), a German painter,
 born at Antwerp in 1546. He was brought up un-
 der a variety of masters, and then went to Rome,
 where cardinal Farnese took him into his service, and
 afterwards recommended him to Pope Pius V. He
 was employed at Belvedere, and worked two years
 and ten months in drawing the picture of the Last
 Judgment; this piece, which contained 500 heads,
 was so highly valued, that, after the death of Pius, it
 was placed over his monument as its principal orna-
 ment. From Rome he entered into the service of the
 emperors Maximilian and Rudolphus II. by whom
 he was exceedingly cherished and honoured: the latter
 in 1588 ennobled him and his descendants, and in the
 presence of his whole court placed a chain of gold of
 three rows round the neck of the artist, and ordered
 him to wear it as long as he lived. He died in 1623;
 and

Spooning
Spranger

and as he worked mostly for princes and nobles, his works are not frequently to be bought.

SPRAT (Dr Thomas), bishop of Rochester, was born in 1636. He had his education at Oxford, and after the Restoration entered into holy orders. He became fellow of the Royal Society, chaplain to George duke of Buckingham, and chaplain in ordinary to king Charles II. In 1667, he published the History of the Royal Society, and a Life of Mr Cowley; who, by his last will, left to his care his printed works and MSS. which were accordingly published by him. In 1668, he was installed prebendary of Westminster; in 1683, was appointed canon of Windsor, and dean of Westminster; and in 1684, consecrated to the bishopric of Rochester. He was clerk of the closet to king James II.; in 1685, was made dean of the chapel royal; and the year following, was appointed one of the commissioners for ecclesiastical affairs. In 1692, his lordship, with several other persons, was charged with treason by two men, who forged an association under their hands, of which the bishop published an account. He died of an apoplexy in 1713. His writings are greatly admired for elegance of style.

SPRAT, in ichthyology. See **CLUPEA**.

SPRAY, the sprinkling of the sea, which is driven from the top of a wave in stormy weather. It differs from spoon-drift, as being only blown occasionally from the broken surface of a high wave; whereas the latter continues to fly horizontally along the sea, without intermission, during the excess of a tempest or hurricane.

SPRING, in natural history, a fountain or source of water rising out of the ground.

Many have been the conjectures of philosophers concerning the origin of fountains, and great pains have been taken both by the members of the Royal Society and those of the Academy of Sciences at Paris, in order to ascertain the true cause of it. It was Aristotle's opinion, and held by most of the ancient philosophers after him, that the air contained in the caverns of the earth, being condensed by cold near its surface, was thereby changed into water; and that it made its way through, where it could find a passage. But we have no experience of any such transmutation of air into water.

Those who imagine that fountains owe their origin to waters brought from the sea by subterraneous ducts, give a tolerable account how they lose their saltness by percolation as they pass through the earth: but they find great difficulty in explaining by what power the water rises above the level of the sea to near the tops of mountains, where springs generally abound; it being contrary to the laws of hydrostatics, that a fluid should rise in a tube above the level of its source. However, they have found two ways whereby they endeavour to extricate themselves from this difficulty. The one is that of Des Cartes, who imagines, that after the water is become fresh by percolation, it is raised out of the caverns of the earth in vapour towards its surface; where meeting with rocks near the tops of mountains in the form of arches or vaults, it sticks to them, and runs down their sides, (like water in an Alembic), till it meets with proper receptacles, from which it supplies the fountains. Now this is a

mere hypothesis, without foundation or probability: for, in the first place, we know of no internal heat of the earth to cause such evaporation; or if that were allowed, yet it is quite incredible, that there should be any caverns so smooth and void of protuberances, as to answer the ends of an alembic, in collecting and condensing the vapours together in every place where fountains arise. There are others (as Varenius, &c.) who suppose that the water may rise through the pores of the earth, as through capillary tubes by attraction. But hereby they show, that they are quite unacquainted with what relates to the motion of a fluid through such tubes: for when a capillary tube opens into a cavity at its upper end, or grows larger and larger, so as to cease to be capillary at that end, the water will not ascend through that tube into the cavity, or beyond where the tube is capillary; because that part of the periphery of the cavity, which is partly above the surface of the water and partly below it, is not of the capillary kind. Nay, if the cavity is continually supplied with water, it will be attracted into the capillary tube, and run down it as through a funnel, if the lower end is emerged in the same fluid, as in this case it is supposed to be.

It has been a generally received opinion, and much espoused by Mariotte, (a diligent observer of nature), that the rise of springs is owing to the rains and melted snow. According to him, the rain-water which falls upon the hills and mountains, penetrating the surface, meets with clay or rocks contiguous to each other; along which it runs, without being able to penetrate them, till, being got to the bottom of the mountain, or to a considerable distance from the top, it breaks out of the ground, and forms springs.

In order to examine this opinion, Mr Perrault, De la Hire, and D. Sideleau, endeavoured to make an estimate of the quantity of rain and snow that falls in the space of a year, to see whether it would be sufficient to afford a quantity of water equal to that which is annually discharged into the sea by the rivers. The result of their inquiries was, that the quantity of rain and snow which fell in a year into a cylindrical vessel, would fill it (if secured from evaporating) to the height of about nineteen inches. Which quantity D. Sideleau showed, was not sufficient to supply the rivers; for that those of England, Ireland, and Spain, discharge a greater quantity of water annually, than the rain, according to that experiment, is able to supply. Besides which, another observation was made by them at the same time, viz. that the quantity of water raised in vapour, one year with another, amounted to about thirty-two inches, which is thirteen more than falls in rain: a plain indication that the water of fountains is not supplied by rain and melted snow.

Thus the true cause of the origin of fountains remained undiscovered, till Dr Halley, in making his celestial observations upon the tops of the mountains at St Helena, about 800 yards above the level of the sea, found, that the quantity of vapour which fell there (even when the sky was clear) was so great, that it very much impeded his observations, by covering his glasses with water every half quarter of an hour: and upon that he attempted to determine by experiment the quantity of vapour exhaled from the surface of the

sea, as far as it rises from heat; in order to try whether that might be a sufficient supply for the water continually discharged by fountains. The process of his experiment was as follows: He took a vessel of water salted to the same degree with that of sea-water, in which he placed a thermometer; and by means of a pan of coals, brought the water to the same degree of heat, which is observed to be that of the air in our hottest summer; this done, he fixed the vessel of water with the thermometer in it, to one end of a pair of scales, and exactly counterpoised it with weights on the other: then, at the end of two hours, he found, by the alteration made in the weight of the vessel, that about a sixtieth part of an inch of the depth of the water was gone off in vapour; and therefore, in twelve hours, one-tenth of an inch would have gone off. Now this accurate observer allows the Mediterranean Sea to be forty degrees long, and four broad, (the broader parts compensating for the narrower, so that its whole surface is 160 square degrees); which, according to the experiment, must yield at least 5,280,000,000 tons of water: In which account no regard is had to the wind and the agitation of the surface of the sea; both which undoubtedly promote the evaporation.

It remained now to compare this quantity of water with that which is daily conveyed into the same sea by the rivers. The only way to do which, was to compare them with some known river; and accordingly he takes his computation from the river Thames; and, to avoid all objections, makes allowances, probably greater than what were absolutely necessary.

The Mediterranean receives the following considerable rivers, viz. the Iberus, the Rhone, the Tyber, the Po, the Danube, the Nießer, the Borythenes, the Tanais, and the Nile. Each of these he supposes to bring down ten times as much water as the Thames; whereby he allows for smaller rivers which fall into the same sea. The Thames, then, he finds by mensuration to discharge about 20,300,000 tons of water a-day. If therefore the above-said nine rivers yield ten times as much water as the Thames doth, it will follow, that all of them together yield but 1827 millions of tons in a day; which is but little more than one-third of what is proved to be raised in vapour out of the Mediterranean in the same time. We have therefore from hence a source abundantly sufficient for the supply of fountains.

Now having found, that the vapour exhaled from the sea is a sufficient supply for the fountains, he proceeds in the next place to consider the manner in which they are raised; and how they are condensed into water again, and conveyed to the sources of springs.

In order to this he considers, that if an atom of water was expanded into a shell of bubble, so as to be ten times as big in diameter as when it was water, that atom would become specifically lighter than air; and therefore would rise so long as the warmth which first separated it from the surface of the water should continue to distend it to the same degree; and consequently, that vapours may be raised from the surface of the sea in that manner, till they arrive at a certain height in the atmosphere, at which they find air of equal specific gravity with themselves. Here they

will float, till being condensed by cold, they become specifically heavier than the air, and fall down in dew; or being driven by the winds against the sides of mountains, (many of which far surpass the usual height to which the vapours would of themselves ascend), are compelled by the stream of the air to mount up with it to the tops of them; where being condensed into water, they presently precipitate, and gleeing down by the crannies of the stones, part of them enters into the caverns of the hills; which being once filled, all the overplins of water that comes thither, runs over by the lowest place, and breaking out by the sides of the hills, forms single springs. Many of these running down by the valleys between the ridges of the hills, and coming to unite, form little rivulets or brooks: many of these again meeting in one common valley, and gaining the plain ground, being grown less rapid, become a river; and many of these being united in one common channel, make such streams as the Rhine and the Danube; which latter, he observes, one would hardly think to be a collection of water condensed out of vapour, unless we consider how vast a tract of ground that river drains, and that it is the sum of all those springs which break out on the south side of the Carpathian mountains, and on the north side of the immense ridge of the Alps, which is one continued chain of mountains from Switzerland to the Black Sea.

Thus one part of the vapours which are blown on the land is returned by the rivers into the sea from whence it came. Another part falls into the sea before it reaches the land; and this is the reason why the rivers do not return so much water into the Mediterranean as is raised in vapour. A third part falls on the low-lands, and is the pabulum of plants: where yet it does not rest; but is again exhaled in vapour by the action of the sun, and is either carried by the winds to the sea to fall in rain or dew there, or else to the mountains to become the sources of springs.

However, it is not to be supposed, that all fountains are owing to one and the same cause; but that some proceed from rain and melted snow, which subsiding through the surface of the earth, makes its way into certain cavities, and thence issues out in the form of springs; because the waters of several are found to increase and diminish in proportion to the rain which falls: that others again, especially such as are salt, and spring near the sea-shore, owe their origin to sea-water percolated through the earth; and some to both these causes: though, without doubt, most of them, and especially such as spring near the tops of high mountains, receive their waters from vapours, as before explained.

This reasoning of Dr Halley's is confirmed by more recent observations and discoveries. It is now found, that though water is a tolerable conductor of the electric fluid, dry earth is an electric *per se*; consequently the dry land must always be in an electrified state compared with the ocean, unless in such particular cases as are mentioned under the article EARTHQUAKE, n° 39. It is also well known, that such bodies as are in an electrified state, whether *plus* or *minus*, will attract vapour, or other light substances that come near them. Hence the vapours that are raised from the ocean must necessarily have a tendency

Spring
||
Spruce.

to approach the land in great quantity, even without the assistance of the wind; though this last must undoubtedly contribute greatly towards the same purpose, as Dr Halley justly observes. In like manner, the higher grounds are always in a more electrified state than the lower ones: and hence the vapours having once left the ocean and approached the shore, are attracted by the high mountains; of which Mr Pennant gives an instance in Snowdon. Hence we may see the reason why springs are so common in the neighbourhood of mountains, they being so advantageously formed in every respect for collecting and condensing the vapours into water.

There is a certain species of springs which ebb and flow alternately, and some that cease to flow for a time, which from thence are called *reciprocating* or *intermitting springs*. Their reciprocations are accounted for under *HYDROSTATICS*, n° 21.

SPRING, in mechanics, denotes a thin piece of tempered steel, or other elastic substance, which being wound up, serves to put several machines in motion by its elasticity, or endeavour to unbend itself: such is the spring of a watch, clock, or the like.

SPRING, *Ver*, in cosmography, denotes one of the seasons of the year; commencing in the northern parts of the world, on the day the sun enters the first degree of Aries, which is about the 10th day of March, and ending when the sun leaves Gemini: Or, more strictly and generally, the spring begins on the day when the distance of the sun's meridian altitude from the zenith, being on the increasing hand, is at a medium between the greatest and least. The end of the spring coincides with the beginning of summer. See *SUMMER*.

SPRING-Tide. See *ASTRONOMY*, n° 164.

Burning Springs. See *BURNING Springs*.

SPRIT, a small boom or pole which crosses the fall of a boat diagonally, from the mast to the upper hindmost corner of the sail, which it is used to extend and elevate: the lower end of the sprit rests in a sort of wreath or collar called the *smutter*, which encircles the mast in that place. These sort of sails are accordingly called *sprit-fails*.

SPRITSAIL, a sail attached to a yard which hangs under the bowprit, as represented in fig. 2. y, Plate CCLX. It is furnished with a large hole in each of its lower corners, to evacuate the water with which the cavity or belly of it is frequently filled by the surge of the sea when the ship pitches.

SPRITSAIL-Topfail, a fail extended above the former, by a yard which hangs across the jib-boom. The lower corners of this fail are hauled home to the spritfail-yard-arms; after which the fail is drawn out towards the extremity of the boom, in light winds, as any other topfail-yard is hoisted upon its mast.

Formerly the spritfail-topfails were set on a mast which was erected perpendicularly on the end of the bowprit: but this method has of late been justly rejected as inconvenient and dangerous to the bowprit, although serviceable in light breezes.

SPRUCE-TREE of New Zealand, a very beautiful tree, conspicuous on account of its pendant branches, which are loaded with numerous long thread-like leaves, of a vivid green. It frequently grows to the height of 50 or 60, or even of 100 feet, and above

ten in circumference. This tree proved very useful to captain Cook's people while on the island of New Zealand, who found that a wholesome and palatable liquor might be brewed from it as a substitute for spruce-beer. With the addition of some inspissated wort and molasses, they brewed a very good sort of beer; which they afterwards improved considerably, by correcting the too great astringency of the spruce with an equal quantity of the new tea-tree *. Its taste was pleasant, and something bitter; its only fault was, that, when taken on an empty stomach, it caused a nausea or sickness. Mr Forster regrets that New Zealand was visited at such unfavourable seasons that he could never find the spruce-tree either in flower or in fruit, so that he could not give a botanical description of it.

SPUNGE, or *SPONGE*. See *SPONGIA*.

SPUNGING, in gunnery, the cleaning a gun's inside with a sponge, in order to prevent any sparks of fire from remaining in her, which would endanger the life of him that should load her again.

SPUN YARN, among sailors, is a kind of line made from rope yarn, and used for seizing or fastening things together.

SPUNK, in botany. See *BOLETUS*.

SPUR, a piece of metal consisting of two branches encompassing a horseman's heel, and a rowel in form of a star, advancing out behind to prick the horse.

SPURGE, in botany. See *EUPHORBIA*.

SPURGE-Laurel. See *DAPHNE*.

SPY, a person hired to watch the actions, motions, &c. of another; particularly what passes in a camp. When a spy is discovered, he is hanged immediately.

SQUADRON, in military affairs, denotes a body of horse whose number of men is not fixed; but is usually from 100 to 200.

SQUADRON of Ships, either implies a detachment of ships employed on any particular expedition, or the third part of a naval armament.

SQUADS, in a military sense, are certain divisions of a company into so many squads, generally into three or four. The use of forming companies into as many squads of inspection as it has sergeants and corporals, is proved by those regiments who have practised that method; as by it the irregularity of the soldiers is considerably restrained, their dress improved, and the discipline of the regiment in general most remarkably forwarded. Every officer should have a roll of his company by squads.

SQUALL, a sudden and violent blast of wind, usually occasioned by the interruption and reverberation of the wind from high mountains. These are very frequent in the Mediterranean, particularly that part of it which is known by the name of the *Levan**, as produced by the repulsion and new direction which the wind meets with in its passage between the various islands of the Archipelago.

SQUALUS, the *SHARK-KIND*; a genus belonging to the order of amphibia nantes. There are five spiracula, one on each side of the neck, the body is somewhat oblong and cylindrical; and the mouth is situated in the anterior part of the head. There are 15 species, all inhabitants of the ocean. The most remarkable are,

1. The *squatina*, or angel-fish, has a large head; teeth broad at their base, but slender and very sharp

above,

Sponge
||
Squalus.

* See Tea-tree of New Zealand.

Squalus.

above, and disposed in five rows all round the jaws. Like those of all sharks, they are capable of being raised or depressed by means of muscles uniting them to the jaws, not being lodged in sockets as the teeth of cetaceous fish are. The back is of a pale ash-colour, and very rough; along the middle is a prickly tuberculated line: the belly is white and smooth. The pectoral fins are very large, and extend horizontally from the body to a great distance; they have some resemblance to wings, whence its name. The ventral fins are placed in the same manner, and the double penis is placed in them; which forms another character of the males in this genus.

This is the fish which connects the genus of rays and sharks, partaking something of the character of both; yet is an exception to each in the situation of the mouth, which is placed at the extremity of the head. It is a fish not unfrequent on most of our coasts, where it prowls about for prey like others of the kind. It is extremely voracious; and, like the ray, feeds on flounders and flat fish, which keep at the bottom of the water. It is extremely fierce, and dangerous to be approached. Mr Pennant mentions a fisherman whose leg was terribly tore by a large one of this species, which lay within his nets in shallow water, and which he went to lay hold of incautiously. The aspect of these, as well as the rest of the genus, have much malignity in them: their eyes are oblong, and placed lengthwise in their head, sunk in it, and overhung by the skin, and seem fuller of malevolence than fire. Their skin is very rough; the ancients made use of it to polish wood and ivory, as we do at present that of the greater dog-fish. The flesh is now but little esteemed on account of its coarseness and rankness; yet Archæstratus, (as quoted by Athenæus, p. 319.), speaking of the fish of Miletus, gives this first the place, in respect to its delicacy, of the whole cartilaginous tribe. They grow to a great size; being sometimes near an hundred weight.

2. The spinax, or picked dog-fish, takes its name from a strong and sharp spine placed just before each of the back-fins, distinguishing it at once from the rest of the British sharks. The nose is long, and extends greatly beyond the mouth, but is blunt at the end. The teeth are disposed in two rows, are small and sharp, and bend from the middle of each jaw towards the corners of the mouth. The back is of a brownish ash-colour; the belly white.—It grows to the weight of about 20 pounds.

This species swarms on the coasts of Scotland, where it is taken, split, and dried; and is a food among the common people. It forms a sort of internal commerce, being carried on women backs 14 or 16 miles up the country, and sold or exchanged for necessaries.

3. The maximus, basking shark, or the sun-fish of the Irish. This species has been long known to the inhabitants of the south and west of Ireland and Scotland, and those of Caernarvonshire and Anglesea; but having never been considered in any other, than a commercial view, is described by no English writer except Mr Pennant; and, what is worse, mistaken for and confounded with the luna of Rondeletius, the fame that our English writers call the *sun-fish*. The Irish and Welsh give it the same name, from its lying as if to sun itself on the surface of the water; and for the same

Squalus.]

reason Mr Pennant calls it the *basking shark*. It was long taken for a species of whale, till Mr Pennant pointed out the branchial orifices on the sides, and the perpendicular site of the tail.—These are migratory fish, or at least it is but in a certain number of years that they are seen in multitudes on the Welsh seas, though in most summers a single, and perhaps strayed, fish, appears. They inhabit the northern seas, even as high as the arctic circle. They visited the bays of Caernarvonshire and Anglesea in vast shoals in the summers of 1756 and a few succeeding years, continuing there only the hot months; for they quitted the coast about Michaelmas, as if cold weather was disagreeable to them. Some old people say they recollect the same sort of fish visiting these seas in vast numbers about 40 years ago. They appear in the Frith of Clyde, and among the Hebrides, in the month of June, in small droves of seven or eight, but oftener in pairs. They continue in those seas till the latter end of July, when they disappear.

They have nothing of the fierce and voracious nature of the shark kind, and are so tame as to suffer themselves to be stroked: they generally lie motionless on the surface, commonly on their bellies, but sometimes, like tired swimmers, on their backs. Their food seemed to consist entirely of sea-plants, no remains of fish being ever discovered in the stomachs of numbers that were cut up, except some green stuff, the half-digested parts of algae, and the like. Linnæus says it feeds on medusæ.

At certain times, they are seen sporting on the waves, and leaping with vast agility several feet out of the water. They swim very deliberately, with the dorsal fins above water. Their length is from three to twelve yards, and sometimes even longer. Their form is rather slender, like others of the shark kind. The upper jaw is much longer than the lower, and blunt at the end. The tail is very large, and the upper part remarkably longer than the lower. The colour of the upper part of the body is a deep leaden; the belly white. The skin is rough like shagreen, but less so on the belly than the back. Within-side the mouth, towards the throat, is a very short sort of whalebone. The liver is of a great size, but that of the female is the largest; some weighs above 1000 pounds, and yield a great quantity of pure and sweet oil, fit for lamps, and also much used to cure bruises, burns, and rheumatic complaints. A large fish has afforded to the captors a profit of 20l. They are viviparous; a young one about a foot in length being found in the belly of a fish of this kind. The measurements of one found dead on the shore of Loch Ranza in the isle of Arran were as follows: The whole length, 27 feet 4 inches: first dorsal fin, 3 feet; second, 1 foot: pectoral fin, 4 feet; ventral, 2 feet: the upper lobe of the tail, 5 feet; the lower, 3.

They will permit a boat to follow them, without accelerating their motion till it comes almost within contact; when a harpooner strikes his weapon into them, as near to the gills as possible. But they are often so insensible as not to move till the united strength of two men have forced in the harpoon deeper. As soon as they perceive themselves wounded, they fling up their tail and plunge headlong to the bottom; and fre-

Squalus. frequently coil the rope round them in their agonies, attempting to disengage the harpoon from them by rolling on the ground, for it is often found greatly bent. As soon as they discover that their efforts are in vain, they swim away with amazing rapidity, and with such violence, that there has been an instance of a vessel of 70 tons having been towed away against a fresh gale. They sometimes run off with 200 fathoms of line, and with two harpoons in them; and will employ the fishers for 12, and sometimes for 24, hours before they are subdued. When killed, they are either hauled on shore, or, if at a distance from land, to the vessel's side. The liver (the only useful part) is taken out, and melted into oil in kettles provided for that purpose. A large fish will yield eight barrels of oil, and two of worthless sediment.

4. The carcharias, or white shark, grows to a very great bulk, Gillius says to the weight of 4000 pounds: and that in the belly of one was found a human corpse entire; which is far from incredible, considering their vast greediness after human flesh. The mouth of this fish is furnished with (sometimes) a sixfold row of teeth, flat, triangular, exceedingly sharp at their edges, and finely serrated. Mr Pennant has one that is rather more than an inch and a half long. Grew says, that those in the jaws of a shark two yards in length are not half an inch; so that the fish to which this tooth belonged must have been six yards long, provided the teeth and body keep pace in their growth.

This dreadful apparatus, when the fish is in a state of repose, lie quite flat in the mouth; but when he seizes his prey, he has power of erecting them by the help of a set of muscles that join them to the jaw. The mouth is placed far beneath; for which reason these, as well as the rest of the kind, are said to be obliged to turn on their backs to seize their prey; which is an observation as ancient as the days of Pliny. The eyes are large; the back broad, flat, and shorter than that of other sharks. The tail is of a semilunar form, but the upper part is longer than the lower. It has vast strength in the tail, and can strike with great force; so that the sailors instantly cut it off with an axe as soon as they draw one on board. The pectoral fins are very large, which enables it to swim with great swiftness. The colour of the whole body and fins is a light ash. The ancients were acquainted with this fish; and Oppian gives a long and entertaining account of its capture. Their flesh is sometimes eaten, but is esteemed coarse and rank.—They are the dread of the sailors in all hot climates, where they constantly attend the ships in expectation of what may drop overboard: a man that has that misfortune perishes without redemption; they have been seen to dart at him like gudgeons to a worm. A master of a Guinea ship informed Mr Pennant, that a rage of suicide prevailed among his new-bought slaves, from a notion the unhappy creatures had, that after death they should be restored again to their families, friends, and country. To convince them at least that they should not reanimate their bodies, he ordered one of their corpses to be tied by the heels to a rope and lowered into the sea; and though it was drawn up again as fast as the united force of the crew could be exerted, yet in that short space the sharks had devoured every part but the feet, which were secured at the end of the cord.

Swimmers very often perish by them; sometimes they lose an arm or leg, and sometimes are bit quite asunder, serving but for two morrels for this ravenous animal: a melancholy tale of this kind is related in a West-India ballad, preserved in Dr Percy's Relics of ancient English Poetry.

5. The glaucus, or blue shark, is of an oblong form: the nose extends far beyond the mouth: it wants the orifices behind the eyes, which are usual in this genus: the nostrils are long, and placed transversely. Artdi remarks a triangular dent in the lower part of the back. The skin is smoother than that of other sharks: the back is of a fine blue colour; the belly of a silvery white. Linnæus says, that its teeth are granulated. Rondeletius says he was an eye-witness to its fondness for human flesh: that these fish are less destructive in our seas, is owing to the coolness of the climate, which is well known to abate the fierceness of some, as well as the venom of other animals.

6. The long-tailed shark, or sea-fox, is most remarkable for the great length of the tail: the whole measure of one examined by Mr Pennant being 13 feet, of which the tail alone was more than six, the upper lobe extending greatly beyond the lower, almost in a straight line. The body was round and short: the nose short, but sharp-pointed: the eyes large, and placed immediately over the corners of the mouth, which was small, and not very distant from the end of the nose. The teeth triangular, small for the size of the fish, and placed in three rows. The back ash-colour; the belly white; the skin universally smooth.

The ancients styled this fish *ἀλφιός*, and *vulpes*, from its supposed cunning. They believed, that when it had the misfortune to have taken a bait, it swallowed the hook till it got at the cord, which it bit off, and so escaped. They are sometimes taken in our seas, and have been imagined to be the fish called the *thresher*, from its attacking and beating the grampus with its long tail, whenever that species of whale rises to the surface to breathe.

7. The canicula, or spotted shark.—The weight of one examined by Mr Pennant was six pounds three ounces, and yet it measured three feet eight inches in length; so light are the cartilaginous fish in respect to their size. The nose was short and very blunt, not extending above an inch and an half beyond the mouth. The nostrils were large, placed near the mouth, and covered with a large angular flap: the head very flat. The eyes were oblong, behind each a large orifice opening to the inside of the mouth. The teeth small, sharp, smooth at their sides, straight, and disposed in four rows. The tail was finned, and below extended into a sharp angle. The colour of the whole upper part of the body and the fins was brown, marked with numbers of large distinct black spots: some parts of the skin were tinged with red; the belly was white. The whole was remarkably round, and had a strong smell. The tendrils that issue from each end of the purse of this fish are much more delicate and slender than those of any other; are as fine as Indian grass, and very much resemble it. The female of this species, and we believe of other sharks, is greatly superior in size to the male; so that in this respect there is an agreement between the fish and the birds of prey. They bring about 19 young at a time: the fishermen believe

Squamaria believe that they breed at all times of the year, as they scarce ever take any but what are with young.

Stabbing.

8. The catulus, or lesser spotted shark.—The weight of one that was brought to Mr Pennant by a fisherman was only one pound twelve ounces; the length two feet two inches: it is of a slender make in all parts. The head was flat; the nostrils covered with a long flap; the nose blunt, and marked beneath with numerous small punctures; behind each eye was a small orifice; the back-fins, like those of the former, placed far behind. The ventral fins are united, forming as if it were but one, which is a sure mark of this species. The tail finned like that of the greater dog-fish. The colour is cinereous, streaked in some parts with red, and generally marked with numbers of small black spots; but in some they are very faint and obscure. The belly is white. This species breeds from 9 to 13 young at a time; is very numerous on some of our coasts, and very injurious to the fisheries.

SQUAMARIA, in botany. See **LATHRÆA**.

SQUAMOUS, in anatomy, a name given to the spurious or false sutures of the skull, because composed of squame, or scales like those of fishes.

SQUARE, in geometry, a quadrilateral figure both equilateral and equiangular. See **GEOMETRY**.

SQUARE-Root. See **ALGEBRA**, n° 8. and **ARITHMETIC**, n° 33.

Hollow SQUARE, in the military art, a body of foot drawn up with an empty space in the middle, for the colours, drums, and baggage, faced and covered by the pikes every way, to keep off the horse.

SQUARE, among mechanics, an instrument consisting of two rules or branches, fastened perpendicularly at one end of their extremities, so as to form a right angle. It is of great use in the description and mensuration of right angles, and laying down perpendicularly.

SQUARE-Rigged, an epithet applied to a ship whose yards are very long. It is also used in contradistinction to all vessels whose sails are extended by flays or lateen-yards, or by booms and gaffs; the usual situation of which is nearly in the plane of the keel; and hence,

SQUARE-Sail, is a sail extended to a yard which hangs parallel to the horizon, as distinguished from the other sails which are extended by booms and flays placed obliquely. This sail is only used in fair winds, or to scud under in a tempest. In the former case, it is furnished with a large additional part called the *bonnet*, which is then attached to its bottom, and removed when it is necessary to scud. See that article.

SQUATINA. See **SQUALUS**.

SQUILL, in botany. See **SCILLA**.

SQUILLA, the name of a species of cancer. See **CANCER**, n° 5, 6.

SQUINTING. See **MEDICINE**, n° 476.

SQUIRREL, in zoology. See **SCIURUS**.

STABBING, in law. The offence of mortally stabbing another, though done upon sudden provocation, is punished as murder; the benefit of clergy being taken away from it by statute. (See **MURDER**). For by J. I. c. 8. when one thrusts or stabs another, not then having a weapon drawn, or who hath not then first stricken the party stabbing, so that he dies thereof within six months after, the offender shall not

have the benefit of clergy, though he did it not of malice aforethought. This statute was made on account of the frequent quarrels and stabblings with short daggers between the Scotch and the English at the accession of James I.; and being therefore of a temporary nature, ought to have expired with the mischief which it meant to remedy. For, in point of solid and substantial justice, it cannot be said that the mode of killing, whether by stabbing, strangling, or shooting, can either extenuate or enhance the guilt; unless where, as in the case of poisoning, it carries with it an internal evidence of cool and deliberate malice. But the benignity of the law hath construed the statute so favourably in behalf of the subject, and so strictly when against him, that the offence of stabbing now stands almost upon the same footing as it did at the common law. Thus, (not to repeat the cases mentioned under **MANSLAUGHTER**, of stabbing an adulteress, &c. which are barely manslaughter, as at common law), in the construction of this statute it hath been doubted, whether, if the deceased had struck at all before the mortal blow given, this does not take it out of the statute, though in the preceding quarrel the stabber had given the first blow; and it seems to be the better opinion, that this is not within the statute. Also it hath been resolved, that the killing a man, by throwing a hammer or other weapon, is not within the statute; and whether a shot with a pistol be so or not, is doubted. But if the party slain had a cudgel in his hand, or had thrown a pot or a bottle, or discharged a pistol at the party stabbing, this is a sufficient reason for having a weapon drawn on his side within the words of the statute.

STADIUM, an ancient Greek long measure, containing 125 geometrical paces, or 625 Roman feet, corresponding to our furlong.

The word is formed from the Greek *στασις*, station; and it is said, on this occasion, that Hercules, after running so far at one breath, stood still. The Greeks measured all their distances by stadia, which they call *στάδιον*.—Stadium was also the course or career wherein the Greeks ran their races.

STADTHOLDER, the principal magistrate or governor of the United provinces. The Stadtholder seems to be empowered, either directly, or by his influence, to change both the deputies, magistrates, and officers in every province and city. He is president in the states of every province, though he has not so much as a state or vote in the states-general; but as he influences the states of each province to send what deputies he pleases to the assembly, he has in fact the appointing of the persons that constitute it, and may be deemed sovereign of the United Provinces. The stadtholders had once a very great power; so that we find one of them appointing what towns should send deputies to the assembly of the states of Holland: but the stadtholdership was never hereditary till the year 1747, when it was made so in the family of Orange.

It is observed, that the States passed by the stadtholder's eldest son, and appointed his younger son prince Maurice of Orange their stadtholder. At other times they have suppressed the stadtholdership entirely. The stadtholder always in the council, where there happens to be an equality of votes, has a decisive voice.

STAFF, an instrument ordinarily used to rest on in walking.

Stadium,
Staff.

Staff,
Staffs.

walking. The staff is also frequently used as a kind of natural weapon both of offence and defence; and for several other purposes.

STAFF, a light pole erected in different parts of a ship, whercon to hoist and display the colours.

The principal of these is reared immediately over the stern, to display the ensign; another is fixed on the bowsprit, to extend the jack; three more are erected at the three mast-heads, or formed by their upper ends, to show the flag or pendant of the respective Squadron or division to which the ship is appropriated. See ENSIGN, MAST, JACK, and PENDANT.

STAFF, in military matters, consists of a quarter-master-general, adjutant-general, and majors of brigade. The staff properly exists only in time of war. See QUARTER-MASTER General, &c.

Regimental STAFF, consists in the adjutant, quarter-master, chaplain, surgeon, &c.

STAFF, in music, five lines, on which, with the intermediate spaces, the notes of a song or piece of music are marked.

STAFFA, one of the Hebrides, or Western Islands of Scotland, remarkable for its basaltic pillars. It was lately visited by Mr Joseph Banks, who communicated the following account of it to Mr Pennant.

"The little island of Staffa lies on the west coast of Mull, about three leagues N. E. from Jona, or the Colum Kill: its greatest length is about an English mile, and its breadth about half a one. On the west side of the island is a small bay where boats generally land; a little to the southward of which, the first appearance of pillars are to be observed: they are small; and instead of being placed upright, lie down on their sides, each forming a segment of a circle. From thence you pass a small cave, above which the pillars, now grown a little larger, are inclining in all directions: in one place in particular, a small mass of them very much resemble the ribs of a ship. From hence having passed the cave, which, if it is not low water, you must do in a boat, you come to the first ranges of pillars, which are still not above half as large as those a little beyond. Over-against this place is a small island, called in Erse *Boo-sha-la*, separated from the main by a channel not many fathoms wide. This whole island is composed of pillars without any stratum above them; they are still small, but by much the neatest formed of any about the place.

"The first division of the island, for at high water it is divided into two, makes a kind of a cone, the pillars converging together towards the centre: on the other they are in general laid down flat; and in the front next to the main, you see how beautifully they are packed together, their ends coming out square with the bank which they form. All these have their transverse sections exact, and their surfaces smooth; which is by no means the case with the large ones, which are cracked in all directions. I much question, however, if any one of this whole island of *Boo-sha-la* is two feet in diameter.

"The main island opposite to *Boo-sha-la*, and farther towards the N. W. is supported by ranges of pillars pretty erect, and, though not tall, (as they are not uncovered to the base), of large diameters; and at their feet is an irregular pavement, made by the upper sides of such as have been broken off, which extends as

Staffs.

far under water as the eye can reach. Here the forms of the pillars are apparent: these are of three, four, five, six, and seven sides; but the number of five and six are by much the most prevalent. The largest I measured was of seven; it was four feet five inches in diameter.

"The surfaces of these large pillars, in general, are rough and uneven, full of cracks in all directions; the transverse figures in the upright ones never fail to run in their true directions. The surfaces upon which we walked were often flat, having neither concavity nor convexity; the larger number, however, were concave, though some were very evidently convex. In some places, the interstices within the perpendicular figures were filled up with a yellow spar; in one place, a vein passed in among the mass of pillars, carrying here and there small threads of spar. Though they were broken and cracked through and through in all directions, yet their perpendicular figures might easily be traced: from whence it is easy to infer, that whatever the accident might have been that caused the dislocation, it happened after the formation of the pillars.

"From hence proceeding along shore, you arrive at Fingal's cave. Its dimensions I have given in the form of a table:

	Fect. In.
Length of the cave from the rock without,	371 6
From the pitch of the arch,	250 0
Breadth of ditto at the mouth,	53 7
At the farther end,	20 0
Height of the arch at the mouth,	117 6
At the end,	70 0
Height of an outside pillar,	39 6
Of one at the N. W. corner,	54 0
Depth of water at the mouth,	18 0
At the bottom,	9 0

"The cave runs into the rock in the direction of N. E. by E. by the compass.

"Proceeding farther to the north-west, you meet with the highest ranges of pillars; the magnificent appearance of which is past all description. Here they are bare to their very basis, and the stratum below them is also visible: in a short time, it rises many feet above the water, and gives an opportunity of examining its quality. Its surface is rough, and has often large lumps of stone sticking in it as if half immerged: itself, when broken, is composed of a thousand heterogeneous parts, which together have very much the appearance of a lava; and the more so, as many of the lumps appear to be of the very same stone of which the pillars are formed. This whole stratum lies in an inclined position, dipping gradually towards the south-east. As hereabouts is the situation of the highest pillars, I shall mention my measurements of them and the different strata in this place, premising, that the measurements were made with a line, held in the hand of a person who stood at the top of the cliff, and reaching to the bottom; to the lower end of which was tied a white mark, which was observed by one who stood below for the purpose: when this mark was set off from the water, the person below noted it down, and made signal to him above, who made then a mark in his rope: whenever this mark passed a notable place, the same signal was made, and the name of the place noted

ted down as before: the line being all hauled up, and the distances between the marks measured and noted down, gave, when compared with the book kept below, the distances, as for instance in the cave:

"No 1. in the book below, was called from the water to the foot of the first pillar in the book above; n^o 1. gave 36 feet 8 inches, the height of that ascent, which was composed of broken pillars.

"No 1. Pillar at the west corner of Fingal's cave.

	Feet. In.
1 From the water to the foot of the pillar,	12 10
2 Height of the pillar,	37 3
3 Stratum above the pillar,	66 9

"No 2. Fingal's cave.

1 From the water to the foot of the pillar,	36 8
2 Height of the pillar,	39 6
3 From the top of the pillar to the top of the arch,	31 4

4 Thickness of the stratum above,	34 4
By adding together the three first measurements, we got the height of the arch from the water,	117 6

"No 3. Corner pillar to the westward of Fingal's cave.

Stratum below the pillar of lava-like matter,	11 0
Length of pillar,	54 0
Stratum above the pillar,	61 6

"No 4. Another pillar to the westward.

Stratum below the pillar,	17 1
Height of the pillar,	50 0
Stratum above,	51 1

"No 5. Another pillar farther to the westward.

Stratum below the pillar,	19 8
Height of the pillar,	55 1
Stratum above,	54 7

"The stratum above the pillars, which is here mentioned, is uniformly the same, consisting of numberless small pillars, bending and inclining in all directions, sometimes so irregularly that the stones can only be said to have an inclination to assume a columnar form; in others more regular, but never breaking into or disturbing the stratum of large pillars, whose tops every where keep an uniform and regular line.

"Proceeding now along the shore round the north end of the island, you arrive at *Oua na scarve*, or the Corvoraunt's Cave. Here the stratum under the pillars is lifted up very high; the pillars above it are considerably less than those at the north-west end of the island, but still very considerable. Beyond is a bay, which cuts deep into the island, rendering it in that place not more than a quarter of a mile over. On the sides of this bay, especially beyond a little valley, which almost cuts the island into two, are two stages of pillars, but small; however, having a stratum between them exactly the same as that above them, formed of innumerable little pillars, shaken out of their places, and leaning in all directions.

"Having passed this bay, the pillars totally cease; the rock is of a dark-brown stone, and no signs of regularity occur till you have passed round the south-east end of the island (a space almost as large as that occupied by the pillars), which you meet again on the west side, beginning to form themselves irregularly, as if the stratum had an inclination to that form, and soon arrive at the bending pillars where I began.

"The stone of which the pillars are formed, is a coarse kind of basalt, very much resembling the Giant's Causeway in Ireland, though none of them are near so neat as the specimens of the latter which I have seen at the British Museum; owing chiefly to the colour, which in ours is a dirty brown, in the Irish a fine black: indeed the whole production seems very much to resemble the Giant's Causeway."

STAFFORD, the capital of a county of England of the same name, in W. Long. 2. 6. N. Lat. 52. 20. It stands on the river Sow, over which it has a stone-bridge. It is well built and paved, and had formerly a cattle and walls. It has a flourishing cloth-manufacture, and gives the title of *earl* to a Popish branch of the family of Howard.

STAFFORDSHIRE, a county of England, bounded on the south by Worcestershire, by Cheshire and Derbyshire on the north, by Warwickshire and Derbyshire on the east, and Shropshire and Cheshire on the west. The length is reckoned at 40 miles, the breadth at 26, and the circumference at 141. It contains 5 hundreds, 150 parishes, 810,000 acres, 1 city, and 18 market-towns. The air, except in those parts that are called the Moorlands and Woodlands, and about the mines, is good, especially upon the hills, where it is accounted very fine: but the soil in the northern mountainous part is not so fertile. In the middle, where it is watered by the Trent, the third river in England, it is both fruitful and pleasant, being a mixture of arable and meadow grounds. In the south, it abounds not only with corn, but with mines of iron and pits of coal. The other rivers of this country, besides the Trent, which runs almost through the middle of it, and abounds with salmon, are the Dove and Tame, both which are well stored with fish. In this county are also a great many lakes, or meres and pools, as they are called; which, having streams either running into them or from them, cannot be supposed to be of any great prejudice to the air, and yield plenty of fish. In divers parts of the county are medicinal waters, impregnated with different sorts of minerals, and consequently of different qualities and virtues; as those at Hynts and Brefsford-house, which are mixed with bitumen; those at Ingeltre, Codfallow, and Willough-bridge park, which are sulphureous. Of the saline kind are the Brine-pits at Chertley, Epson, Penfnet-clofe, of which very good salt is made. There is a well at Newcastle Under-Line that is said to cure the king's evil; another called *Elder-well* near Blehill, said to be good for sore eyes; and a third called the *Spa*, near Wolverhampton.

Great flocks of sheep are bred in this county, especially in the moor-lands, or mountains of the northern part of it; but the wool is said to be somewhat coarser than that of many other counties. Of this wool, however, they make a variety of manufactures, particularly felts. In the low grounds along the rivers, are rich pastures for black cattle; and vast quantities of butter and cheese are made there. In the middle and southern parts not only grain of all kinds, but a great deal of hemp and flax, are raised. This county produces also lead, copper, iron; marble, alabaster, mill-stones, limestone; coal, salt, and marles of several sorts and colours; brick-earth, fullers-earth, and potters-clay, particularly a sort used in the glass-manufacture at Amble-

Stag
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Stamina.

Amblecot, and fold at seven-pence a bushel; tobacco-pipe-clay; a sort of reddish earth called *slip*, used in painting divers vessels; red and yellow okers; fire-stones for hearths of iron furnaces, ovens, &c.; iron-stones of several sorts; blood-stones, or hæmatites, found in the brook Tent, which, when wet a little, will draw red lines like ruddle; quarry-stones, and grind-stones. For fuel the county is well supplied with turf, peat, and coal of several sorts, as cannel-coal, peacock-coal, and pit-coal. The peacock-coal is so called, because, when turned to the light, it displays all the colours of the peacock's tail; but it is fitter for the forge than the kitchen. Of the pit-coal there is an inexhaustible store: its burns into white ashes, and leaves no such cinder as that of the Newcastle coal. It is not used for malting till it is charred, and in that state it makes admirable winter-fuel for a chamber.

This county is in the diocese of Litchfield and Coventry, and the Oxford circuit. It sends eight members to parliament; namely, two for the county, two for the city of Litchfield, two for Stafford, and two for Newcastle-Under-Line.

STAG, in zoology. See CERVUS.

STAGE, in the modern drama, the place of action and representation, included between the pit and the scenes, and answering to the proscenium or pulpitum of the ancients.

STAGGERS. See FARRIERY, § ix.

STAHL (George Ernest), an eminent German chemist, born in Franconia in the year 1660. He wrote upon almost all parts of chemistry; and his works, some of which are in German, and some in Latin, are highly esteemed.

STAINING of BONE, IVORY, MARBLE, PAPER, WOOD, &c. See these articles.

STAIRCASE, in architecture, an ascent inclosed between walls, or a ballustrade consisting of stairs or steps, with landing places and rails, serving to make a communication between the several stories of a house. See ARCHITECTURE, n° 94, &c.

STALACTITE, in natural history, crystalline spars formed into oblong, conical, round, or irregular bodies, composed of various crusts, and usually found hanging in form of icicles from the roofs of grottos, &c.

STALE, among sportsmen, a living fowl put in a place to allure and bring others where they may be taken. For want of these, a bird shot, his entrails taken out, and dried in an oven in his feathers, with a stick thrust through to keep it in a convenient posture, may serve as well as a live one.

STALE is also a name for the urine of catile.

STALLION, or STONE-HORSE, in the manege, an ungelt horse, designed for the covering of mares, in order to propagate the species. See EQUUS.

STAMFORD, an ancient town of Lincolnshire in England; seated on the river Walland, on the edge of Northamptonshire. It is a large handsome place, containing six parish-churches, several good streets, and fine buildings. It had formerly a college, the students of which removed to Brazen-Nose college in Oxford. It has no considerable manufactories, but deals chiefly in malt. W. Long. c. 27. N. Lat. 52. 39.

STAMINA, in botany, are those upright filaments which, on opening a flower, we find within the co-

rolla surrounding the pistillum. According to Linnaeus, they are the male organs of generation, whose office it is to prepare the pollen. Each flamen consists of two distinct parts, viz. the FILAMENTUM and the ANTHERA.

STAMINA, in the animal body, are defined to be those simple original parts which existed first in the embryo, or even in the seed; and by whose distinction, augmentation, and accretion, by additional juices, the animal body, at its utmost bulk, is supposed to be formed.

STAMP-DUTIES, a branch of the perpetual revenue. See REVENUE.

There is a tax imposed upon all parchment and paper whereon any legal proceedings, or private instruments of almost any nature whatsoever, are written; and also upon licences for retailing wines, of all denominations; upon all almanacks, newspapers, advertisements, cards, dice, &c. These imposts are very various, according to the nature of the things stamped, rising gradually from a penny to ten pounds. This is also a tax which, though in some instances it may be heavily felt, by greatly increasing the expence of all mercantile as well as legal proceedings, yet (if moderately imposed) is of service to the public in general, by authenticating instruments, and rendering it much more difficult than formerly to forge deeds of any kind; since, as the officers of this branch of the revenue vary their stamps frequently, by marks perceptible to none but themselves, a man that would forge a deed of king William's time, must know and be able to counterfeit the stamp of that date also. In France and some other countries the duty is laid on the contract itself, not on the instrument in which it is contained; as, with us too in England, (besides the stamps on the indentures), a tax is laid, by statute 8 Ann. c. 9. on every apprentice-fee; of 6d. in the pound if it be 50l. or under, and 1s. in the pound if a greater sum: but this tends to draw the subject into a thousand nice disquisitions and disputes concerning the nature of his contract, and whether taxable or not; in which the farmers of the revenue are sure to have the advantage. Our general method answers the purposes of the state as well, and consults the ease of the subject much better. The first institution of the stamp-duties was by statute 5 and 6 W. and M. c. 21. and they have since, in many instances, been increased to five times their original amount.

STANCHION, or STANCHIONS, a sort of small pillars of wood or iron used for various purposes in a ship; as to support the decks, the quarter-rails, the nettings, the awnings, &c. The first of these are two ranges of small columns fixed under the beams, throughout the ship's length between decks; one range being on the starboard and the other on the larboard side of the hatchways. They are chiefly intended to support the weight of the artillery.

STAND, in commerce, a weight from two hundred and an half to three hundred of pitch.

STANDARD, in war, a sort of banner or flag, borne as a signal for the joining together of the several troops belonging to the same body.

STANDARD, in commerce, the original of a weight, measure, or coin, committed to the keeping of a magistrate, or deposited in some public place, to regulate,

Stamina
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Standard.

Stanhope. adjust, and try the weights used by particular persons in traffic. See MONEY.

STANHOPE (Philip Dormer, earl of Chesterfield), was born in 1695, and educated in Trinity-hall, Cambridge; which place he left in 1714, when, by his own account, he was an absolute pedant. In this character he went abroad, where a familiarity with good company soon convinced him he was totally mistaken in almost all his notions: and an attentive study of the air, manner, and address of people of fashion, soon polished a man whose predominant desire was to please; and who, as it afterward appeared, valued exterior accomplishments beyond any other human acquirement. While lord Stanhope, he got an early feat in parliament; and in 1722, succeeded to his father's estate and titles. In 1728, and in 1745, he was appointed ambassador extraordinary and plenipotentiary to Holland, which high character he supported with the greatest dignity; serving his own country, and gaining the esteem of the states-general. Upon his return from Holland, he was sent lord-lieutenant of Ireland; and during his administration there, gave general satisfaction to all parties. He left Dublin in 1746, and in October succeeded the earl of Harrington as secretary of state, in which post he officiated until Feb. 6th 1748. Being seized with a deafness in 1752 that incapacitated him for the pleasures of society, he from that time led a private and retired life, amusing himself with books and his pen; in particular, he engaged largely as a volunteer in a periodical miscellaneous paper called *The World*, in which his contributions have a distinguished degree of excellence. He died in 1773, leaving a character for wit and abilities that had few equals. He distinguished himself by his eloquence in parliament on many important occasions; of which we have a characteristic instance, of his own relating. He was an active promoter of the bill for altering the style; on which occasion, as he himself writes in one of his letters to his son, he made so eloquent a speech in the house, that every one was pleased, and said he had made the whole very clear to them; "when (says he), God knows, I had not even attempted it. "I could just as soon have talked Celtic or Slavonian to them, as astronomy; and they would have understood me full as well." Lord Macclesfield, one of the greatest mathematicians in Europe, and who had a principal hand in framing the bill, spoke afterward, with all the clearness that thorough knowledge of the subject could dictate; but not having a flow of words equal to lord Chesterfield, the latter gained the applause from the former, to the equal credit of the speaker and the auditors. The high character lord Chesterfield supported during life, received no small injury soon after his death, from a fuller display of it by his own hand. He left no issue by his lady, but had a natural son, Philip Stanhope, Esq; whose education was for many years a close object of his attention, and who was afterward envoy extraordinary at the court of Dresden, but died before him. When lord Chesterfield died, Mr Stanhope's widow published a course of letters, written by the father to the son, filled with instructions suitable to the different gradations of the young man's life to whom they were addressed. These letters contain many fine observations on mankind, and rules of conduct: but it is observable

that he lays a greater stress on exterior accomplishments and address, than on intellectual qualifications and sincerity; and allows greater latitude to fashionable pleasures than good morals will justify, especially in paternal instructions. Hence it is that a celebrated writer†, of manners somewhat different from those of the polite earl of Chesterfield, is said to have observed† of these Letters, that "they inculcate only the morals of a whore, with the manners of a dancing-maſter."

STANISLAUS I. king of Poland and elector of Saxony, a most unfortunate but virtuous prince. He was driven from his dominions by his competitor, who was supported by the czar Peter the Great, in opposition to Charles XII. king of Sweden. He was obliged, by a treaty of peace in 1736, to content himself with the empty title of *king*, and the duchies of Lorraine and Bar, in which he led a retired life; distinguishing himself, however, in this obscure situation, by public and private acts of humanity and benevolence; particularly by supplying a fund, under the direction of the magistrates of Bar, for purchasing corn, to be sold at a cheap price to the poor, whenever it becomes dear. At the age of 90 he came to a fatal end, having set fire to his night-gown in smoking his pipe: he was burnt almost to death before he could get assistance; and died soon after, in 1766. He wrote several philosophical, political, and moral tracts, which were published under the title of *The Works of the Beneficent Philosopher*, in 4 vols 8vo. Paris, 1673.

STANLEY (Thomas), a very learned English writer in the 17th century, was the son of Sir Thomas Stanley of Cumberlow-Green in Herefordshire, knight. He was born at Cumberlow, and educated in his father's house, whence he removed to the university of Cambridge. He afterwards travelled; and, upon his return to England, prosecuted his studies in the Middle Temple. He married, when young, Dorothy, the eldest daughter of Sir John Enyon of Flowne, in Northamptonshire, baronet. He wrote, 1. A volume of Poems. 2. History of Philosophy, and Lives of the Philosophers. 3. A Translation of and Commentary on Eschylus; and several other works. He died in 1678.

STANNARIES, the mines and works where tin is dug and purified; as in Cornwall, Devonshire, &c.

STANNARY courts, in Devonshire and Cornwall, for the administration of justice among the tinners therein. They are held before the lord-warden and his substitutes, in virtue of a privilege granted to the workers in the tin-mines there, to sue and be sued only in their own courts, that they may not be drawn from their business, which is highly profitable to the public, by attending their law-suits in other courts. The privileges of the tinners are confirmed by a charter, 33 Edw. I. and fully expounded by a private statute, 50 Edw. III. which has since been explained by a public act, 16 Car. I. c. 15. What relates to our present purpose is only this: That all tinners and labourers in and about the stannaries shall, during the time of their working therein, *bona fide*, be privileged from suits of other courts, and be only pleaded in the stannary court in all matters, excepting pleas of land, life, and member. No writ of error lies from hence to any court in Westminster-hall; as was agreed by all the judges, in 4 Jac. I. But an appeal lies from the steward

Stanislaus

Stannary.

Dr John-

steward

steward of the court to the under warden; and from him to the lord-warden; and thence to the privy-council of the prince of Wales, as duke of Cornwall, when he hath had livery or investiture of the same. And from thence the appeal lies to the king himself, in the last resort.

STANNUM, TIN. See **CHEMISTRY**, n° 150, 203, 246, 285, 406.

STANZA, in poetry, a certain stated number of verses, generally containing a perfect sense, that ought to end with some lively and ingenious thought, or just and pertinent reflection.

-STAPLE, primarily signifies a public place or market, whither merchants, &c. are obliged to bring their goods to be bought by the people; as the Greve, or the places along the Seine, for sale of wines and corn, at Paris, whither the merchants of other parts are obliged to bring those commodities.

Formerly, the merchants of England were obliged to carry their wool, cloth, lead, and other like staple commodities of this realm, in order to utter the same by wholesale; and these staples were appointed to be constantly kept at York, Lincoln, Newcastle upon Tyne, Norwich, Westminster, Canterbury, Chichester, Winchester, Exeter, and Bristol; in each whereof a public mart was appointed to be kept, and each of them had a court of the mayor of the staple, for deciding differences, held according to the law-merchant, in a summary way.

STAR, in astronomy, a general name for all the heavenly bodies, which, like so many brilliant studs, are dispersed throughout the whole heavens.

The stars are distinguished, from the phenomena of their motion, &c. into fixed, and erratic or wandering stars: these last are again distinguished into the greater luminaries, viz. the sun and moon; the planets, or wandering stars, properly so called; and the comets; which have been all fully considered and explained under the article **ASTRONOMY**.

As to the fixed stars, or simply stars, they are so called, because they seem to be fixed, or perfectly at rest, and consequently appear always at the same distance from each other.

Falling STARS, in meteorology, fiery meteors which dart through the sky in form of a star. See **ELECTRICITY**, n° 39. and **METEOR**.

Twinkling of the STARS. See **OPTICS**, n° 20. *et seq.*

STAR, is also a badge of honour, worn by the knights of the garter, bath, thistle. See **GARTER**.

Star of Bethlehem, in botany. See **ORNITHOGALUM**.

Court of STAR-CHAMBER, (*camera stellata*), a famous, or rather infamous, English tribunal, said to have been so called either from a Saxon word signifying to *stear* or govern; or from its punishing the *crimen stellionatus*, or cozenage; or because the room wherein it sat, the old council-chamber of the palace of Westminster, (Lamb. 148.) which is now converted into the lottery-office, and forms the eastern side of new palace-yard, was full of windows; or, (to which Sir Edward Coke, 4. Inst. 66. accedes), because *haphly* the roof thereof was at the first garnished with gilded stars. As all these are merely conjectures, (for no stars are now in the roof, nor are any said to have remained there fo

late as the reign of queen Elizabeth), it may be allowable to propose another conjectural etymology, as plausible perhaps as any of them. It is well known, that, before the banishment of the Jews under Edward I. their contracts and obligations were denominated in our ancient records *starra* or *starris*, from a corruption of the Hebrew word, *stetar*, a covenant. (*Tovey's Angl. Judaic.* 32. Selden. tit. of hon. ii. 34. *Uxor Ebraic.* i. 14.) These stars, by an ordinance of Richard the first, preserved by Hoveden, were commanded to be enrolled and deposited in chests under three keys in certain places; one, and the most considerable, of which was in the king's exchequer at Westminster: and no star was allowed to be valid, unless it were found in some of the said repositories. (*Memorand.* in *Scac' P. 6 Edw. I.* prefixed to Maynard's year-book of Edw. II. fol. 8. Madox hist. exch. c. vii. § 4, 5, 6.) The room at the exchequer, where the chests containing these stars were kept, was probably called the *star-chamber*; and, when the Jews were expelled the kingdom, was applied to the use of the king's council, sitting in their judicial capacity. To confirm this, the first time the star chamber is mentioned in any record, it is said to have been situated near the receipt of the exchequer at Westminster: (the king's council, his chancellor, treasurer, justices, and other judges, were assembled *en la chambre des esteilles pres la receipt al Westminster.* Clauf. 41. Edw. III. m. 13.) For in process of time, when the meaning of the Jewish *stars* were forgotten, the word *star-chamber* was naturally rendered in law-French, *la chambre des esteilles*, and in law-Latin *camera stellata*; which continued to be the style in Latin till the dissolution of that court.

This was a court of very ancient origin; but new-modelled by statutes 3 Hen. VII. c. 1. and 21 Hen. VIII. c. 20, consisting of divers lords spiritual and temporal, being privy counsellors, together with two judges of the courts of common-law, without the intervention of any jury. Their jurisdiction extended legally over riots, perjury, misbehaviour of sheriffs and other notorious misdemeanors, contrary to the laws of the land. Yet this was afterwards (as lord Clarendon informs us) stretched "to the asserting of all proclamations and orders of state; to the vindicating of illegal commissions, and grants of monopolies; holding for honourable that which pleased, and for just that which profited; and becoming both a court of law to determine civil rights, and a court of revenue to enrich the treasury: the council-table by proclamations enjoining to the people that which was not enjoined by the laws, and prohibiting that which was not prohibited; and the star-chamber, which consisted of the same persons in different rooms, censuring the breach and disobedience to those proclamations by very great fines, imprisonments, and corporal severities: so that any disrespect to any acts of state, or to the persons of statemen, was in no time more penal, and the foundations of right never more in danger to be destroyed." For which reasons, it was finally abolished by statute 16 Car. I. c. 10. to the general joy of the whole nation. See *KING'S Bench*. There is in the British Museum (Harl. MSS. Vol. I. n° 12.6.) a very full, methodical, and accurate account of the constitution and course of this court, compiled by,

Star,
Starch.

by William Hudfon of Gray's Inn, an eminent practitioner therein; a short account of the fame, with copies of all its procefs, may also be found in 18 Rym. Foed. 192, &c.

STAR-Board, the right fide of the fhip when the eye of the fpeciator is directed forward.

STAR-Fish. See **ASTERIAS**.

STAR Shot, a gelatinous fubftance frequently found in fields, and fuppofed by the vulgar to have been produced from the meteor called a *falling-ftar*: but, in reality, is the half-digefted food of herons, fea-mews, and the like birds; for thefe birds, when fhot, have been found, when dying, to difgorge a fubftance of the fame kind.

STAR-Stone, in natural hiftory, a name given to certain extraneous foffile ftones, in form of fhort, and commonly fomewhat crooked, columns, compofed of feveral joints, each refembling the figure of a radiated ftar, with a greater or fmall number of rays in the different fpecies: they are ufually found of about an inch in length, and of the thicknefs of a goofe-quill. Some of them have five angles or rays, and others only four; and in fome the angles are equi-diftant, while in others they are irregularly fo: in fome alfo they are fhort and blunt, while in others they are long, narrow, and pointed; and fome have their angles very fhort and obtufe. The feveral joints in the fame fpecimen are ufually all of the fame thicknefs; this, however, is not always the cafe; but in fome they are larger at one end, and in others at the middle, than in any other part of the body; and fome fpecies have one of the rays bifid, fo as to emulate the appearance of a fix-rayed kind.

STARCH, a fecula or fedi ment, found at the bottom of veffels wherein wheat has been fteeped in water, of which fecula, after feparating the bran from it, by paffing it through fieves, they form a kind of loaves, which being dried in the fun or an oven, is afterwards cut into little pieces, and fo fold. The beft ftarch is white, foft, and friable, and eafily broken into powder. Such as require fine ftarch, do do not content themfelves, like the ftarchmen, with refuse wheat, but ufe the fineft grain. The procefs is as follows: The grain being well cleaned, is put to ferment in veffels full of water, which they expofe to the fun while in its greateft heat; changing the water twice a-day, for the fpace of eight or twelve days, according to the feafon. When the grain burfts eafily under the finger, they judge it fufficiently fermented. The fermentation perfected, and the grain thus foftened, it is put, handful by handful, into a canvas-bag, to feparate the flour from the hulks; which is done by rubbing and beating it on a plank laid acrofs the mouth of an empty vefel that is to receive the flour.

As the veffels are filled with this liquid flour, there is feen fwimming at top a reddifh water, which is to be carefully fcummed off from time to time, and clean water is to be put in its place, which, after ftirring the whole together, is alfo to be ftrained through a cloth or fieve, and what is left behind put into the vefel with new water, and expofed to the fun for fome time. As the fedi ment thickens at the bottom, they drain off the water four or five times, by inclining the vefel, but without paffing it through the fieve. What remains at bottom is the ftarch, which

they cut in pieces to get out, and leave it to dry in the fun. When dry, it is laid up for ufe.

STARE, or **STARLING**. See **STURNUS**.

STATE of a **CONTOVERSY**. See **ORATORY**, n^o 20, &c.

STATES, or **ESTATES**, a term applied to feveral orders or claffes of people afsembled to confult of matters for the public good.

Thus ftates-general is the name of an afsembly confifting of the deputies of the feven United Provinces. There are ufually 30 in number, fome provinces fending two, others more; and whatever refolution the ftates-general take, muft be confirmed by every province, and by every city and republic in that province, before it has the force of a law. The deputies of each province, of what number fover they be, have only one voice, and are efteemed as but one perfon, the votes being given by provinces. Each province prefides in the afsembly in its turn, according to the order fettled among them. Guelderland prefides firft, then Holland, &c.

States of Holland are the deputies of eighteen cities, and one reprefentative of the nobility, conftituting the ftates of the province of Holland: the other provinces have likewife their ftates, reprefenting their fovereignty; deputies from which make what they call the ftates-general. In an afsembly of the ftates of a particular province, one diffenting voice prevents their coming to any refolution.

STATIUS, (Publius Papinius), a celebrated Latin poet of the firft century, was born at Naples, and was the fon of Statius, a native of Epirus, who went to Rome to teach poetry and eloquence, and had Domitian for his fcholar. Statius the poet alfo obtained the favour and friendship of that prince; and dedicated to him his *Thebais* and *Achilleis*; the firft in twelve books, and the laft in two. He died at Naples about the year 100. Befides the above poems, there are alfo ftill extant his *Sylvæ*, in five books; the ftyle of which is purer, more agreeable, and more natural, than that of his *Thebais* and *Achilleis*.

STATUARY, a branch of fculpture, employed in the making of ftatues. See **SCULPTURE** and the next article.

Statuary is one of thofe arts wherein the ancients furpaffed the moderns; and indeed it was much more popular, and more cultivated, among the former than the latter. It is difputed between ftatuary and painting, which of the two is the moft difficult and the moft artful.

Statuary is alfo ufed for the artificer who makes ftatues. Phidias was the greateft ftatuary among the ancients, and Michael Angelo among the moderns.

STATUE, is defined to be a piece of fculpture in full relievo, reprefenting a human figure. Daviler more fcientifically defines ftatue a reprefentation, in high relievo and infulate, of fome perfon diftinguifhed by his birth, merit, or great actions, placed as an ornament in a fine building, or expofed in a public place, to preferve the memory of his worth. In ftrictnefs, the term ftatue is only applied to figures on foot, the word being formed from *ftatura*, the fize of the body.

Statues are formed with the chifel, of feveral matters, as ftone, marble, plafter, &c. They are alfo caft

Stare
Statue.

Statue. cast of various kinds of metal, particularly gold, silver, brass, and lead. For the method of casting statues, see the article **FOUNDERY of Statues**.

Statues are usually distinguished into four general kinds. The first are those less than the life; of which kind we have several statues of great men, of kings, and of gods themselves. The second are those equal to the life; in which manner it was that the ancients, at the public expence, used to make statues of persons eminent for virtue, learning, or the services they had done. The third are those that exceed the life; among which those that surpassed the life once and a half were for kings and emperors; and those double the life, for heroes. The fourth kind were those that exceeded the life twice, thrice, and even more, and were called *colossifigs*. See **COLOSSUS**.

Every statue resembling the person it is intended to represent, is called *statua iconica*. Statues acquire various other denominations. 1. Thus, allegorical statue is that which, under a human figure, or other symbol, represents something of another kind; as a part of the earth, a season, age, element, temperament, hour, &c. 2. Curule statues, are those which are represented in chariots drawn by bigæ or quadrigæ, that is, by two or four horses; of which kind there were several in the circuses, hippodromes, &c. or in cars, as we see some, with triumphal arches on antique medals. 3. Equestrian statue, that which represents some illustrious person on horseback, as that famous one of Marcus Aurelius at Rome; that of king Charles I. at Charing-cross; King George II. in Leicester-Square, &c. 4. Greek statue, denotes a figure that is naked and antique; it being in this manner the Greeks represented their deities, athletes of the olympic games, and heroes: the statues of heroes were particularly called *Achilleian statues*, by reason of the great number of figures of Achilles in most of the cities of Greece. 5. Hydraulic statue, is any figure placed as an ornament of a fountain or grotto, or that does the office of a *jet d'eau*, a cock, spout, or the like, by any of its parts, or by any attribute it holds: the like is to be understood of any animal serving for the same use. 6. Pedestrian statue, a statue standing on foot; as that of king Charles II. in the Royal-Exchange, and of king James II. in the Privy-Gardens. 7. Roman statue, is an appellation given to such as are clothed, and which receive various names from their various dresses. Those of emperors, with long gowns over their armour, were called *statue paludate*; those of captains and cavaliers, with coats of arms, *thoracate*; those of soldiers with cuirasses, *loricate*; those of senators and augurs, *trabeate*; those of magistrates with long robes, *togate*; those of the people with a plain tunic, *tunicate*; and, lastly, those of women with long trains, *stolate*.

In repairing a statue cast in a mould, they touch it up with a chisel, graver, or other instrument, to finish the places which have not come well off: they also clear off the barbs, and what is redundant in the joints and projectures.

STATUTE, in its general sense, signifies a law, ordinance, decree, &c. See **LAW**, &c.

STATUTE, in our laws and customs, more immediately signifies an act of parliament made by the three estates of the realm; and such statutes are either ge-

neral, of which the courts at Westminster must take notice without pleading them; or they are special and private, which last must be pleaded.

STAY, a large strong rope employed to support the mast on the fore-part, by extending from its upper end towards the fore-part of the ship, as the shrouds are extended to the right and left, and behind it. See **MAST**, **RIGGING**, and **SHROUD**.

The stay of the fore-mast *a*, fig. 3. Plate CCLXXXVI. which is called the *fore-stay*, reaches from the mast-head towards the bowprit-end: the main-stay *b* extends over the forecable to the ship's stem; and the mizen-stay *c* is stretched down to that part of the main-mast which lies immediately above the quarter-deck: the fore-top-mast stay *d* comes also to the end of the bowprit, a little beyond the fore-stay: the main-top-mast stay *e* is attached to the head or hounds of the fore-mast; and the mizen-top-mast stay comes also to the hounds of the main-mast: the fore-top-gallant stay comes to the outer end of the jib-boom; and the main-top-gallant stay is extended to the head of the fore-top-mast.

STAY-Sail, a sort of triangular sail extended upon a stay. See **SAIL**.

STEAM, the smoke arising from water, or any other liquid, when considerably heated.

STEAM-Engine, an engine for raising water by means of fire.

The earliest account to be met with of the invention of this engine is in a book published by the marquis of Worcester in the year 1663, where he proposed the raising of great quantities of water by the force of fire, or by turning water into steam; and mentions an engine of that kind of his own contrivance which could raise a continual stream like a fountain 40 feet high, by the means of two cocks which were alternately and successively turned by a man to admit the steam, and to re-fill the vessel with cold water, the fire being continually kept up: for which reason this nobleman is generally looked upon as the first inventor of this engine; and though his method of applying the force of steam was certainly much different from the present, yet the water was raised by the same original power, which is the expansion of water into steam by fire. However, this invention not meeting with encouragement, probably owing to the confused state in which the public affairs were about that time, it was neglected, and lay dormant several years until one captain Savery having read the marquis of Worcester's books, several years afterwards, tried many experiments upon the force and power of steam; and at last luckily hit upon a method of applying it to raise water. This he had no sooner done, than he bought up and destroyed all the marquis's books that could be got, and then claimed the honour of this invention to himself, and obtained a patent for it, pretending to have discovered this secret of nature by such an accident as by experiment was found could not give him any such idea. He contrived an engine which, after many experiments, he brought to some degree of perfection, so as to raise water in small quantities: but he could not succeed in raising water a great height and in large quantities for the draining of mines; to effect which by his method, the steam required to be boiled to such a strength as would have

Stay
||
Steam.

burst all his vessels; so that he was obliged to be content with raising water a small height or in small quantities. The largest engine that he ever erected, was for the York-buildings company in London, for the supplying the inhabitants of the Strand and that neighbourhood with water. A draught and description of one of these engines is in Harris's Lexicon Technicum.

At the same time that captain Savery was employed in perfecting his engine, Dr Papinus of Marburg was contriving one on the same principles, which he describes in a small book published in 1707, intitled *Art nova ad aquam ignis adminiculo efficacissime elevandam*. Captain Savery's engine, however, was much completer than that propoed by Dr Papinus.

About the same time also one Monsieur Amontons of Paris was engaged in the same pursuit: but his method of applying the force of steam was different from those before-mentioned; for he intended it to drive or turn a wheel, which he called a *fire-mill*, which was to work pumps for raising water: but he never brought it to perfection. Each of these three gentlemen claimed the originality of the invention; but it is more than probable they all took the hint from the book published by the marquis of Worcester many years before.

In this imperfect state it continued without farther improvements until the year 1705, when Mr Newcomen and Mr Calley of Dartmouth in Southhamptonshire made several experiments to bring it to work with a piston and beam, as now used; in which, after much pains taken, they succeeded, and obtained a patent for the sole use of this invention, for 14 years. The first proposal they made for draining of mines by this engine was in the year 1711; but they were very coldly received by many persons in the south of England, who did not understand the nature of it. In 1712, they came to an agreement with the owners of a colliery at Griff in Warwickshire, where they erected an engine with a cylinder of 22 inches diameter. At first they were under great difficulties in many things; but by the assistance of some good workmen they got all the parts put together in such a manner as to answer their intention tolerably well: and this was the first engine of the kind erected in England. There was at first one man to attend the steam-cock, and another to attend the injection-cock; but they afterwards contrived a method of opening and shutting them by some small machinery connected with the working-beam. The next engine erected by these patentees was at a colliery in the county of Durham, about the year 1718, where one Mr Beighton was concerned; who, not approving of the intricate manner of opening and shutting the cocks by strings and catches as in the former engine, substituted the hanging-beam for that purpose as at present used, and likewise made some improvement in the pipes, valves, and some other parts of the engine.

In a few years afterwards these engines came to be better understood than they had been; and their advantages, especially in draining of mines, became more apparent: and from the great number of them erected, they received additional improvements from different hands, until they arrived at their present degree of perfection.

This engine, as now improved, is the most curious and compound machine of all those inventions which have been owing to modern philosophy; and is not only applicable to the raising of large quantities of water out of mines, and for the supplying of towns, &c. but to many other of the most necessary purposes for mankind.

The principles on which it acts are truly philosophical; and when all the parts of the machine are proportioned to each other agreeable to these principles, it never fails answering the intention of the engineer.

1. It has been proved in Pneumatics, that the pressure of the atmosphere upon a square inch at the earth's surface, is about 14.8 pounds avoirdupoise at a mean. And,

2. If a vacuum is made by any means in a cylinder, Theory: which has a moveable piston suspended at one end of a lever equally divided, the air will endeavour to rush in, and will press down the piston, with a force proportionable to the area of the surface, and will raise an equal weight at the other end of the lever.

3. Water may be rarefied near 14,000 times by being reduced into steam, the particles whereof are so strongly repellent, as to drive away air of the common density, only by a heat sufficient to keep the water in a boiling state: by increasing the heat, the steam may be rendered much stronger; but this requires great strength in the vessels to support it. This steam may again be condensed into its former state by a jet of cold water dispersed among it; so that 14,000 cubic inches of steam admitted into a cylinder, may be reduced into the space of one cubic inch of water only, by which means a vacuum is partly obtained.

4. Though the pressure of the atmosphere be about 14 $\frac{8}{10}$ pounds upon every square inch, yet on account of the friction of the several parts, the resistance from some air which is unavoidably admitted with the jet of cold water, and from some remainder of steam in the cylinder, the vacuum is very imperfect, and the piston does not descend with a force exceeding eight or nine pounds upon every square inch of its surface.

5. The gallon of water of 282 cubic inches weighs 10.2 pounds avoirdupoise, or a cubic foot 62.5 pounds. The piston being pressed by the atmosphere with a force proportionable to its area in inches, multiplied by about eight or nine pounds, depresseth that end of the lever, and raiseth a column of water in the pumps of equal weight at the other end, by means of the pump-rods suspended to it. When the steam is again admitted, the piston rises and the pump-rods sink; and when that steam is condensed, the pump-rods again lift; and so alternately as long as the engine works.

It has been observed above, that the piston does not descend with a force exceeding eight or nine pounds upon every square inch of its surface; but by reason of accidental frictions and alterations in the density of the air, it will be the safest method, in calculating the power of the cylinder, to allow something less than eight pounds for the pressure of the atmosphere upon every square inch, viz. seven pounds ten ounces; and it being allowed that the gallon of water of 282 cubic inches weighs 10.2 pounds avoirdupoise, from these premises the dimensions of the cylinder, pumps, &c. for any fire-engine, may be deduced as follows:

Sup-

Suppose c = the cylinder's diameter in inches.

p = the pump's ditto.

f = the depth of the pit in fathoms.

g = the gallons drawn by a stroke of six feet or one fathom.

h = the hogheads drawn per hour.

s = the number of strokes per minute.

Then $c^2 \times .7854$ = area of the cylinder, which multiplied by 7.64 pound, the air's pressure on a square inch, we have $6c^2$ for the power of any cylinder in pounds average-dupoise.

And, $p^2 \times .7854 \times 72$ =, the gallons contained in one 282 fathom of any pump = $.2005p^2$; which multiplied by f fathoms, we have $.2005p^2f$ for the gallons contained in any number of fathoms of any pump.

Also, $.2005p^2f \times 10.2$ pound, the weight of one gallon, we have $2.0451p^2f$ = the weight in pounds of the column of water which is to be raised by the power of the cylinder.

But as a sufficient allowance was made in the power of the cylinder, by estimating it at 7.64 pound only, instead of 8 pound, the fraction of .0451 in the weight of the column of water may be safely omitted; whence we shall have $6c^2 = 2p^2f$ by the latter equation; and by the same mode $.2p^2 = \frac{p^2}{5} = g$ by the former.

Or if, instead of six pounds for the pressure of the air on each circular inch of the cylinder, it be supposed a pound, we shall then have $ac^2 = 2p^2f$; and substituting $5g$ in the place of p^2 , it will be, $ac^2 = 10gf$. And farther, $\frac{63b}{60s} = g$; whence $\frac{1.05b}{s} = \frac{p^2}{5}$.

From a comparison of these equations, the following theorems are derived, which will determine the size of the cylinder and pumps of any steam-engine capable of drawing a certain quantity of water from any assigned depth, with the pressure of the atmosphere on each circular inch of the cylinder's area.

A TABLE OF THEOREMS for the reader computing of the Powers of a Fire-engine.

1	$c = \sqrt{\frac{p^2f}{3}} = \sqrt{\frac{5gf}{3}} = \sqrt{\frac{2p^2f}{a}} = \sqrt{\frac{1.75bf}{s}}$
2	$p = \sqrt{\frac{3c^2}{f}} = \sqrt{\frac{5g}{f}} = \sqrt{\frac{ac^2}{2f}} = \sqrt{\frac{5.25b}{s}}$
3	$f = \frac{3c^2}{p^2} = \frac{3c^2}{5g} = \frac{c^2a}{10g} = \frac{c^2s}{1.75b}$
4	$g = \frac{p^2}{5} = \frac{3c^2}{5f} = \frac{c^2a}{10f} = \frac{1.05b}{s}$
5	$a = \frac{2p^2f}{c^2} = \frac{10gf}{c^2} = \frac{5gf}{.5c^2} = \frac{10.5bf}{sc^2}$
6	$b = \frac{sp^2}{5.25} = \frac{gs}{1.05} = \frac{c^2s}{1.75} = \frac{ac^2s}{10.5f}$
7	$s = \frac{1.75bf}{c^2} = \frac{5.25}{p^2} = \frac{1.05b}{g} = \frac{10.5bf}{ac^2}$

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In this Table there are four particular values of each letter, which render it more extensively useful than it would have been upon a less scale, because sometimes one value is more convenient for finding the unknown letter or quantity than another; as will be seen in the following examples, in which, to avoid repetitions, it is supposed that the pressure of the atmosphere is six pounds upon a circular inch of the piston, and that the engine goes at the rate of 12 strokes, 6 feet long each, in a minute.

EXAMPLES of the use of the TABLE.

1. Required the size of the cylinder to work a pump of 12 inches diameter, 30 fathoms deep. *Per theorem 1.* $c = \sqrt{\frac{p^2f}{3}}$; therefore $\sqrt{\frac{12 \times 12 \times 30}{3}} = c = 38$ inches.

2. Required the size of the pump that a cylinder of 38 inches diameter can work at 30 fathoms deep. *Per theorem 2.* $p = \sqrt{\frac{3c^2}{f}}$; therefore $\sqrt{\frac{38 \times 38 \times 3}{30}} = p = 12$ inches.

3. Required the depth that a 36-inch cylinder will work a pump of 10 inches diameter. *Per theorem 3.* $f = \frac{3c^2}{p^2}$; therefore $\frac{36 \times 36 \times 3}{10 \times 10} = f = 39$ fathoms.

4. Required the number of gallons drawn at a six-foot stroke per last-mentioned cylinder and pumps.

Per theorem 4. $g = \frac{p^2}{5}$; therefore $\frac{10 \times 10}{5} = 20$ gal. = g .

5. Required the pressure of the atmosphere on a cylinder of 36 inches, which works a pump 10 inches diameter, 39 fathoms deep. *Per theorem 5.* $a = \frac{2p^2f}{c^2}$; therefore $\frac{10 \times 10 \times 39 \times 2}{36 \times 36} = a = 6$ pounds.

6. Required the hogheads delivered per hour by a pump of 16 inches diameter, at 12 strokes per minute. *Per theorem 6.* $b = \frac{sp^2}{5.25}$; therefore $\frac{16 \times 16 \times 12}{5.25} = b = 585$ hogheads.

7. Required the number of strokes per minute an engine must make to raise 585 hogheads per hour by a 16-inch pump. *Per theorem 7.* $s = \frac{5.25b}{p^2}$; therefore $\frac{585 \times 5.25}{16 \times 16} = s = 12$ strokes.

By these examples it is evident that the quantity sought is discoverable (by the help of the theorems) by one operation only, which without them might have taken several. But it often happens in practice, that an engine has to draw several pumps of different diameters from different depths; in which case the operations will be somewhat different from those above, as will be seen in the following example.

8. Let it be required to find the diameters of the cylinder and pumps to draw 520 hogheads per hour from 30 fathoms deep, 450 hogheads per hour from 20 fathoms deep, and 80 hogheads per hour for the jackhead from 10 fathoms deep, allowing the engine to make 12 six-foot strokes per minute, and the air's pressure 6 pounds upon each circular inch of the piston.

41 K

PER

Per theor. 2. $p = \sqrt{\frac{5 \cdot 25 b}{s}}$; therefore $\sqrt{\frac{520 \times 5 \cdot 25}{12}}$
 $= 15$, the first pump $= x$.

Per ditto, $\sqrt{\frac{450 \times 5 \cdot 25}{12}} = 14$, the 2d pump $= y$.

Per ditto, $\sqrt{\frac{80 \times 5 \cdot 25}{12}} = 6$, the 3d pump $= z$.

Then, per theor. 1. $c = \sqrt{\frac{p^2 f}{3}}$, if the water was to

be raised in one column from a certain depth; but it being in three columns of various dimensions, it is evident from the question, that the power of the cylinder must be a counterpoise to the weight of all these columns; and putting x, y, z , for the three pumps, instead of p , the equation will be $c = \sqrt{\frac{x^2 f + y^2 f + z^2 f}{3}}$, which is $\sqrt{\frac{11030}{3}} = 60.6$

inches, the cylinder's diameter. If there had been a greater number of pumps, the size of the cylinder might have been found in the same manner, by substituting the sum of their squares instead of p^2 in the theorem.

It is the practice of some engineers to allow a longer stroke than six feet; and, although the advantages of it are rather problematical, if that be supposed, for instance, a z feet stroke; then, instead of $p = \sqrt{58}$, and $c = \sqrt{\frac{p^2}{58}}$ in the table of theorems, we shall have

$$p = \sqrt{\frac{5 \cdot 25 b}{z}}, \text{ and } c = \sqrt{\frac{p^2}{58}}$$

On the following page is given a Table, calculated from the foregoing theorems, of the powers of cylinders from 30 to 70 inches diameter; and the diameter and lengths of pumps which those cylinders are capable of working, from a six-inch bore to that of 20 inches, together with the quantity of water drawn per stroke and per hour, allowing the engine to make 12 strokes of 6 feet per minute.

EXPLANATION of the TABLE.

The first column on the left is the diameter of the cylinders from 30 inches to 70. The first line of numbers at the top is the diameters of pumps from 6 to 20 inches; and the numbers in the common angle of meeting are the fathoms in depth which the cylinder is capable of working with any of these pumps. The right-hand column gives the power of the cylinder in pounds, to which it stands opposite, likewise the weight of the columns of water in the same line. Thus the first pump, 5400 pounds, is the power of a 30-inch cylinder; it is also the weight of water contained in 75 fathoms of 6-inch pumps, 55 fathoms of 7 inches diameter, 42 fathoms of 8 inches, 33 fathoms of 9 inches, &c.

The quantity in gallons drawn by a six-feet stroke,

or the quantity contained in one fathom of any of the pumps, is expressed in the lowest line but one; any quantity in this line multiplied by 10.2 will give the weight in pounds of one fathom, if wanted. The lowest line of figures is the number of hogheads drawn in an hour by each pump respectively, when the engine goes 12 strokes per minute.

EXAMPLES of the Use of the TABLE.

1. Required the size of the cylinder to work a pump of 12 inches diameter 30 fathom deep.

Under 12 inches, the diameter of the pump, find the fathoms 30, (or the nearest number to it); and on the same line in the first column is 38 inches, the diameter of the cylinder.

2. Required the size of the pump that a cylinder of 38 inches diameter can work at 30 fathoms deep.

Find 38, the cylinder's diameter in the first column; then in the line from it look for 30 fathoms, or the nearest number to it; and where that is found, the diameter of the pump will be found above: thus 30 fathoms has 12 inches for the pump's diameter.

3. Required the depth that a 36-inch cylinder will work a pump of 10 inches diameter.

Find 36 in the side-column, and 10 in the upper line; and in the common angle of meeting is 39, the fathoms required.

4. Required the number of gallons drawn per stroke by the last-mentioned cylinder and pumps.

Under the diameter 10 of the pump, and in the lowest line but one, is 20, the number of gallons drawn per stroke.

5. Required the hogheads delivered per hour by a 12-inch pump.

Under 12, the pump's diameter, in the lowest line of figures, is 328, the hogheads delivered per hour.

6. Required the diameter of the cylinder and pumps to draw 520 hogheads per hour from 30 fathoms deep, 450 hogheads per hour from 20 fathoms deep, and 80 hogheads per hour from 10 fathoms deep.

In this question take the nearest numbers in the Table: thus 513 hogheads per hour is the nearest to 520, and above it find the fathoms 29, which is nearest to 30; then at the head of that column is 15 inches for the size of the largest pump, and in the right-hand column, opposite 29, is 12,696 lb. the weight of that water; viz. Pump, 15 inches. Weight, 12,696

In the same manner find pump 14 inch. 7776

Also pump 6 inch. 800

The sum is the weight of the whole, 21272

Then, by looking in the last column amongst the powers of cylinders, the nearest number to 21,272 is 21,600; and opposite to it, in the first column, is 60 inches, the diameter of a cylinder capable of working those three pumps.

TABLE of the Power and Effects of STEAM-ENGINES, allowing 12 strokes of 6 feet long each *per* minute, and the Pressure of the Air 7lb. 10oz. *per* square Inch.

		The Diameters of the Pumps in Inches.																		Power of the cylinders, and weight of water in pounds.
		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
The Diameters of the Cylinders in Inches.	30	75	55	42	33	27	22	19	16	14	12	10	—	—	—	—	5400			
	31	80	58	45	35	29	24	20	17	15	13	11	10	—	—	—	5766			
	32	83	61	47	37	30	25	21	18	16	13	12	10	—	—	—	6144			
	33	90	67	51	40	33	27	22	19	17	14	13	11	10	—	—	6534			
	34	94	70	53	42	34	28	23	20	18	15	14	12	10	—	—	6936			
	35	102	75	57	45	37	30	26	22	19	16	14	13	11	—	—	7350			
	36	—	79	61	48	39	32	27	23	20	17	15	14	12	10	—	7776			
	37	—	84	64	51	41	34	29	24	21	18	16	14	12	11	10	8214			
	38	—	88	68	53	43	35	30	26	22	19	17	15	13	12	10	8664			
	39	—	93	71	56	45	37	32	27	23	20	18	16	14	12	11	9126			
	40	—	98	75	59	48	39	34	28	24	21	19	17	15	13	12	9600			
	42	—	108	83	65	53	43	38	31	27	23	21	18	16	14	13	10584			
	44	—	—	90	71	58	48	41	34	30	26	23	20	18	16	14	11616			
	46	—	—	99	78	63	52	45	37	33	29	25	21	19	17	16	12696			
	48	—	—	—	85	69	57	49	41	35	31	27	24	21	19	17	13824			
	50	—	—	—	92	75	62	53	44	38	34	29	26	23	21	19	15000			
	52	—	—	—	100	81	67	57	48	41	36	31	28	25	22	20	16224			
	54	—	—	—	—	87	72	61	52	44	38	34	30	27	24	22	17496			
	56	—	—	—	—	94	78	66	56	48	42	37	32	29	26	23	18816			
	58	—	—	—	—	101	83	70	59	54	44	39	34	31	28	25	20184			
60	—	—	—	—	—	89	75	63	55	48	42	37	33	30	27	21600				
62	—	—	—	—	—	95	80	68	58	51	45	39	35	32	28	23064				
64	—	—	—	—	—	—	85	72	62	54	48	42	38	34	30	24546				
66	—	—	—	—	—	—	90	77	66	57	51	45	40	36	32	26676				
68	—	—	—	—	—	—	96	82	70	61	54	48	42	38	34	27744				
70	—	—	—	—	—	—	—	86	75	64	57	50	45	40	36	29400				
Quantity drawn at one stroke in gallons.		7.2	10	13	16.2	20	24.2	28.8	33.8	39.2	45	51.2	57.8	64.8	72.2	80				
Quantity drawn in one hour in horse-powers.		82	114	148	184	228	276	328	385	447	513	583	659	738	823	912				
		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				

We shall now describe the several parts of an engine, and exemplify the application of the foregoing principles in the construction of one of the completest of the modern engines. See Plate CCLXXXIII. fig. 1.

A, Represents the fire-place under the boiler, for the boiling of the water, and the ash-hole below it.

B, The boiler, filled with water about three feet above the bottom, made of iron plates.

C, The steam-pipe through which the steam passes from the boiler into the receiver.

D, The receiver, a close iron vessel, in which is the regulator or steam-cock, which opens and shuts the hole of communication each stroke.

E, The communication-pipe betwixt the receiver and the cylinder; it rises 5 or 6 inches up, in the inside of the cylinder bottom, to prevent the injected water from descending into the receiver.

F, The cylinder, of cast iron, about 10 feet long, bored smooth in the inside; it has a broad flanch in the middle on the outside, by which it is supported when hung in the cylinder-beams.

G, The piston, made to fit the cylinder exactly: it has a flanch rising 4 or 5 inches upon its upper surface, betwixt which and the side of the cylinder a quantity of junk or oakum is stuffed, and kept down by weights, to prevent the entrance of air or water and the escaping of steam.

H, The chain and piston shank by which it is connected to the working-beam.

II, The working-beam or lever: it is made of two or more large logs of timber, bent together at each end, and kept at the distance of 8 or 9 inches from each other in the middle by the gudgeons, as represented in the Plate. The arch-heads, II, at the ends, are for giving a perpendicular direction to the chains of the piston and pump-rods.

K, The pump-rod which works in the sucking-pump L, and draws the water from the bottom of the pit to the surface.

M, A cistern, into which the water drawn out of the pit is conducted by a trough, so as to keep it always full; and the superfluous water is carried off by another trough.

N, The jack-head pump, which is a sucking-pump wrought by a small lever or working-beam, by means of a chain connected to the great beam or lever near the arch *g* at the inner end, and the pump-rod at the outer end. This pump commonly stands near the corner of the front of the house, and raises the column of water up to the cistern O, into which it is conducted by a trough.

O, The jack-head cistern for supplying the injection, which is always kept full by the pump N: it is fixed so high as to give the jet a sufficient velocity into the cylinder when the cock is opened. This cistern has a pipe on the opposite side for conveying away the superfluous water.

PP, The injection-pipe, of 3 or 4 inches diameter, which turns up in a curve at the lower end, and enters the cylinder bottom: it has a thin plate of iron upon the end *a*, with 3 or 4 adjustable holes in it, to permit the jet of cold water from the jack-head cistern to fly up against the piston and condense the steam each stroke, when the injection-cock is open. *a*, A valve upon the upper end of the injection-pipe within the

cistern, which is shut when the engine is not working, to prevent any waste of the water. *f*, A small pipe which branches off from the injection-pipe, and has a small cock to supply the piston with a little water to keep it air-tight.

Q, The working plug, suspended by a chain to the arch *g* of the working-beam. It is usually a heavy piece of timber, with a slit vertically down its middle, and holes bored horizontally through it, to receive pins for the purpose of opening and shutting the injection and steam cocks as it ascends and descends by the motion of the working-beam.

h, The handle of the steam-cock or regulator. It is fixed to the regulator by a spindle which comes up through the top of the receiver. The regulator is a circular plate of brass or cast iron, which is moved horizontally by the handle *h*, and opens or shuts the communication at the lower end of the pipe E within the receiver. It is represented in the Plate by a circular dotted line.

i, The spanner, which is a long rod or plate of iron for communicating motion to the handle of the regulator; to which it is fixed by means of a slit in the latter, and some pins put through to fasten it.

k, The vibrating lever, called the *Z*, having the weight *k* at one end and two legs at the other end. It is fixed to an horizontal axis, moveable about its centre-pins or pivots *m*, by means of the two shanks *o* *p* fixed to the same axis, which are alternately thrown backwards and forwards by means of two pins in the working plug; one pin on the outside depressing the shank *o*, throws the loaded end *k* of the *Z* from the cylinder into the position represented in the plate, and causes the leg *l* to strike against the end of the spanner; which forcing back the handle of the regulator or steam-cock, opens the communication, and permits the steam to fly into the cylinder. The piston immediately rising by the admission of the steam, the working-beam II rises; which also raises the working-plug, and another pin which goes through the slit raises the shank *p*, which throws the end *k* of the *Z* towards the cylinder, and, striking the end of the spanner, forces it forward, and shuts the regulator or steam-cock.

q, The lever for opening and shutting the injection-cock, called the F. It has two toes from its centre, which take betwixt them the key of the injection-cock. When the working-plug has ascended nearly to its greatest height, and shut the regulator, a pin catches the end *q* of the F and raises it up, which opens the injection-cock, admits a jet of cold water to fly into the cylinder, and, condensing the steam, makes a vacuum; then the pressure of the atmosphere bringing down the piston in the cylinder, and also the plug-frame, another pin fixed therein catches the end of the lever in its descent, and, by pressing it down, shuts the injection-cock, at the same time the regulator is opened to admit steam, and so on alternately; when the regulator is shut the injection is open, and when the former is open the latter is shut.

R, The hot well. A small cistern made of planks, which receives all the waste water from the cylinder.

S, The sink-pit, to convey away the water which is injected into the cylinder each stroke. Its upper end is even with the inside of the cylinder bottom, its lower end has a lid or cover moveable on a hinge, which

which serves as a valve to let out the injected water, and shuts close each stroke of the engine, to prevent the water being forced up again when the vacuum is made.

T, The feeding pipe, to supply the boiler with water from the hot well. It has a cock to let in a large or small quantity of water as occasion requires, to make up for what is evaporated; it goes nearly down to the boiler bottom.

U, Two gage-cocks, the one larger than the other, to try when a proper quantity of water is in the boiler: upon opening the cocks, if one give steam and the other water, it is right; if they both give steam, there is too little water in the boiler; and if they both give water, there is too much.

W, A plate which is screwed on to a hole in the side of the boiler, to allow a passage into the boiler for the convenience of cleaning or repairing it.

X, The steam-clack or puppet-valve, which is a brass valve on the top of a pipe opening into the boiler, to let off the steam when it is too strong. It is loaded with lead, at the rate of one pound to an inch square; and when the steam is nearly strong enough to keep it open, it will do for the working of the engine.

f, The snifting valve, by which the air is discharged from the cylinder each stroke which was admitted with the injection, and would otherwise obstruct the due operation of the engine.

tt, The cylinder-beams; which are strong joists going through the house for supporting the cylinder.

v, The cylinder-cap of lead, soldered on the top of the cylinder, to prevent the water upon the piston from flashing over when it rises too high.

w, The waste-pipe which conducts the superfluous water from the top of the cylinder to the hot-well.

xx, Iron bars, called the *catch-pins*, fixed horizontally through each arch-head, to prevent the beam descending too low in case the chain should break.

yy, Two strong wooden sgrings to weaken the blow given by the catch-pins when the stroke is too long.

zz, Two friction-wheels, on which the gudgeon or centre of the great beam is hung; they are the third or fourth part of a circle, and move a little each way as the beam vibrates. Their use is to diminish the friction of the axis, which, in so heavy a lever, would otherwise be very great.

When this engine is to be set to work, the boiler must be filled about three or four feet deep with water, and a large fire made under it; and when the steam is found to be of a sufficient strength by the puppet-clack, then by thrusting back the spanner, which opens the regulator or steam-cock, the steam is admitted into the cylinder, which raises the piston to the top of the cylinder, and forces out all the air at the snifting valve; then by turning the key of the injection-cock, a jet of cold water is admitted into the cylinder, which condenses the steam and makes a vacuum; and the atmosphere then pressing upon the piston, forces it down to the lower part of the cylinder, and makes a stroke by raising the column of water at the other end of the beam. After two or three strokes are made in this manner, by a man opening and shutting the cocks to try if they be right, then the pins may be put into the pin-holes in the working plug,

and the engine left to turn the cocks of itself; which it will do with greater exactness than any man can pretend to do.

There are in some engines different methods of shutting and opening the cocks than in the one above described, but perhaps none better adapted to the purpose; and as the principles on which they all act are originally the same, any difference in the mechanical construction of the small machinery will have no influence of consequence upon the total effect of the grand machine.

The furnace or fire-place should not have the bars so close as to prevent the free admission of fresh air to the fire, nor so open as to permit the coals to fall through them; for which purpose two inches or thereabouts is sufficient for the distance betwixt the bars. The size of the furnace depends upon the size of the boiler; but in every case the ash-hole ought to be capacious to admit the air, and the greater its height the better. If the flame is conducted in a flue or chimney round the outside of the boiler, or in a pipe round the inside of it, it ought to be gradually diminished from the entrance at the furnace to its egress at the chimney; and the section of the chimney at that place should not exceed the section of the flue or pipe, and should also be somewhat less at the chimney-top.

The boiler or vessel in which the water is rarefied by the force of fire, may be made of iron-plates, cast iron, or such other materials as can withstand the effects of the fire, and the elastic force of the steam. It may be considered as consisting of two parts; the upper part which is exposed to the steam, and the under part which is exposed to the fire. The form of the latter should be such as to receive the full force of the fire in the most advantageous manner, so that a certain quantity of fuel may have the greatest possible effect in heating and evaporating the water; which is best done by making the sides cylindrical, and the bottom a little concave, and then conducting the flame by an iron flue or pipe round the inside of the boiler beneath the surface of the water, before it reach the chimney. For, by this means, after the fire in the furnace has heated the water by its effect on the bottom, the flame heats it again by the pipe being wholly included in the water, and having every part of its surface in contact with it; which is preferable to carrying it in a flue or chimney round the outside of the boiler, as a third or a half of the surface of the flame only could be in contact with the boiler, the other being spent upon the brick-work. This cylindrical lower part may be less in its diameter than the upper part, and may contain from four to six feet perpendicular height of water in it.

The upper part of the boiler is best made hemispherical, for resisting the elasticity of the steam; yet any other form may do, provided it be of sufficient strength for the purpose. The quick going of the engine depends much on the capaciousness of the boiler-top; for if it be too small, it requires the steam to be heated to a great degree, to increase its elastic force so much as to work the engine. If the top is so capacious as to contain eight or ten times the quantity of steam used each stroke, it will require no more fire to preserve its elasticity than is sufficient to keep the water in a proper state of boiling; this, therefore, is the

Steam-
Engine.

the best size for a boiler-top. If the diameter of the cylinder be c , and works a six-foot stroke, and the diameter of the boiler supposed b , then $200c^2 = b^2$, or

$$b = \sqrt{200c^2}.$$

The effect of the injection in condensing the steam in the cylinder, depends upon the height of the reservoir and the diameter of the adjutage. If the engine makes a six-foot stroke, then the jackhead cistern should be twelve feet perpendicular above the bottom of the cylinder or the adjutage. The size of the adjutage may be from one to two inches in diameter; or if the cylinder be very large, it is proper to have three or four holes rather than one large one, in order that the jet may be dispersed the more effectually over the whole area of the cylinder. The injection-pipe, or pipe of conduct, should be so large as to supply the injection freely with water: if the injection-pipe be called p , and the diameter of the adjutage a , then

$$4a^2 = p^2, \text{ and } a^2 = \frac{p^2}{4}.$$

Mr Watt's
improved
engine.

Mr James Watt of Birmingham having lately obtained a patent for an improvement of the steam-engine above-described, we shall give an account of this improvement, and point out in what the advantage of it consists.

The cylinder, or steam-vessel, A, of this engine, (see Plate CCLXXIII. fig. 2.) is shut at bottom and open at top, as usual; and is included in an outer cylinder or case BB, of wood or metal, covered with materials which transmit heat slowly. This case is at a little distance from the cylinder, and is shut at both ends; the cover C has a hole in it through which the piston-rod E slides; and near the bottom is another hole F, by which the steam from the boiler has always free entrance into this case or outer cylinder, and by the interstice GG between the two cylinders has access to the upper side of the piston HH. To the bottom of the inner cylinder A is joined a pipe I, with a cock or valve K, which is opened and shut when necessary, and forms a passage to another vessel L called a *condenser*, made of thin metal. This vessel is immersed in a cistern M full of cold water, and is contrived in such a manner as to expose a very great surface externally to the water, and internally to the steam. It is also made air-tight, and has pumps N wrought by the engine, which keep it always exhausted of air and water.

Both the cylinders A and BB being filled with steam, the passage K is opened from the inner one to L the condenser, into which the steam rushes with violence by its elasticity, because that vessel is exhausted; but it no sooner enters it, than coming into contact with the cold matter of the condenser, it is reduced to water, and the vacuum still remaining, the steam continues to rush in until the inner cylinder A below the piston is left empty. The steam which is above the piston ceasing to be counteracted by that which was below it, acts upon the piston HH, and forces it to descend to the bottom of the cylinder, and so raises the bucket of the pump by means of the lever. The passage K between the inner cylinder and the condenser is then shut, and another passage O is opened, which permits the steam to pass from the outer cylinder, or from the boiler into the inner cylinder under the piston; and then the superior weight

Steatites.

of the bucket and pump-rods pulls down the outer end of the lever or great beam, and raises the piston, which is suspended to the inner end of the same beam.

The advantages that accrue from this construction are, first, that the cylinder being surrounded with the steam from the boiler, is kept always uniformly as hot as the steam itself, and is therefore incapable of destroying any part of the steam which should fill it, as the common engines do. Secondly, the condenser being kept always as cold as water can be procured, and colder than the point at which it boils *in vacuo*, the steam is perfectly condensed and does not oppose the descent of the piston; which is therefore forced down by the full power of the steam from the boiler, which is somewhat greater than that of the atmosphere.

In the common fire-engines, when they are loaded to seven pounds upon the inch, and are of a middle size, the quantity of steam which is condensed in restoring to the cylinder the heat which it had been deprived of by the former injection of cold water, is about one full of the cylinder, besides what really it required to fill that vessel; so that twice the full of the cylinder is employed to make it raise a column of water equal to about seven pounds for each square inch of the piston: or, to take it more simply, a cubic foot of steam raises a cubic foot of water about eight feet high, besides overcoming the friction of the engine, and the resistance of the water to motion.

In the improved engine, about one full and a fourth of the cylinder is required to fill it, because the steam is one-fourth more dense than in the common engine. This engine raises a load equal to 12 pounds and a half upon the square inch of the piston; and each cubic foot of steam of the density of the atmosphere, raises one cubic foot of water 22 feet high.

STEATITES, in the history of fossils, a name given by late authors to a substance called in English *soap-earth*. Dr Woodward much recommends it as a substance for making porcelain; and repeated trials of it have been made since his time, and some of them very lately; in all which it has afforded the finest earthen-ware ever made with us, and promises fair, with good management, for the equalling any in the world. It is dug in many parts of Devonshire and Cornwall, and the neighbouring counties; the cliff of the Lizard-point is almost wholly composed of it, and the adjacent little islands abound with it; and from all these places it might be brought, at a small expence, in any quantities. It is known from all other earths by these characters: it is composed of extremely fine particles; and is of a firm, equal, and regular texture, and a great weight. It is very firm and hard as it lies in the earth; but when it has been some time exposed to the air, it becomes almost of a stony hardness. It is of a perfectly fine, smooth, and glossy surface, softer to the touch than any other species of earth, and does not at all adhere to the tongue, or stain the fingers in handling; but, drawn along a rough surface, as a piece of cloth, or the like, it marks it with a fine and even white line. In colour it is a clear white, veined and variegated very beautifully with purple of different degrees of deepness; and is of so fine a structure of parts, that when cut into thin pieces it is in some degree transparent. It makes

no effervescence with acids; and burns to a pure white, even in its purple parts. This substance is found to contain in great quantity the fine white earth called *magnesia alba*.

STEATOMA, a kind of encysted tumour, consisting of a matter like suet or lard, soft, without pain, and without discolouring the skin.

STEEL, a very hard and fusible kind of iron.

Stahl, Cramer, and all good chemists, justly consider steel as an improved iron, which is possessed of a larger quantity of inflammable principle, so necessary to all metals, and which really contains fewer heterogeneous, and more metallic, parts than an equal bulk of iron. We shall be convinced of this truth by a description and explanation of the methods of converting iron into steel, and by examining the characteristic properties of steel.

Steel may be made by fusion or by cementation. The first method is used to convert iron into steel immediately from the ore. All ores of iron are not used indifferently for this purpose; because some of these, which are therefore called *ores of steel*, are much fitter than others to furnish good steel; and the steel extracted from them is called *natural steel* (A).

The other method of making steel consists in choosing the best forged iron, or that which is most malleable, whether it be hot or cold; and impregnating this iron with a larger portion of inflammable principle, by cementation alone, without fusion.

To understand well these methods of making steel, we must attend to two essential properties of iron. The first is, that of all metals it is the most difficultly fusible; and that therefore, although, in the melting of its ores, its fusion be much assisted by the sulphureous parts of the ore itself; yet, as these parts are always expelled as much as is possible, iron never enters into so thin and perfect a fusion as the other metals.

The second property of iron to which we ought to attend is, that the earth of this metal is capable of

combining with the inflammable principle, and of being metallised without fusion.

These things being premised, it happens, in consequence of the former property, that, in the first fusion of ores of iron, we obtained only a hard and brittle iron, both from the sulphureous parts from which this iron is not entirely disengaged, and from the presence of a greater or less quantity of earthy matters, which are either unmetallic; or which, if they be ferruginous, have not been metallised, from want of immediate contact with the phlogiston of the fuel.

We may easily perceive that these earthy parts, unmetallic or not metallised, cannot be entirely separated from the perfect iron, because the fusion is not sufficiently thin for that purpose: but in proportion as the iron is deprived of sulphur, its fusion becomes more and more difficult, and we are obliged to have recourse to another expedient than fusion to disengage it from its earthy parts, which in the first melting remain intercepted betwixt the metallic parts. This expedient is the forge. The impure iron intended to be rendered malleable is to be heated red-hot, and struck by a very heavy hammer.

This perculsion, that iron softened by heat sustains, presses strongly, and folders or welds together the metallic parts, which alone are capable of uniting together; and obliges the unmetallic parts, which are incapable of uniting with the metal, to separate. By this operation these unmetallic parts are pressed between the parts of the iron, and driven by degrees to the surface of the metal, from which they are detached in form of dust and scales. This treatment, which is a kind of kneading of the iron, is to be repeated till it has acquired the proper degree of purity and ductility.

The operations by which steel is to be extracted from its ores are essentially the same as those employed for iron; but they differ from them in being much more exact; that an iron still purer, more filled with phlogiston,

(A) Steel is made sometimes directly from the ore, but more frequently from crude or cast iron. These methods of making steel are not known in England; but are practised in Sweden and other parts of Europe. The process for making steel from cast-iron is thus described by Swedenborgius, as it is performed in Dalecarlia.

The ore from which the crude iron to be converted into steel is obtained is of a good kind. It is black, friable, and composed of many small grains; and it produces very tough iron. The conversion into steel is made upon a forge-hearth, something smaller than common. The sides and bottom are made of cast-iron. The tuyere is placed, with very little inclination, on one of the side-plates. The breadth of the fire-place is 14 inches; its length is greater. The lower part of the tuyere is six one-half inches above the bottom. In the interior part of the fire-place, there is an oblong opening for the flowing of the superfluous scoria. The workmen first put scoria on the bottom, then charcoal and powder of charcoal, and upon these the cast-iron run or cut into small pieces. They cover the iron with more charcoal, and excite the fire. When the pieces of iron are of a red-white, and before they begin to melt, they stop the bellows, and carry the mass under a large hammer, where they break it into pieces of three or four pounds each. The pieces are again brought to the hearth, and laid within reach of the workman, who plunges some of them into the fire, and covers them with coal. The bellows are made to blow slowly till the iron is liquified. Then the fire is increased; and when the fusion has been long enough continued, the scoria are allowed to flow out; and at that time the iron hardens. The workman adds more of the pieces of crude iron, which he treats in the same manner, and so on a third and a fourth time, till he obtains a mass of steel of about a hundred pounds, which is generally done in about four hours. This mass is raised and carried to the hammer, where it is forged, and cut into four pieces, which are further beat into square bars four or five feet long. When the steel is thus forged, it is thrown into water, that it may be easily broken; for it is yet crude and coarse-grained. The steel is now carried to another hearth similar to the former, and there broken in pieces. These pieces are laid regularly in the fire-place, first two parallel, upon which seven or eight others are placed across, then a third row across the second, in such a manner that there is space left between those of the same row. The whole is then covered with charcoal, and the fire is excited. In about half or three quarters of an hour the pieces are made hot enough, and are then taken from the fire, one by one, to the hammer, to be forged into little bars from half a foot to two feet long, and while hot, are thrown into water to be hardened. Of these pieces 16 or 20 are put together, so as to make a bundle, which is heated and welded, and afterwards forged into bars four inches thick, which are then broken into pieces of convenient length for use.

Steel.

giston, and better disengaged from its earthy parts, may be obtained.

To succeed in this intention, much smaller quantities must be fused at once than when iron is to be extracted from its ore. Pieces of the first fusion are to be put into crucibles filled and covered with charcoal, and exposed to a violent heat excited by strong bellows. These pieces are to be well fused, and kept in fusion a longer or shorter time, according to the nature of the ore; after which they are to be forged, as iron is; but always in much smaller pieces, and till they are become perfectly ductile both when hot and when cold. Nothing then remains but to temper the steel, of which we shall presently speak.

In these operations, which are to be several times repeated, the iron that is changed into steel must evidently be much better purified, and furnished with a much greater quantity of inflammable principle, than in the smeltings and fusions of large quantities of iron. As the masses of metal are small in these operations for the procuring of steel, and as they are surrounded with a much larger proportion of charcoal, the fusion is not only more complete, by which the separation of the earthy unmetallic parts is much promoted; but also a greater number of ferruginous parts are well metallized; and as all these parts of iron are in more intimate contact with the charcoal, which is capable of supplying them with inflammable principle, they receive the whole quantity of this principle with which they can unite.

The same observation may be applied to the operation of the forge practised upon smaller masses; for the heterogeneous parts are much more easily and copiously pressed out of small masses than great.

This exact purification of iron, by which it is converted into steel, must evidently be attended with considerable loss, or diminution, from the separation of all its heterogeneous parts. This diminution amounts to nearly one half of the weight of the iron. This great loss does not proceed altogether from the separation of heterogeneous parts; for in all the operations used for this separation, some part of the metal is always destroyed and burnt, although all possible precautions are taken to diminish this inconvenience, by securing the melted or red-hot metal from the contact of external air as much as is possible.

Artificial steel is made without fusion from iron ready forged. The chief point to be attended to in the making of the best artificial steel, is to choose the iron which is most perfect and most malleable either when it is hot or cold; which quality always shows that the iron is well purified. It is first to be forged into plates or bars, rather small than large, according to the works for which it is intended; and it is then to be cemented with matters capable of giving to it much inflammable principle. The matters which compose this cement vary according to the uses of different manufacturers. They are all good, provided they contain no sulphur, or vitriolic acid, which might form sulphur during the operation; because sulphur, having much affinity with iron, would certainly unite with this metal, would entirely or partly fuse it, and would, by reducing it to a mineral or pyritous state, give to it qualities very different from those which good steel ought to have.

Steel.

The matters which enter into the composition of the cement for steel, are the coals of animal or vegetable substances, mixed with ashes, calcined bones, and other matters of this kind. Mr Cramer proposes these two following receipts of cements for steel, which appear to be very good.

Take one part of powder of charcoal, half a part of wood-ashes, and mix them very well together. Or,

Take two parts of charcoal, moderately pulverized: one part of bones, horns, hair or skins of animals, burnt in close vessels to blackness, and powdered; half a part of wood-ashes; and mix them well together.

When steel is to be made, the bars of iron are to be placed vertically in a cylindrical crucible, which ought to be three inches higher than the bars, and into which a stratum of the cement of about the thickness of a finger has been previously put and pressed down. The bars ought to be about an inch distant from each other, and from the sides of the crucible. The interstices and crucible are then to be filled with cement, so that the bars shall be covered with about the thickness of two inches at least. The crucible, previously covered with a lid which fits it exactly, and which must be carefully luted with clay mixed with sand, is to be placed in a furnace where an equal fire is to be kept, so that the crucible shall be red-hot during eight or ten hours: the iron will then be found to be converted into steel, which will be so much better as the iron employed was of a better quality: it then only requires to be tempered. We may observe, that in this operation the iron suffers no diminution of weight, and no scoria appear upon its surface, as Mr Cramer remarks. By the sole addition, therefore, of a new quantity of phlogiston, the iron acquires the quality of steel. Thus, if this iron contained some parts of martial earth which was not metallized, by the cementation they are metallized, and the iron or steel are thereby improved: but if the iron contained some earthy unmetallic parts, they are not separated by this operation, because the metal has not been fused: and as the best forged iron which is usually sold, is never so well purified from these extraneous matters, as that which is converted into steel in the great works for procuring steel from the ore of iron; hence, in general, artificial steel made by cementation is not so perfect as that made by fusion.

We may observe, that, in the cementation above described, the iron combines with a part of the phlogiston of the cement, without fusion; which effect proceeds from a peculiar property of the earth of iron, by which it is capable of combining with the inflammable principle, and of being metallized without fusion, which is, nevertheless, necessary for the reduction of all other metallic earths.

The steel which has received only the above-mentioned preparations differs from iron in its colour, which is more dark and brown; in its grain, which is finer and closer; in possessing a greater ductility, flexibility, and softness; but the great difference of steel from iron, which renders it more valuable for many purposes and arts, is the extreme hardness it acquires by being tempered.

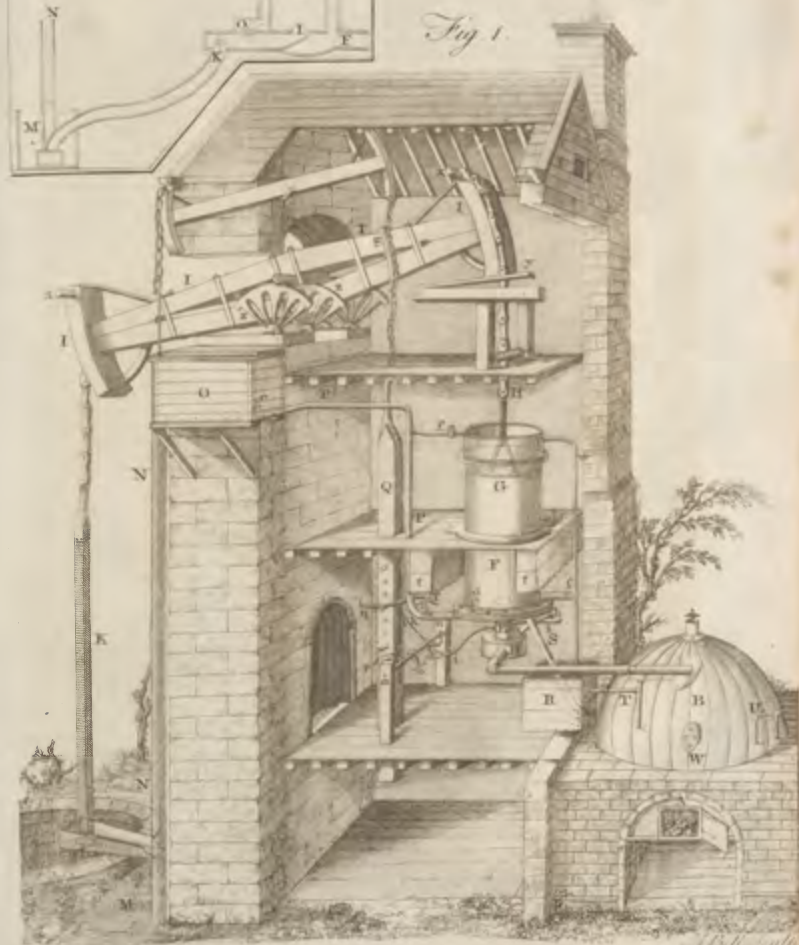
This operation is very simple. It consists in making steel red-hot, and then in plunging it suddenly in cold water. In an instant all the qualities of this steel

Plate CCLXXIII.
STEAM-ENGINE.

Fig. 2.



Fig. 1.



A. Bell sculp.



Steel.

are changed by this tempering; so that from being very ductile and soft, it becomes so hard and so stiff, that it is no longer capable of being cut by the file; but is itself capable of cutting or piercing very hard bodies: that it does not yield to the hammer; but may be sooner broken in pieces like a flint, than be extended. It is sonorous, brittle, very elastic, and capable of acquiring the most lively and most beautiful polish, as we see in finely-wrought toys of steel.

The use of this metal is very extensive for numberless convenient and necessary utensils of all sorts, of which without it we should absolutely be deprived: but what renders its use still more general is, that we can diversify at pleasure its hardness and ductility, by varying the temper. The hotter the steel is when tempered, and the colder the water into which it is plunged, the greater hardness it acquires; but, at the same time, it becomes so much more brittle. This very hard temper is necessary for certain tools designed to cut very hard bodies. On the contrary, the less hot the steel is when tempered, and the hotter the water is in which it is tempered, the less hard it becomes, and also the greater ductility it retains; and hence many tools may be made of it fit for cutting bodies moderately hard, which tools are less liable to have their points broken or their edges notched, than if they were made of a harder steel.

No other general rule can be given for the tempering of steel than that we have mentioned. The proper degree of heat is always relative to the use to which the tools to be made of this steel are to be applied.

Another very convenient property of steel is, that after it has been tempered, it may be again untempered and softened to any degree that we think proper; for which purpose we have only to heat it more or less, and to let it cool slowly. By this method we may soften the hardest-tempered steel.

As the temper is a very essential point with regard to steel, and that the best is in general that which gives the greatest hardness, and destroys the least of the ductility of the metal, various substances are used into which steel to be tempered is plunged. Such are rust, oil, urine; water impregnated with foot, with sal ammoniac, or with other salts. These particular methods are the bases of many secrets in different manufactures; their advantages cannot be ascertained without a very accurate and continued examination. Very interesting researches remain to be made on this subject.

Steel is usually fold tempered, because, in many manufactures of it, the custom is to temper it as soon as it is made, probably that the purchasers of it may be the better able to judge of its quality. When this steel is to be used, it must be untempered, that it may be extended, filed, and receive the form intended to be given to it; after which each workman tempers it again in his manner. But we also find amongst merchants English steel in small bars, which is not tempered, and which is very good.

Well-polished plates of steel, put on a gentle fire of charcoal, acquire different colours on their surface, and pass successively through several shades, as they become hotter, in the following order: white, yellow, orange, purple, violet, and lastly blue, which disap-

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pears and leaves a water-colour, if the steel has been heated too much or too long. These different shades mark the degree of heat or of annealing applied to different tools or utensils. The most generally used shade is the blue, such as that given to steel-springs.

One of the most important properties of steel is the magnetic quality, which it is capable of acquiring much better than iron. Good mariners compasses cannot be made without needles of steel.

From what has been said, we may judge that steel is much better purified iron than any other, impregnated with a larger quantity of inflammable principle, and hardened by the temper. Some celebrated natural philosophers, but who were not chemists, have advanced, that steel was only iron which still retained something of its mineral nature, and that its state was intermediate betwixt that of cast-iron and soft forged iron. But this opinion is manifestly erroneous. They have been deceived by the hardness and brittleness of cast-iron, which are nearly as great as in steel. But these qualities proceed from a remaining part of the mineralising substances, which leave it a pyritous character, very different from that of true steel; since this can only be hardened by the temper, and since in the preparation of it all sulphureous matter must be carefully avoided. The mistake of these authors proceeded from their ignorance of the inflammable principle, the properties of which have been so well explained by the illustrious Stahl, and from their being led into an error by the old chemists, who perpetually confounded phlogiston, or the purest and simplest inflammable principle of all bodies, with sulphur, with sulphureous matters, and with most other inflammable compounds.

Steel may be unmade, or reduced to the state of iron, by a management similar to that by which it is made, that is, by cementation. But the cement used for this purpose must be composed of substances entirely free from inflammable matter, and rather capable of absorbing it, as calcareous earth and quicklime are. By a cementation then with these matters, continued during eight or ten hours, steel is reduced to the state of iron.

Stahl considers it as an undecided question, whether steel be more fusible than iron, and says, that the workmen cannot decide it from the violence of fire necessary to melt either of them. He believed, with reason, that this question might be decided by melting these metals in the focus of a burning speculum. Mr Macquer says, that by this method he found steel much more fusible than iron. This greater fusibility of steel can be only attributed to the greater quantity of phlogiston united with it, as phlogiston is in general the cause of the fusibility of metals.

By conversion of iron into steel, this metal acquires a closer, more compact, and finer grained texture, greater hardness, elasticity, tenacity, density, sonorousness, and disposition to receive the magnetic property; and, as some say, an increase of weight. It is also rendered less liable to rust by exposure to air; and less liable to emit sparkles when heated. The colours or irises which steel acquires by exposure to heat, and which are marks by which workmen know when any acquired heat is given, are not peculiar to steel and iron, but may also be produced by the same means on all

Steel.

Steel.

other calcinable metals. These colours proceed from a calcination gradually advancing on that part of the metals which is exposed to air. And as the particles of metals in their different degrees of calcination are possibly of different sizes, so they must acquire (according to Sir Isaac Newton's theory, which shows that the colours of bodies depend on the size of their integrant parts) different reflective powers, and exhibit changes of colours.

Steel may be made by fusion from the ore, or by cementation of forged iron with inflammable matters. Anciently, steel is said to have been made by immersing forged iron during some time in melted crude iron. Forged iron may also be changed into steel, as Wallerius affirms, by immersing in melted scoria; or by fusion with black flux, glass-gall, or borax; or by strewing sea-salt upon heated iron, and extinguishing it in dung.

Various opinions are formed concerning the cause of the difference between iron and steel. The most general opinion attributes this difference to the presence of a larger quantity of phlogiston in the latter than in the former. Some authors, attending chiefly to the method of conversion by fusion, consider that operation only as a purification of the iron from earthy and heterogeneous particles, and steel merely as a more pure and perfect iron. Others, observing some similitude in the texture of steel to certain kinds of cast-iron, and the hardness of both these, without attending to their essential differences, have imagined that the state of steel was intermediate betwixt that of cast and that of forged iron. Lastly, some metallurgists maintain, that the conversion of iron into steel is effected, not by absorption of phlogiston, but by expulsion of sulphurous or acid particles. To support this opinion, they observe, 1. That steel is less disposed than iron to rust; the cause of rust being, as they think, an acid contained in iron. 2. That steel emits fewer sparkles under the hammer than iron, which sparkles are found to be most frequent in iron abounding with sulphur, as in red-short iron. 3. That iron may be converted into steel by cementation with alkaline salts, capable of attracting the acid and sulphur. 4. That in the preparation of steel by fusion, the metal is rather exposed to a dissipation of its inflammable parts and burnt, than further phlogistified; and that this operation is accordingly called by workmen the *burning of steel*.

In the preparation of steel by fusion, probably much of the earthy matters contained in the iron may be separated, and any contained acid or sulphur may be burnt or dissipated. But the conversion of steel into iron by cementation with absorbent earths, in which operation no acid or sulphur can be absorbed by the metal, shows that the difference between iron and steel does not consist in the presence of an acid or of sulphur in the iron, but rather in the presence of some substance in the steel, which the inflammable cementing substance can give to it, and of which absorbent earths can deprive it. This substance has been generally believed to be phlogiston: by the addition of which the metal acquires a new texture, together with the hardness, elasticity, and other peculiar properties of steel.

The affinities and medicinal virtues of steel are the same as those of iron. See IRON.

Salt of STEEL. See CHEMISTRY, n° 146.

STEEL-Yard. See BALANCE.

STEELE (Sir Richard), was born about the year 1676 in Ireland; in which kingdom one branch of the family was possessed of a considerable estate in the county of Wexford.—His father, a counsellor at law in Dublin, was private secretary to James Duke of Ormond: but he was of English extraction; and his son, while very young, being carried to London, he put him to school at the Charter-house, whence he was removed to Merton College in Oxford. Our author left the university, which he did without taking any degree, in the full resolution to enter into the army. This step was highly displeasing to his friends; but the ardour of his passion for a military life rendered him deaf to any other proposal. Not being able to procure a better station, he entered as a private gentleman in the horse-guards, notwithstanding he thereby lost the succession to his Irish estate. However, as he had a flow of good-nature, a generous openness and frankness of spirit, and a sparkling vivacity of wit, these qualities rendered him the delight of the soldiery, and procured him an ensign's commission in the guards. In the mean time, as he had made choice of a profession which set him free from all the ordinary restraints in youth, he spared not to indulge his inclinations in the wildest excesses. Yet his gaieties and revels did not pass without some cool hours of reflection; and in these it was that he drew up his little treatise intitled *The Christian Hero*, with a design, if we may believe himself, to be a check upon his passions. For this use and purpose it had lain some time by him, when he printed it in 1701, with a dedication to Lord Cutts, who had not only appointed him his private secretary, but procured for him a company in Lord Lucas's regiment of Fusiliers. The above religious piece injuring his reputation among his gay companions, he endeavoured to enliven his character by writing that excellent comedy the *Funeral*.

This play procured him the regard of King William, who resolved to give him some essential marks of his favour; and though, upon that prince's death, his hopes were disappointed, yet, in the beginning of Queen Anne's reign, he was appointed to the profitable place of Gazetteer. He owed this post to the friendship of Lord Halifax and the Earl of Sunderland, to whom he had been recommended by his school-fellow Mr Addison. That gentleman also lent him an helping hand in promoting the comedy called *The Tender Husband*, which was acted in 1704 with great success. But his next play, *The Lying Lover*, found a very different fate. Upon this rebuff from the stage, he turned the same humorous current into another channel; and early in the year 1709, he began to publish the *Tatler*; which admirable paper was undertaken in concert with Dr Swift. His reputation was perfectly established by this work; and, during the course of it, he was made a commissioner of the stamp-duties in 1710. Upon the change of the ministry the same year, he sided with the duke of Marlborough, who had several years entertained a friendship for him; and upon his Grace's dismissal from all employments in 1711, Mr Steele addressed a letter of thanks to him for the services done to his country. However, as our author still continued to hold his place in the stamp-office.

Steel,
Steel.

Steele.

office under the new administration, he forbore entering with his pen upon political subjects; but, adhering more closely to Mr Addison, he dropt the *Tatler*, and afterwards, by the assistance chiefly of that steady friend, he carried on the same plan, under the title of *The Spectator*. The success of this paper was equal to that of the former; which encouraged him, before the close of it, to proceed upon the same design in the character of the *Guardian*. This was opened in the beginning of the year 1713, and was laid down in October the same year. But in the course of it his thoughts took a stronger turn to politics: he engaged with great warmth against the ministry; and being determined to prosecute his views that way by procuring a seat in the house of commons, he immediately removed all obstacles thereto. For that purpose, he took care to prevent a forcible dismissal from his post in the stamp-office, by a timely resignation of it to the Earl of Oxford; and at the same time gave up a pension, which had been till this time paid him by the queen as a servant to the late prince George of Denmark. This done, he wrote the famous *Guardian* upon the demolition of Donkirk, which was published Aug. 7. 1713; and the parliament being dissolved the next day, the *Guardian* was soon followed by several other warm political tracts against the administration. Upon the meeting of the new parliament, Mr Steele having been returned a member for the borough of Stockbridge in Dorsetshire, took his seat accordingly in the house of commons; but was expelled thence in a few days after, for writing the close of the paper called the *Englishman*, and one of his political pieces intitled the *Crisis*. Presently after his expulsion, he published proposals for writing the history of the duke of Marlborough; at the same time he also wrote the *Spinster*; and, in opposition to the *Examiner*, he set up a paper called the *Reader*, and continued publishing several other things in the same spirit till the death of the queen. Immediately after which, as a reward for these services, he was taken into favour by her successor to the throne king George I. He was appointed surveyor of the royal stables at Hampton-Court, governor of the royal company of comedians, put into the commission of the peace for the county of Middlesex, and in 1715 received the honour of knighthood. In the first parliament of that king, he was chosen member for Boroughbridge in Yorkshire; and, after the suppression of the rebellion in the north, was appointed one of the commissioners of the forfeited estates in Scotland. In 1718, he buried his second wife, who had brought him a handsome fortune and a good estate in Wales; but neither that, nor the ample additions lately made to his income, were sufficient to answer his demands. The thoughtless vivacity of his spirit often reduced him to little shifts of wit for its support; and the project of the Fish-pool this year owed its birth chiefly to the projector's necessities. The following year he opposed the remarkable peerage bill in the house of commons; and, during the course of this opposition to the court, his licence for acting plays was revoked, and his patent rendered ineffectual, at the instance of the lord chamberlain. He did his utmost to prevent so great a loss; and finding every direct avenue of approach to his royal master effectually barred against him by his powerful adver-

sary, he had recourse to the method of applying to the public, in hopes that his complaints would reach the ear of his sovereign, though in an indirect course, by that canal. In this spirit he formed the plan of a periodical paper, to be published twice a-week, under the title of the *Theatre*; the first number of which came out on the 2d of January 1719-20. In the mean time, the misfortune of being out of favour at court, like other misfortunes, drew after it a train of more. During the course of this paper, in which he had assumed the feigned name of *Sir John Edgar*, he was outrageously attacked by Mr Dennis, the noted critic, in a very abusive pamphlet, intitled *The Character and Conduct of Sir John Edgar*. To this insult our author made a proper reply in the *Theatre*.

While he was struggling with all his might to save himself from ruin, he found time to turn his pen against the mischievous South-Sea scheme, which had nearly brought the nation to ruin in 1720; and the next year he was restored to his office and authority in the play-house in Drury-Lane. Of this it was not long before he made an additional advantage, by bringing his celebrated comedy called the *Conscious Lovers* upon that stage, where it was acted with prodigious success; so that the receipt there must have been very considerable, besides the profits accruing by the sale of the copy, and a purse of 500 l. given to him by the king, to whom he dedicated it. Yet notwithstanding these ample recruits, about the year following, being reduced to the utmost extremity, he sold his share in the play-house; and soon after commenced a law-suit with the managers, which in 1726 was determined to his disadvantage. Having now again, for the last time, brought his fortune, by the most heedless profusion, into a desperate condition, he was rendered altogether incapable of retrieving the loss, by being seized with a paralytic disorder, which greatly impaired his understanding. In these unhappy circumstances, he retired to his seat at Llanganor near Caermarthen in Wales, where he paid the last debt to nature on the 21st of September 1729, and was privately interred, according to his own desire, in the church of Caermarthen. Among his papers were found the manuscripts of two plays, one called *The Gentlemen*, founded upon the eunuch of Terence, and the other intitled *The School of Action*, both nearly finished.

Sir Richard was a man of undissimble and extensive benevolence, a friend to the friendless, and, as far as his circumstances would permit, the father of every orphan. His works are chaste and manly. He was a stranger to the most distant appearance of envy or malevolence; never jealous of any man's growing reputation; and so far from arrogating any praise to himself from his conjunction with Mr Addison, that he was the first who desired him to distinguish his papers. His greatest error was want of economy; however, he was certainly the most agreeable, and (if we may be allowed the expression) the most innocent, rake that ever trod the rounds of indulgence.

STEPPLE, an appendage erected generally on the western end of churches, to hold the bells. Steeples are denominated from their form, either spires or towers: the first are such as ascend continually diminishing either conically or pyramidally; the latter are mere parallelopipeds, and are covered a-top platform-

Steele.
Steeples.

Steerage,
Steering.

STEERAGE, on board a ship, that part of the ship next below the quarter-deck, before the bulk-head of the great cabin where the steersman stands, in most ships of war. See **STEERING**.

STEERING, in navigation, the art of directing the ship's way by the movements of the helm; or of applying its efforts to regulate her course when she advances.

The perfection of steering consists in a vigilant attention to the motion of the ship's head, so as to check every deviation from the line of her course in the first instant of its motion; and in applying as little of the power of the helm as possible. By this she will run more uniformly in a straight path, as declining less to the right and left; whereas, if a greater effort of the helm is employed, it will produce a greater declination from the course, and not only increase the difficulty of steering, but also make a crooked and irregular track through the water. See **HELM**.—The helmsman should diligently watch the movements of the head by the land, clouds, moon, or stars; because, although the course is in general regulated by the compass, yet the vibrations of the needle are not so quickly perceived, as the fallies of the ship's head to the right or left, which, if not immediately restrained, will acquire additional velocity in every instant of their motion, and demand a more powerful impulse of the helm to reduce them; the application of which will operate to turn her head as far on the contrary side of her course.—The phrases used in steering a ship vary according to the relation of the wind to her course. Thus, if the wind is fair or large, the phrases used by the pilot or officer who superintends the steerage, are *port, starboard, and steady*. The first is intended to direct the ship's course farther to the right; the second is to guide her farther to the left; and the last is designed to keep her exactly in the line whereon she advances, according to the course prescribed. The excess of the first and second movement is called *hard-a-port*, and *hard-a-starboard*; the former of which gives her the greatest possible inclination to the right, and the latter an equal tendency to the left.—If, on the contrary, the wind is foul or scant, the phrases are *luff, thus, and no nearer*: the first of which is the order to keep her close to the wind; the second, to retain her in her present situation; and the third, to keep her falls full.

In a ship of war, the exercise of steering the ship is usually divided amongst a number of the most expert sailors, who attend the helm in their turns; and are

accordingly called *timoneers*, from the French term *timonier*, which signifies "helmsman." The steerage is constantly supervised by the quarter-masters, who also attend the helm by rotation. In merchant-ships every seaman takes his turn in this service, being directed therein by the mate of the watch, or some other officer.—As the safety of a ship, and all contained therein, depend in a great measure on the steerage or effects of the helm, the apparatus by which it is managed should often be diligently examined by the proper officers. Indeed, a negligence in this important duty appears almost unpardonable, when the fatal effects which may result from it are duly considered.

STEGANIUM. See **SLATE**.

STEGANOGRAPHY, the art of secret writing, or of writing in ciphers, known only to the persons corresponding. See **CIPHER**.

STELLATE, among botanists, expresses leaves which grow not less than six at a joint, and are arranged like the rays of a star.

STELLIONATE, in the civil law, a kind of crime committed by a fraudulent bargain, where one of the parties sells a thing for what it is not; as if I sell an estate for my own which belongs to another, or convey a thing as free and clear which is already engaged to another, or put off copper for gold, &c.

STEM, in botany, that part of a plant arising out of the root, and which sustains the leaves, flowers, fruits, &c. By washing and rubbing the stems of trees their annual increase is promoted; for the method of doing which, see the article **TREE**.

Stem of a Ship, a circular piece of timber into which the two sides of a ship are united at the fore-end: the lower end of it is scarfed to the keel, and the bowsprit rests upon its upper end. The stem is formed of one or two pieces, according to the size of the vessel; and as it terminates the ship forward, the ends of the wales and planks of the sides and bottom are let into a groove or channel, in the middle of its surface, from the top to the bottom; which operation is called *rabiting*. The outside of the stem is usually marked with a scale, or division of feet, according to its perpendicular height from the keel. The intention of this is to ascertain the draught of water at the fore-part, when the ship is in preparation for a sea-voyage, &c. The stem at its lower end is of equal breadth and thickness with the keel, but it grows proportionally broader and thicker towards its upper extremity. See **SHIP-BUILDING**.

S T E N O G R A P H Y;

Or, SHORT-HAND WRITING.

Plate
ECLXXV.

THE most essential properties of short-hand are expedition and legibility. Any scheme which does not possess a sufficient degree of the first has no title to the name of *Short-hand*; and if the last is wanting, let the method in other respects be what it will, it is good for nothing. The scheme here proposed has a very considerable degree of both, and is also more regular and beautiful than any other.

The characters are all supposed to be written in a

space between two parallel lines. Such letters as are perpendicular or diagonal are intended to fill the whole space; but the natural place of horizontal characters is at the top of the space, except when it is otherwise directed by the following rules.

On Plate CCLXXIV. No 1. you have the letters of the alphabet, and words expressed by them when they stand alone. Thus the first *b* signifies *be* or *by*; the second, *but* or *put*. Horizontal characters, or such as belong

Stegani-
um
||
Stem.

Plat
CCLXXV.

belong to that class, as *d, m, n*, &c. are double; the first standing at the top of the space, as *d*, which then signifies *do* or *doings*; the other *d* is set at the bottom of the space, and stands for *would* or *doing*. *m, n, s*, and *x*, have three places in the space, at the top, in the middle, and at the bottom. Example: *m* at the top is *them*, *me*, *my*, or *am*; the connection will readily distinguish which of these words is meant. The second *k* being a horizontal character, has one place at the top of the space, when it expresses *can*, *come*, or *comings*; and another at the bottom, when it is put for *common* or *commonly*. N. B. The first column contains all the characters used in this short-hand; those in No 4. being no more than natural and obvious contractions of some of them. Where two characters are employed to express one letter, that one is to be chosen occasionally which will make the most easy and natural joining. Beginners will be ready to choose that character which does not join easily; but let not this discourage them, for a little practice will remove this difficulty. The first *l* must always be begun at the bottom; but *r* either at the top or bottom of the space, as occasion may require.

No 2. is a list of prepositions, and No 3. is a list of terminations; of which afterwards. No 4. contains some double and triple consonants, which are contracted according to the rules afterwards laid down.

All unnecessary angles must be avoided in joining the characters, as in No 5. The horizontal *k* must not follow a character drawn upward, nor *x* one that is drawn downward, as in No 6. Many of the letters may be contracted as in No 7. *bn, gm, gn, gr, kr, mv*; and double letters are wrote as in No 8. *bb, dd, kk, mm, nn, ss*. N. B. No letter is to be considered as doubled unless a vowel intervenes; as *mnemon*, write *mnmon*; *babble*, *bbb*; *candid*, *cnnd*. No 9. contains another method of doubling letters, by dividing them with a small stroke behind; as *ff, rr, tt, br, bt, hf, lt, pr, chf*. Consonants may be also doubled by making one of them only half the usual size, as in No 10. *btr, brr, ffr, ffr, ffr, lrr, ltr, ttr, rrr, rrt, rtt, wrr, wrr*.

Letters of the same organ may be changed, for the sake of more easy joining; as *b* for *p*, *f* for *v*, *k* for *g* or *c* hard, *ks* for *x*, *ch* for *sh*, *k* for hard *ch*; and also *t* for *th*, and *vice versa*. This is the reason why our alphabet has no *z*, because *k* or *s* stands for it; and likewise why it has no *s*, because *t* will express it. These exchanges are intended only to take place in the middle and end of words, except *g*; for we may write *kalfy, kite*, for *qualify, quite*; but *k* is always used for hard *c*, *s* for *c* soft, and *s* for *z*. *f* is never wrote for *v*, only for *v*.

No 11. shows the method of joining the letters to one another, and needs no explanation. *b* is always omitted in the middle and end of words; and if a vowel follows, it may be left out even in the beginning, as *Jevva*, or even *Jova*, *unmour* or *unmor*. *y* is never wrote except in the beginning of words; but *beyond, behind*, may be expressed as in No 12. A compound word may be disjoined, as *steel yard*. *t* is sometimes used for *th*, as No 13. *lengthen*. The second *th* is never to be joined to the first *l* or *r* when standing by themselves; but it may be joined to *y* and *g*, as in No 14. *youth, quoth*. At the end of a word *f* or *v* may be joined thus, No 15. *be, to, do, &c.* and *wt what, wn when*; which last is

distinguished from *wd*, which is joined at the bottom of the *w*.

The stroke dividing two letters may sometimes be supplied by the preceding character, as *ffr, kpt*, No 16. but the dividing stroke may frequently be omitted in words of many syllables, as *confutite*; and the same liberty may soon be taken with words that are shorter; *spst* with *r* only half the usual length, may be *spedator*, No 17. As *t* is sometimes used for *th*, *thr* or *thire* may be wrote as in No 18. *bthr* as in No 19. and *btr* or *better*, as in No 20.

OF SPELLING.—The general rule is, "Spell as you pronounce;" for *chaife, haife*; *laugh, laf*; *draught, draft*; *though, tho*; *debt, det*; *phycic, fyfick*; *schism, ffsm*; *foreign, foren*; *writing, riting*; *high, hi*; *honest, onest*; *psalm, sam*; *friendship, frinsp*. *g* is dropt in such words as *strength, t* in *setch*; *act, cct, iet*, may be wrote by *k*, and their plurals by *ks*. *t* at the end of a word with *p* before it may be dropt. In general, let the word be as much contracted as possible: after a little practice, the learner will find this very easy, and farther rules will be necessary.

If *p* ends a word, write the second *p*; but if *pf* or *bf*; then use the first *p*; if *bt* or *pt*, use the second *b* as a final character.

OF VOWELS.—They are expressed by a dot in different situations, as in No 21. where *i, m, n*, and *s*, have dots placed both before and after them, to show the different vowels. But as the position of the dots is fully exemplified in No 22. it is unnecessary to give a particular description. When a vowel is to be placed between two consonants, *a, e, i*, follow the first, *o* and *u* go before the last; see No 22.: but advantage may be taken of the place of *i*, so that by changing it different words may be expressed, as *kite, quite*, No 23. When two perpendicular characters are separated by the dividing stroke, *a* and *e* go to the first, *i* in the middle, *o* and *u* to the last part of the character; as No 24. *bat, bet, bit, bot, but*. Diphthongs are to be expressed by the vowel whose sound is most prevalent: as *ai, au, by a; oi by i; ou by o; oo by u*. *u* is never a vowel, for it is always dropt at the end of words.

The following rules show when vowels ought to be expressed, and when not.

In general, no more than one vowel ought to be written in any word, excepting in such words as *idea, ide*. 1st. The initial vowel of a monosyllable must be expressed as in *add, apt, elf, ill*. 2^{dly}. The final vowel (if there is no initial) must be wrote in monosyllables; *few, bow, pay*, write *fiu, bo, pa*. 3^{dly}. No short vowel is to be expressed in any word whatever. 4^{thly}. A long vowel must be wrote in a monosyllable, except in such common words as *both, life, sake*. 5^{thly}. A word of more than one syllable must have its final vowel expressed thus, *aptly, empty, concisely, ptly, empty, knisly*. 6^{thly}. A word of more than one syllable must have its long vowel expressed (if it has no final), as *spual* for *espual*, *dmir* for *admire*. 7^{thly}. A word of two syllables, having no final nor long vowel, must have its initial vowel wrote, as *akrn* for *acorn*, *img* for *image*. 8^{thly}. If a word have three or more syllables without either long or final vowel, write no vowel at all; thus, *mbleth, embellish*. When the prepositions *in, im*, are followed by *n, m*, the initial vowel must be expressed, *imdsf, immodest, untrl, unnatural*. When the plural

or possessive *s* follows a final vowel, the vowel must not be omitted; as *follicle*, *rallies*, No 25. In writing after a speaker, though you should leave out more vowels than the above rules direct, they may be inserted afterwards when you have more leisure.

OF PREPOSITIONS.—They are always to be wrote separate from the rest of the word. Such as are horizontal may be placed in the middle or at the bottom of the space, but never at the top. The perpendicular and horizontal are made shorter by one-third than their usual length, and are placed at the bottom of the space. No vowel must at any time be joined to a preposition, but must always be prefixed to the following consonant; as *conive*, No 26. If *s* follows a preposition, and is used as a dividing stroke, the preposition may be joined to it; as *insult*, No 29. Such letters as are not employed as prepositions may be made prepositions at large; as *gentleman*, *gentlewoman*, *gingerbread*, *landlord*, No 27. Compound words may be joined or disjoined at pleasure; as *coachman*. In the list of prepositions No 2, the first *n* signifying *anti*, &c. is placed in the middle of the space; and the other, signifying *um*, &c. at the bottom. *s* has three places; when it signifies *fatis*, *super*, it stands at the top of the space, and is the only preposition which has a place at the top.

OF TERMINATIONS.—They may be made the usual size, and may therefore fill the whole space: the termination *ings* is always placed at the top, and *ing* at the bottom. *sion*, *tion*, in No 3, has five places, according to the vowel which goes before it, as *ation*, *etion*, &c.: but if a consonant goes before it, that consonant is left out, and *sion*, *tion*, is put in the preceding vowel's place; as for *invention*, we write *invetion*; *transaction*, *transation*; *distinction*, *distition*; *adoption*, *adotion*; *presumption*, *presution*. Let *sion*, *tion*, be put in the preceding vowel's place, to horizontal as well as perpendicular characters: example, *ascension*, No 30. If one termination follows another, the last must be written at length, as *possibility*; with or without the dividing stroke, *testamentary*, No 31. If a preposition and termination compose the whole of a word, one of them must be wrote at length, whichever the writer pleases. *Comical*, *transit*ion, are wrote both ways in No 32. *N. B.* Prepositions and terminations must never be used in writing monosyllables.

Plate CCLXXV. No 33, contains the compound prepositions *concom*, *contradist*, *decom*, No 34. *discom* or *discon*, *disin* or *disinter*, *disfatis*, *incon* or *incom*, *indis* or *undis*, No 35. *insigni*, *inpro*, *insuper* or *unsatis*, *unpro*, *intrans* or *untrans*, No 36. *incircum* or *uncircum*, *incontro* or *uncontro*, *misinter* or *misunder*, *miscom* or *miscon*, *mispre*. No 37. *recom* or *recon*, *repre*, *uninter*, *interpre*, *misinterpre*. The reader will observe, that these compound prepositions are all made up of such as are more simple, and are such as any person would naturally be led to form for his own use; on which account they can be no burden to the memory. *N. B.* In these examples, and every where else, where two or more words are coupled together by the conjunction *or*, there is but one character to express them in the Plate.

No 38, contains examples of prepositions and terminations in their formation of words, *contradist*, *circumstance*, *external*, *recompense*. No 39. *selfishness*, *remember*, *blamable*, *repetition*. No 40. *discontentment*, *un-*

comfortable, *conical*, *omnipotent*. No 41. *Antichrist*, *interpreter*, *undermine*, *contradistinction*. No 42. *competent*, *supereminently*, *magnitude*, *property*. No 43. *transferable*, *withstand*, *discompose*, *disinterested*.

ABBREVIATING RULES. 1st, Such words as are usually abbreviated in long hand may be abbreviated in short: as *Dr*, *Doctor*; *admir*, *administrator*; *e'er*, *ever*; *e'er*, *over*; *e'en*, *even*; *e'entide*, *eventide*; *e'er-take*, *overtake*; *e'ery*, *every*; as in No 44. Poetic contractions may also be used: as *morn*, *morning*; *trump*, *trumpet*; *e'en*, *evening*; No 45. But there are some contractions in long-hand, which are not to be imitated in short: we write *he will*, not *he'll*; *will not*, not *won't*; *cannot*, not *can't*. 2^d, A dot variously applied to a character, so as not to interfere with the vowels places, may be made a mark of abbreviation: thus, if it is placed where the character terminates, it may be the mark of a substantive singular or verb; as *t*, *d*, *s*, and *u*, in No 47. If it is placed at the beginning of the character, it will denote the substantive-plural; as in No 48. The adjective has a mark above the character towards the left-hand; and the participle-perfect a small perpendicular stroke towards the right-hand of the character: both these are exemplified in No 49. The adverb is a dot towards the left-hand below; as in No 50. The participle in *ing* is an oblique stroke, like the third part of our *r*, placed towards the right-hand below, No 51. The participle in *ings*, is the same stroke placed at the top of the space, No 52. In No 53, these marks of abbreviation are illustrated, where *d* with the substantive-dot denotes *advice* or *advise*; with the plural-dot, *advices*; with the participle-perfect dot, *advised*; with the adverb-dot, *advisedly*; with the participle in *ing*, *advising*; its plural *advisings*, and the adjective *advisable*. No 54. exemplifies the same thing with letter *s*; which, with the substantive-mark, signifies *service* or *serve*; and, with the other dots, *services*, *served*, *serviceably*, *serving*, *servings*, *serviceable*: and in No 55. *s* with the substantive or verb mark expresses *triumph*; and, with the other dots, *triumphs*, *triumphed*, *triumphantly*, *triumphing*, *triumphings*, *triumphant*. This use of the dot is only intended to abbreviate such words in a sentence as the connection will readily suggest by this hint; that is, in such cases as, if a person were writing long-hand, he would contract some word in a sentence by writing only the first letter of the word with a dash after it, as a sufficient expression for the word: and in every subject there are some leading words which cannot be mistaken though they are thus contracted, for the connection will immediately decipher them. In following a speaker, it may be sufficient to use the substantive mark only; but if time will permit, it is better to use them all. In order that these marks may be easily applied, let it be observed, that if a word ends in *s*, the substantive-plural mark may be used. If it ends in *ed*, use the participle-perfect mark: if in *ly*, use the adverb mark: if in *ing* or *ings*, use these marks respectively; only *ing* and *ings* are not to be used in writing monosyllables. If a word ends in none of these, use the substantive or adjective mark at pleasure. A list of words may be formed by the help of this mark, and committed to memory; each individual may adapt the list to his own profession, by making choice of such words as frequently occur, and would

be too long if wrote by any other rule. From No 56. to No 61. a lift is given of such words as may suit the divine; the lawyer or physician may easily change these for others more suited to their respective professions. No 56. contains *blss* or *blessing*, *believe* or *belief*, *difficulty*, *doctrine*, *advantage*, *divide* or *division*. No 57. frequent or frequency, *godliness*, *justice*, *glory* or *glorify*, *goodness*, *humanize* or *humanity*. No 58. *covet* or *covetousness*, *consider* or *consideration*, *consequence*, *liberality*, *lament* or *lamentation*, *mortality*, *member*. No 59. *nature*, *engage* or *engagement*, *present* or *presence*, *part*, *qualify* or *qualification*, *repent* or *repentance*, *spirit*. No 60. *sense*, *temper*, *world*, *exemplify* or *example*, *except* or *exception*, *youthfulness*, *cheerfulness*. No 61. *change*, *shame*, *thank*, *charity*, *cheat*, *grace*, *Christian*, *thoughtfulness*. In completing this list, that adjective, adverb, &c. should be chosen which bears the greatest resemblance to the substantive in its consonants. Nos 62. 63. 64. and 65. exemplify the manner of completing the list in the word *divide*. No 62. contains *divide*, *dividing*, *dividing*, *divided*, *divisible*, *divisibly*. No 63. *divider*, *dividend*. No 64. *indivisible*, *undivided*, *individual*, *individuality*. No 65. *divisibility*, *indivisibility*, *indivisibleness*. Where there is no angle at which the dot may be placed, a small line is drawn through the character at the part where the dot should stand, as in *dividend* in No 63. In these examples both prepositions and terminations are applied, which makes the method of carrying this list to a great extent sufficiently plain. 3d. Some words may be abbreviated by writing the preposition with the following consonant and mark of contraction; as, *She ruined her camp*—with *rouge*. *He presents comp*—s, and *thanks for your favours*. *They are so alike that it is difficult to dist*—between them, No 66. 4th. Other words may be contracted by writing the vowel following the consonant, instead of the mark of contraction. As *competition* or *β*, as *circumstance* in No 67. But if the word is plural, the plural mark must not be omitted. 5th. Words of more than one consonant may have their termination expressed by the mark of contraction; as, *reasonableness*, *hardness*, *different*, *fairly*, as in No 68. If the termination of a plural substantive is dropped, the plural mark must be set at the beginning of a word; as *exhortations*, No 69. But the termination must never be omitted if a long vowel goes before it, as *employment*. In many cases the termination is so evident, that no expression need be made for it, as in these examples: *He was very closely engage in business*; *We had entertain them very elegantly*; *They were walk in the fields*. The terminations of the second and third persons of verbs may be always omitted; as, *Speak for speakst*, *teach for teacheth*.—6th. Many words may be expressed by their first vowel and consonant following; as in No 70. *Abroad*, *about*, *after*. No 71. *often*, *action*, *according* or *accordingly*, *occasion*. No 72. *Almost*, *always*, *immediately*, *impossible*. No 73. *Into*, *only*, *unto*, *apart*. No 74. *Open*, *acquaint*, *afide*, *these*. No 75. *This*, *those*, *thus*, *utmost*. No 76. *Extremely*, *excessively*. Observe that *these* and *this* are wrote in the middle of the space, *those* and *thus* at the bottom. This list of words, contained in Nos 70, 71, &c. may be increased as the learner improves in the writing; and leading words may be wrote by this rule as well as by the mark of contrac-

tion, always taking care that they be such as the connection will readily discover. Other words may be expressed by their first consonant and vowel following; as in No 77. *Before*, *become*, *hardly*, *likewise*. No 78. *Likely*, *many*, *perpetual* or *perpetually*, *peculiar* or *peculiarly*, *real* or *really* or *reality*. No 79. *Every*, *something*, *sometimes*, *since*. Something is wrote in the middle of the space; *sometimes* and *since* are both placed at the bottom.—7th. The beginnings and endings of some words will be sufficient to express them; as in No 80. *University*, *banishment*, *curiosity*, *arbitrary*: And if the first character is horizontal, it may be placed at the bottom; as in No 81. *University*, *civility*. In these two last numbers *university* is differently expressed; that in No 80. may be put for the word *unity*.—8th. The first consonant and termination of a word may often be a sufficient expression for it; as in No 82. *punishment*.—9th. The first and last consonant may signify a whole word in these cases following. If the characters are both horizontal, place them at the bottom of the space; as, *certain*, *concern*, No 83.: or join them by an angle, as, *doctor*, *master*, No 83.: or join them in an unusual manner; as, *former*, *proper* or *pleasure*, *character*, *harbour*: or, lastly, write them separately the one above the other; as, *between*, *returns*, *retreat*, in No 85. And words wrote by this 9th rule may have any necessary augment joined to them; as, *Returns*, *delivered*, *murdering*, in No 86. Many common words may be abbreviated by writing the first and last consonants, the one above the other: thus, *between*, *former*, *neither*, *unless*, in No 87.; and *perhaps*, *seldom*, *further*, in No 88.—10th. Repetition is to be expressed by placing so many dots at the bottom of the word, to be repeated as there are repetitions of it; thus, *Holy*, *holy*, *holy*, No 89. Or if a whole sentence is repeated, draw a line under the whole repetition, and place dots at the end for as many times as it is repeated. *The temple of the Lord*, *the temple of the Lord*, *the temple of the Lord*, No 90.

These rules ought to be used sparingly at first; as they grow familiar, they may be used more extensively.

No 91. contains characters for figures, distinguished from other characters by a small oblique stroke placed before them. No 92. is an illustration of the joining of such characters, in the various combinations of figures; but if the learner chooses, he may make use of common figures. No 93. shows how dots may be placed for the comma, semicolon, colon, and period; but proportional spaces may be left in the writing instead of them. No 94. are marks of reference, which the reader may vary at his pleasure.

GENERAL SPECIMEN, (Plate CCLXXV.) “How frequently is the honesty and integrity of a man disposed of by a smile or a shrug?—How many good and generous actions have been sunk into oblivion by a distrustful look,—or stamped with the imputation of proceeding from bad motives, by a mysterious and feigning whisper?”

“Look into companies of those whose gentle natures should disarm them,—we shall find no better account.—How large a portion of charity is sent out of the world by distant hints,—nodded away, and cruelly winked into suspicion by the envy or those who are
passed

passed all temptation of it themselves?—How often does the reputation of a helpless creature bleed by a report—which the party who is at the pains to propagate it, beholds with much pity and fellow-feeling,—that she is heartily sorry for it,—hopes in God it is not true? however, as archbishop Tillotson wittily observes upon it, is resolved, in the mean time, to give the report her pangs, that at least it may have fair play to take its fortune in the world—to be believed or not, according to the charity of those into whose hands it shall happen to fall?

“So fruitful is this vice in variety of expedients, to satiate as well as disguise itself. But if these smoother weapons cut so fore—what shall we say of open and unblushing scandal—subjected to no caution—tied down to no restraints? If the one, like an arrow shot in the dark, does nevertheless so much secret mischief—this, like the pestilence which rageth at noon-day, sweeps all before it, levelling without distinction the good and the bad; a thousand fall beside it, and ten thousand on its right hand—they fall—so rent and torn in this tender part of them, so unmercifully butchered, as sometimes never to recover either the wounds or the anguish of heart—which they have occasioned.—

“But there is nothing so bad which will not admit of something to be said in its defence.

“And here it may be asked—Whether the inconveniences and ill effects which the world feels—from the licentiousness of this practice—are not sufficiently counterbalanced by the real influence it has upon mens lives and conduct?—That if there was no evil-speaking in the world, thousands would be encouraged to do ill, and would rush into many indecours, like a horse into the battle, were they sure to escape the tongues of men.

“That if we take a general view of the world—we shall find, that a great deal of virtue—at least of the outward appearance of it, is not so much from any fixed principle, as the terror of what the world will

say, and the liberty it will take upon the occasions we shall give.

“That if we descend to particulars, numbers are every day taking more care to be well spoken of, than what would actually enable them to live so as to deserve it.

“That there are many of both sexes who can support life well enough without honour or chastity, who, without reputation (which is but the opinion which the world has of the matter), would hide their heads in shame, and sink down in utter despair of happiness.

“No doubt the tongue is a weapon which does chastise many indecours which the laws of men will not reach,—and keeps many in awe, whom conscience will not; and where the case is indisputably flagrant, the speaking of it in such words as it deserves, scarce comes within the prohibition.—In many cases it is hard to express ourselves so as to fix a distinction betwixt opposite characters—and sometimes it may be as much a debt we owe to virtue, and as great a piece of justice, to expose a vicious character, and paint it in its proper colours, as it is to speak well of the deserving, and describe his particular virtues. And indeed, when we inflict this punishment upon the bad, merely out of principle, and without indulgences to any private passion of our own—’tis a case which happens so seldom, that one might venture to except it.

“However, to those who in this objection are really concerned for the cause of virtue, I cannot help recommending what would much more effectually serve her interest, and be a sure token of their zeal and attachment to her. And that is—in all such plain instances where it seems to be duty to fix a distinction betwixt the good and the bad—to let their actions speak it instead of their words, or at least to let them both speak one language. We all of us talk so loud against vicious characters, and are so unanimous in our cry against them—that an unexperienced man, who only trusted his ears, would imagine the whole world was in an uproar about it.”

S T E

Stenoro-
phonic
||
Stephens.

STENTOROPHONIC TUBE, a speaking-trumpet; thus called from Stentor, a person mentioned by Homer. See ACOUSTICS, n° 26.

STEPHANUS (Byzantines), an able grammarian, who lived in the 5th or 6th century. He wrote a Dictionary, in which he made a great number of observations, borrowed from mythology and history, which showed the origin of cities and colonies, of which we have nothing remaining but a mean abridgment, by Hermolaus the grammarian; but from that work the learned have received great light; and Sigonius, Casaubon, Scaliger, Salmassius, &c. have employed themselves in illustrating it.

STEPHEN, king of England. See ENGLAND, n° 107, &c.

STEPHEN, or *St Stephen's Day*, a festival of the Christian church, observed on the 26th of December, in memory of the first martyr St Stephen.

STEPHENS, the name of a family of printers to whom the world is obliged for the most correct and beautiful editions of the best classic authors, the Greek ones particularly.

HENRY Stephens, the first distinguished person of

S T E

his name, was a Frenchman, and one of the best printers of his time. He died in 1520.

ROBERT Stephens, his second son, was still more eminent in this art than his father. He was born at Paris in 1503; and applied so assiduously to letters in his youth, that he very early acquired a perfect knowledge in the Latin, Greek, and Hebrew tongues. In 1521, the year after his father's death, his mother was married to Simon de Colines, in Latin *Colineus*; who by this means came into the possession of Henry Stephens's printing-house, carried on the business till his death in 1547, and is well known for the neatness and beauty of his Italic character. In 1522, when Robert was 19 years of age, he was charged with the management of his father-in-law's press: and the same year came out, under his inspection, a New Testament in Latin; which gave such offence to the Paris divines, that they threatened to have it burnt and him banished. He appears to have set up for himself soon after, for there are books of his printing so early as 1526. He married Perette, the daughter of Badius, another eminent printer: she was a learned woman, and of great use to her husband in correcting

Stephens.

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each, chief	10 th ~ ~ ~ ~ ~		26 th ~ ~ ~ not ~ ~ ~
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GENERAL SPECIMEN.

From STERNE'S Sermons Vol. 2. Ser. 11.

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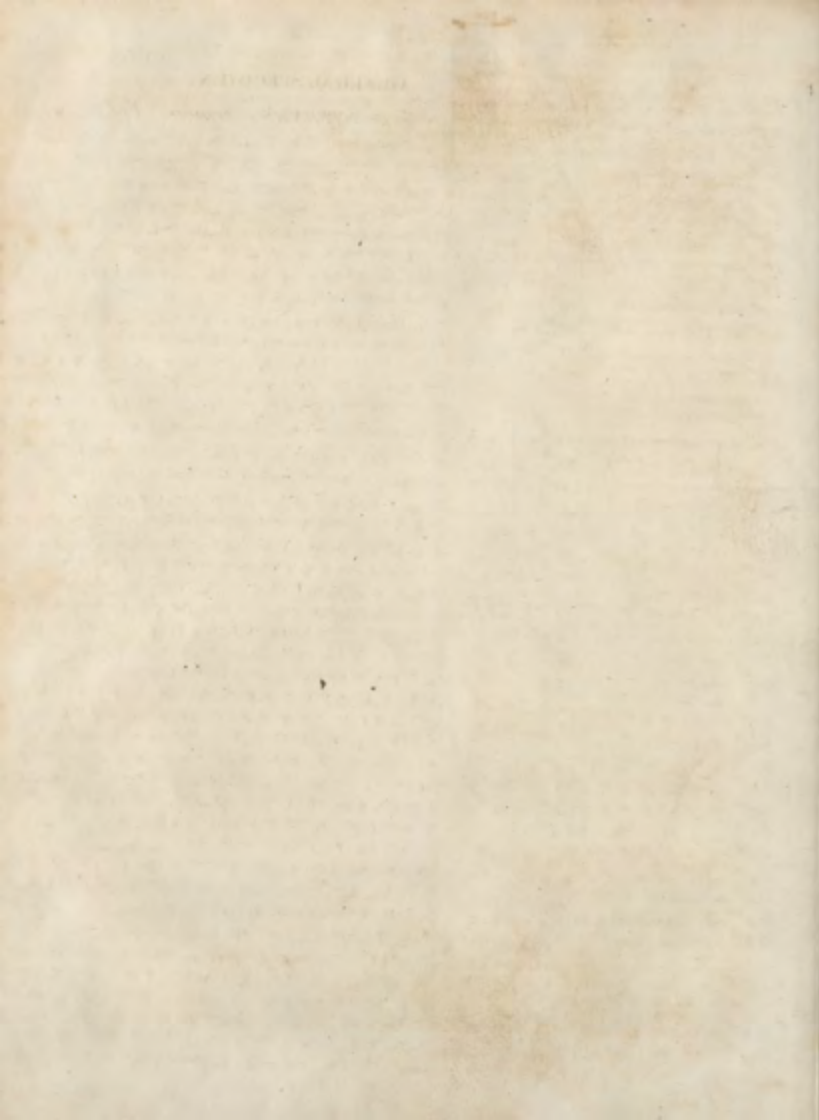
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ting Latin works. He had, besides, in his house ten or twelve correctors of different nations; and nothing but Latin was spoken in his family. In 1539, Francis I. named him his printer; and ordered ancient manuscripts to be fought after for him. The aversion which the doctors of the Sorbonne had conceived against him on account of the Latin New Testament in 1522, revived in 1532, when he printed his great Latin Bible. Francis protected him: but this king dying in 1547, he withdrew to Geneva; where he embraced Calvinism. Here he lived in intimacy with Calvin, Beza, Rivet, and others, whose works he printed; and died in 1559. This eminent artist valued himself so much upon the accuracy of his Latin impressions, that he offered a reward to the discoverer of any fault in them. Robert, like the rest of his family, was not only a printer, but also a writer: his *Theſaurus Lingue Latine* is a work of immense learning, and in high repute.

CHARLES Stephens, younger brother of the preceding, wrote and printed many useful and valuable works. He was born about the year 1504, and became perfectly skilled in Greek and Latin literature. He studied physic, and took a doctor's degree at Paris; but this did not hinder him from following the profession of his father, and being printer to the king. He was, however, more eminent as an author than a printer; having written upwards of thirty works upon various subjects. He died at Paris in 1564; leaving behind him a very learned daughter.

HENRY Stephens, eldest son of ROBERT, was born at Paris in 1528, and became the most learned of all his learned family. He was esteemed, after the death of Budæus, the best Greek scholar of his time. It seems to have been about the year 1546 when his father took him into business; yet, before he could think of fixing, he resolved to travel into foreign countries, to examine libraries, and to connect himself with learned men. He went into Italy in 1547, and staid there two years; and returned to Paris in 1549, when he subjoined some Greek verses, made in his youth, to a folio edition of the New Testament in Greek, which his father had just finished. In 1550, he went over to England; and in 1551 to Flanders, where he learned the Spanish tongue of the Spaniards, who then possessed those countries, as he had before learned the Italian in Italy. On his return to Paris, he found his father preparing to leave France: it is not known whether he accompanied him to Geneva; but if he did, it is certain that he returned immediately after to Paris, and set up a printing house. In 1554, he went to Rome, visiting his father at Geneva as he went; and the year after, to Naples. He returned to Paris, by the way of Venice, in 1556. This was upon business, committed to him by the government. Then he settled to printing in good earnest, and gave the world most beautiful and correct editions of all the ancient Greek and other valuable writers. He called himself at first *Printer of Paris*; but, in 1558, took the title of *Printer to Ulric Fugger*, a very rich German, who allowed him a considerable pension. He was at Geneva in 1558, to see his father, who died the year after; and he married in 1560. Henry III. of France was very fond of Stephens, sent him to Switzerland in search of ma-

nuscripts, and gave him a pension. He took him to court, and made him great promises: but the troubles which accompanied the latter part of this king's reign, not only occasioned Stephens to be disappointed, but made his situation in France so dangerous, that he thought it prudent to remove, as his father had done before him, to Geneva. He bestowed great labour and expence on compiling his *Theſaurus Lingue Græcæ*, to the impoverishment of his family: for though the work is highly esteemed to this day by the learned, yet these being but few, the demand from them did not reimburse him; and, to add to his misfortune, Scapula his servant treacherously extracted the most useful parts, and published an epitome, which destroyed the sale of the *Theſaurus*. He died in 1598; leaving a son, Paul, and two daughters, one of whom had espoused the learned Casaubon in 1586.

PAUL Stephens, the son of Henry, was well skilled in the Greek and Latin tongues. He carried on the business of printing for some time at Geneva: but his press had greatly degenerated from the beauty of that at Paris; and he afterwards sold his types to Chouet, another printer. He died at Geneva in 1627, aged 60 years; leaving a son,

ANTHONY; who, quitting the religion of his father for that of his ancestors, quitted also Geneva, and returned to Paris the place of their original. Here he was some time printer to the king; but managing his affairs ill, he was obliged to give all up, and to have recourse to an hospital, where he died blind in 1674, aged 80.—In him terminated the family of eminent printers, after it had flourished for five generations; and it should be observed, that there were other sons in the three first generations, who followed the art, and acquired great, though inferior, reputation.

STEREOGRAPHIC PROJECTION, is the projection of the circles of the sphere on the plane of some one great circle, the eye being placed in the pole of that circle. See PROJECTION.

STERILITY, the quality of a thing that is barren, in opposition to fertility. It has been asserted by many authors, that all monsters produced by a mixture of different species of animals, such as mules, are barren; but this does not hold universally, even with the mule, which is the instance most generally adduced. See MULE.

Sterility in women sometimes happens from a miscarriage, or violent labour injuring some of the genital parts; but one of the most frequent causes is the suppression of the menstrual flux.—There are other causes, arising from various diseases incident to those parts; by which the uterus may be unfit to receive or retain the male seed;—from the tubæ fallopianæ being too short, or having lost their cretive power; in either of which cases no conception can take place:—from universal debility and relaxation; or a local debility of the genital system; by which means, the parts having lost their tone or contractile power, the semen is thrown off immediately *post coitum*:—from imperforation of the vagina, the uterus, or the tubæ; or from diseased ovas, &c. Hence medical treatment can only avail in cases arising from topical or universal debility, in correcting irregularities of the menstrual flux, or in removing tumours, cicatrices, or contractions of the passage, by the art of surgery.

STERLING, (*Sterlingum*), was the epithet for silver money current within this kingdom, and took name from this: That there was a pure coin stamped first in England by the Easterlings, or merchants of East Germany, by the command of king John; and Hoveden writes it *Esterlings*. Instead of the pound sterling, we now say to many pounds of lawful English money: but the word is not wholly disused, for though we ordinarily say lawful money of England, yet in the mint they call it *Sterling money*; which is meant to denote the certain degree of fineness which ought to be retained in the respective coins.

STERN, the posterior face of a ship; or that part which is represented to the view of a spectator, placed on the continuation of the keel behind, as exhibited in Plate CCLXXVII. fig. 1, 2, 3, 4.

The stern, fig. 1. is terminated above by the taffarel, and below by the counters: It is limited on the sides by the quarter-pieces; and the intermediate space comprehends the galleries and windows of the different cabins.

This figure exhibits the stern of a 74-gun ship.

A, the keel, with *a* the false keel beneath it.

AB, the stern-post.

C, the rail which determines the height of the counters.

DD, the upper and lower quarter-galleries, with their balustrades and windows.

E, the quarter-pieces: and PFP, the taffarel.

KGK, the lower counter, with HH, its gun-ports.

G, the rail which separates the lower counter from the second or upper counter; which last is included between G and C.

KK, the wing-transom.

LL, the deck-transom.

M, N, O, first, second, and third transoms; the 4th, 5th, and 6th transoms are placed immediately under these: and that which lies between the wing and deck-transoms, is called the *filling transom*.

OMLK P, the direction of the fashion-piece, whose upper part is expressed by the dotted lines KP.

Q, the cove, a sort of arched canopy, serving as a roof to the stern-gallery.

RQR, the screen bulk-head, or partition, containing the cabin-windows.

RSSR, the balustrade of the stern-gallery, with SS, the foot-pace-rail, which determines the height of its floor, or platform.

SCS, the ward-room windows.

T, the lower finishing of the quarter gallery.

Fig. 2. exhibits a stern-view of a 60 gun ship, with the curve of the frame-timbers on one side, and the disposition of all the planks of the bottom on the other side.

Fig. 3. represents a stern view of a French man of war of 70 guns.

Fig. 4. is a stern for a first or second rate: accordingly it is furnished with a middle apartment between the ward-room and the captain's cabin. This apartment is also furnished with galleries on the stern and quarter. The other parts of it are described in the explanation of fig. 1. See also the article **QUARTER**.

Stern-Fast, a rope used to confine the stern of a ship or boat to any wharf or jetty-head, &c.

Stern-Post, a long straight piece of timber erected

on the extremity of the keel, to sustain the rudder and terminate the ship behind.

This piece, which is expressed by B in the pieces of the hull, Plate CCLXV. fig. 3. ought to be well secured and supported; because the ends of all the lower planks of the ship's bottom are fixed in a channel, cut on its surface; and the whole weight of the rudder is sustained by it.

The dimensions of the stern-post, or the proportional breadth and thickness in the different parts of its height, are geometrically delineated in the quarter and stern of a 74 gun ship, Plate CCLIV. fig. 1. and CCLXXVII. fig. 1. being expressed in both by AB. It is usually marked like the stern, with a scale of feet from the keel upwards, in order to ascertain the draught of water at that part of the vessel.

The difficulty of procuring a stern-post of sufficient breadth in one piece, has introduced the practice of fixing an additional piece behind it, which is strongly bolted to the former. The hinges, which support the rudder, are accordingly fixed to this latter, which is also tenanted into the keel, and denominated the *back of the post*. It is half the breadth of the stern-post at the keel, but diminishes gradually towards the upper end, where it is one-third narrower.

The stern-post is strongly attached to the keel by a knee, G, Plate CCLXV. fig. 3. of which one branch extends along the keel, being scarfed and bolted to the dead-wood, and fore-locked under the keel; whilst the other branch inclines upwards, and corresponds with the inside, or fore-part of the stern-post; to which it is also bolted in the same manner.

Stern-Sheets, that part of a boat which is contained between the stern and the aftmost, or hindmost, seat of the rowers. It is generally furnished with benches to accommodate the passengers. See **BOAT**.

STERNA, a genus of birds, of the order of anseres. There are seven species, three of which are British, viz. 1. The hirundo, or great tern, weighs four ounces one-quarter: the length is fourteen inches; the breadth thirty: the bill and feet are of a fine crimson; the former tipped with black, straight, slender, and sharp-pointed: the crown, and hind part of the head, black: the throat, and whole under side of the body, white: the upper part, and the coverts of the wings, a fine pale grey: the tail consists of twelve feathers; the exterior edges of the three outmost are grey, the rest white: the exterior, on each side, is two inches longer than the others: in flying, the bird frequently closes them together, so as to make them appear one slender feather. These birds frequent the sea-shores, banks of lakes and rivers: they feed on small fish, and water-insects; hovering over the water, and suddenly darting into it, catch up their prey. They breed among small tufts of rushes; and lay three or four eggs, of a dull olive colour, spotted with black. All the birds of this genus are very clamorous.

2. The lesser tern, called by Linnaeus *larus minutus*, weighs only two ounces five grains; length eight inches and a half; the breadth nineteen and a half. The bill is yellow, tipped with black: the forehead and cheeks white: from the eyes to the bill is a black line: the top of the head and hind part black: the breast, and under side of the body clothed with feathers so closely set together, and of such an exquisite rich gleis, and so fine a white, that

STERN.

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



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that no fatin can be compared to it: the back and wings of a pale grey: the tail short, less forked than that of the former, and white: the legs yellow: the irides dusky.—These two species are very delicate, and seem unable to bear the inclemency of the weather on our shores during winter; for we observe they quit their breeding places at the approach of it, and do not return till spring. The manners, haunts and food of this are the same with those of the former; but these are far less numerous.

3. The stilpice, or black tern, is of a middle size between the first and second species. The usual length is ten inches; the breadth twenty-four; the weight two ounces and a half. The head, neck, breast, and belly, as far as the vent, are black; beyond is white: the male has a white spot under its chin: the back and wings are of a deep ash-colour: the tail is short and forked; the exterior feather on each side is white; the others ash-coloured: the legs and feet of a dusky red. Mr Ray calls this a *clown-footed gull*; as the webs are depressed in the middle, and form a crescent. These birds frequent fresh waters; breed on their banks, and lay three small eggs of a deep olive-colour, much spotted with black. They are found during spring and summer in vast numbers in the Fens of Lincolnshire; make an incessant noise, and feed as well on flies as water-insects and small fish. Birds of this species are seen very remote from land. Kalm saw flocks of hundreds in the Atlantic Ocean, midway between England and America; and a later voyager saw one 240 leagues from the Lizard, in the same ocean.

STERNO-HYOIDEUS, in anatomy. See there, *Table of the Muscles*.

STERNUM, in anatomy. See there, n° 36.

STERNUTATIVE, or STERNUTATORY, a medicine proper to produce sneezing. Sternutatives are of two kinds, gentle and violent. Of the first kind are betony, sage, marjoram, tobacco, and the whole fashionable tribe of snuffs. Of the latter kind are euphorbium, white hellebore, pellitory, &c. Sternutatives operate by their sharp pungent parts vellicating the inner membrane of the nose, which is exceeding sensible, and occasioning the serous matter contained in the glands of the nose, and in several sinuses situated in the base of the cranium and of the os frontis, to be expelled.

STETIN, or STETTIN, a sea-port town of Germany, in the circle of Upper Saxony, and capital of Hither Pomerania, with the title of a duchy, and a cattle. It had long a famous school, which the wars of Germany never disturbed. The ancient dukes of Pomerania resided here; and it was taken by the elector of Brandenburg in 1676, but given to Sweden by the treaty of Nimeguen. In 1713, it submitted to the allies; and then the said elector was put in possession again of this important place, which is a bulwark to the Marche of Brandenburg: and the fortifications have been greatly improved. It is now a flourishing place, and carries on a considerable trade. It is seated on the river Oder, 80 miles north of Francfort, and 70 north by east of Berlin. E. Lon. 14. 58. N. Lat. 53. 27. The duchy is 125 miles in length; and borders upon Mecklenburg, and partly upon Brandenburg. The breadth is from 17 to 25 miles, and it is

divided by the river Oder into two parts.

STEW, a small kind of fish-pond, the peculiar office of which is to maintain fish, and keep them in readiness for the daily use of the family, &c.

STREWS, (from the French *flaves*, i. e. *therme, balneum*), are those places which were permitted in England to women of professed incontinency, and that for hire would prostitute their bodies to all comers; so called, because dissolute persons are wont to prepare themselves for venereous acts by bathing; and hot baths were by Homer reckoned among the effeminate sort of pleasures. These stews were suppressed by King Henry VIII. about the year 1546.

STEWARD, (*senescallus*, compounded of the Saxon *steda*, i. e. "room;" or *stead* and *weard*, "a ward" or "keeper,") an officer appointed in another's stead or place, and always taken for a principal officer within his jurisdiction. Of these there are various kinds. The greatest officer under the crown is the lord high-steward of England, an office that was anciently the inheritance of the earls of Leicester, till forfeited by Simon de Mountfort to king Henry III. But the power of this officer is so very great, that it has not been judged safe to trust it any longer in the hands of a subject, excepting only *pro hac vice*, occasionally: as to officiate at a coronation, at the arraignment of a nobleman for high-treason, or the like. During his office, the steward bears a white staff in his hand; and the trial, &c. ended, he breaks the staff, and with it his commission expires. There is likewise a lord-steward of the king's household, who is the chief officer of the king's court, has the care of the king's house, and authority over all the officers and servants of the household, except such as belong to the chapel, chamber, and stable.

STEWARD, an officer in a ship of war, appointed by the purser to distribute the different species of provisions to the officers and crew; for which purpose he is furnished with a mate and proper assistants.

Court of the Lord High STEWARD of Great Britain, is a court instituted for the trial of peers indicted for treason or felony, or for misprison of either. The office of this great magistrate is very ancient, and was formerly hereditary, or at least held for life, or *dum bene se gesserit*: but now it is usually, and hath been for many centuries past, granted *pro hac vice* only; and it hath been the constant practice (and therefore seems now to have become necessary) to grant it to a lord of parliament, else he is incapable to try such delinquent peer. When such an indictment is therefore found by a grand jury of freeholders in the King's bench, or at the assizes before the justices of *oyer and terminer*, it is to be removed by a writ of *certiorari* into the court of the lord high-steward, which has the only power to determine it. A peer may plead a pardon before the court of King's bench, and the judges have power to allow it, in order to prevent the trouble of appointing an high-steward merely for the purpose of receiving such plea: but he may not plead in that inferior court any other plea, as guilty or not guilty of the indictment, but only in this court; because, in consequence of such plea, it is possible that judgment of death might be awarded against him. The king, therefore, in case a peer be indicted of treason, felony,

Stew
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Steward.

Steward.

lony, or misprision, creates a lord high-steward *pro hac vice* by commission under the great seal; which recites the indictment so found, and gives his Grace power to receive and try it *secundum legem et consuetudinem Angliæ*. Then when the indictment is regularly removed by writ of *certiorari*, commanding the inferior court to certify it up to him, the lord high-steward directs a precept to a serjeant at arms, to summon the lords to attend and try the indicted peer. This precept was formerly issued to summon only 18 or 20 selected from the body of the peers; then the number came to be indefinite; and the custom was for the lord high-steward to summon as many as he thought proper, (but of late years not less than 23), and that those lords only should sit upon the trial; which threw a monstrous weight of power into the hands of the crown, and this its great officer, of selecting only such peers as the then predominant party should most approve of. And accordingly, when the earl of Clarendon fell into disgrace with Charles II. there was a design formed to prorogue the parliament, in order to try him by a select number of peers; it being doubted whether the whole house could be induced to fall in with the views of the court. But now, by statute 7 W. III. c. 3. upon all trials of peers for treason or misprision, all the peers who have a right to sit and vote in parliament shall be summoned at least 20 days before such trial, to appear and vote therein; and every lord appearing shall vote in the trial of such peer, first taking the oaths of allegiance and supremacy, and subscribing the declaration against popery.

During the session of parliament, the trial of an indicted peer is not properly in the court of the lord high-steward, but before the court last mentioned of our lord the king in parliament. It is true, a lord high-steward is always appointed in that case to regulate and add weight to the proceedings: but he is rather in the nature of a speaker *pro tempore*, or chairman of the court, than the judge of it; for the collective body of the peers are therein the judges both of law and fact, and the high-steward has a vote with the rest in right of his peerage. But in the court of the lord high-steward, which is held in the recess of parliament, he is the sole judge of matters of law, as the lords triors are in matters of fact; and as they may not interfere with him in regulating the proceedings of the court, so he has no right to intermix with them in giving any vote upon the trial. Therefore, upon the conviction and attainder of a peer for murder in full parliament, it hath been holden by the judges, that in case the day appointed in the judgment for execution should lapse before execution done, a new time of execution may be appointed by either the high court of parliament during its sitting, though no high-steward be existing, or, in the recess of parliament, by the court of king's-bench, the record being removed into that court.

It has been a point of some controversy, whether the bishops have now a right to sit in the court of the lord high-steward to try indictments of treason and misprision. Some incline to imagine them included under the general words of the statute of king William, "all peers who have a right to sit and vote in parliament:" but the expression had been much clear-

er, if it had been "all lords," and not "all peers;" for though bishops, on account of the baronies annexed to their bishoprics, are clearly lords of parliament, yet their blood not being ennobled, they are not universally allowed to be peers with the temporal nobility: and perhaps this word might be inserted purposely with a view to exclude them. However, there is no instance of their sitting on trials for capital offences, even upon impeachments or indictments in full parliament, much less in the court we are now treating of; for indeed they usually withdraw voluntarily, but enter a protest, declaring their right to stay. It is observable, that, in the 11th chapter of the constitutions of Clarendon, made in parliament 11th Hen. II. they are expressly excused, rather than excluded, from sitting and voting in trials, when they come to concern life or limb: *episcopi, sicut ceteri barones, debent interesse iudicii cum baronibus, quousque perveniantur ad diminutionem membrorum, vel ad mortem*. And Becket's quarrel with the king hereupon was not on account of the exception, (which was agreeable to the canon law), but of the general rule, that compelled the bishops to attend at all. And the determination of the house of lords in the earl of Danby's case, which hath ever since been adhered to, is consonant to these constitutions; "that the lords spiritual have a right to stay and sit in court in capital cases, till the court proceeds to the vote of guilty or not guilty." It must be noted, that this resolution extends only to trials in full parliament; for to the court of the lord high-steward (in which no vote can be given, but merely that of guilty or not guilty) no bishop, as such, ever was or could be summoned: and though the statute of king William regulates the proceedings in that court, as well as in the court of parliament, yet it never intended to new-model or alter its constitution; and consequently does not give the lords spiritual any right, in cases of blood, which they had not before. And what makes their exclusion more reasonable is, that they have no right to be tried themselves in the court of the lord high-steward, and therefore surely ought not to be judges there. For the privilege of being thus tried depends upon nobility of blood rather than a seat in the house, as appears from the trials of popish lords, of lords under age, and (since the Union) of the Scots nobility, though not in the number of the sixteen; and from the trials of females, such as the queen consort or dowager, and of all peeresses by birth; and peeresses by marriage also, unless they have, when dowagers, disparaged themselves by taking a commoner to their second husband.

STEWART in Scots law. See LAW, N^o clviii. 5.

STIBIUM, a name for ANTIMONY.

STIGMA, a brand, or impression with a hot iron; a mark of infamy. See STIGMATIZING.

STIGMA, in botany, the summit or top of the style, accounted by the sexualists the female organ of generation in plants, which receives the fecundating dust of the tops of the stamina, and transmits its vapour or effluvia through the style into the heart of the seed-bud, for the purpose of impregnating the seeds.

STIGMATA, the apertures in different parts of the bodies of insects, communicating with the tracheæ or air-vessels, and serving for the office of respiration.

Steward

Stigmata.

Stigmata
Stillingfleet.

STIGMATA, in antiquity, certain marks impressed on the left shoulders of the soldiers when lifted.

STIGMATIZING, among the ancients, was inflicted upon slaves as a punishment, but more frequently as a mark to know them by: in which case, it was done by applying a red-hot iron marked with certain letters to their foreheads, till a fair impression was made; and then pouring ink into their furrows, that the inscription might be the more conspicuous. Stigmatizing, among some nations, was, however, looked upon as a distinguishing mark of honour and nobility.

STILE. See STYLE.

STILL-BOTTOMS, in the distillery, a name given by the traders to what remains in the still after working the wash into low wines. These bottoms are procured in the greatest quantity from the malt-wash, and are of so much value to the distiller in the fattening of hogs, &c. that he often finds them one of the most valuable articles of the business.

STILLINGFLEET (Edward), bishop of Worcester, was the son of Samuel Stillingfleet gentleman, and was born at Cranborn in Dorsetshire in 1635. He was educated at St John's College, Cambridge; and having received holy orders, was, in 1657, presented to the rectory of Sutton in Nottinghamshire. By publishing his *Origines Sacrae*, and other works, he soon acquired such reputation, that he was appointed preacher of the Rolls Chapel; and in January 1665 was presented to the rectory of St Andrew's, Holborn. He was afterwards chosen lecturer at the Temple, and appointed chaplain in ordinary to king Charles II. In 1668, he took the degree of doctor of divinity; and was soon after engaged in a dispute with those of the Romish religion, by publishing his discourse concerning the idolatry and fanaticism of the church of Rome, which he afterwards defended against several antagonists. In 1680 he preached at Guildhall chapel a sermon on Phil. iii. 16. which he published under the title of *The Mischief of Separation*; and this being immediately attacked by several writers, he in 1683 published his *Unreasonableness of Separation*. In 1685 appeared his *Origines Britannicae*, or the Antiquities of the British Church, in folio. During the reign of king James II. he wrote several tracts against popery, and was prolocutor of the convocation, as he had likewise been under king Cha. II. After the Revolution he was advanced to the bishopric of Worcester, and was engaged in a dispute with the Socinians, and also with Mr Locke; in which last contest he is generally thought to have been unsuccessful. He died at Westminster in 1699, and was interred in the cathedral of Worcester, where a monument was erected to his memory by his son. Dr Stillingfleet wrote other works besides those here mentioned, which, with the above, have been reprinted in 6 vols. folio.

STILLINGFLEET (Benjamin), an ingenious naturalist, was grandson of the preceding. His father Edward was fellow of St John's College in Cambridge, F. R. S. M. D. and Gresham professor of physic: but marrying in 1692, he lost his lucrative offices and his father's favour; a misfortune that affected both himself and his posterity. However, going into orders, he obtained, by his father's means, the living of Newton-Butts, which he immediately exchanged for

thofe of Wood-Norton and Swanton in Norfolk. He died in 1708.

Benjamin, his only son, was educated at Norwich school; which he left in 1720, with the character of an excellent scholar. He then went to Trinity-College in Cambridge, at the request of Dr Bentley, the master, who had been private tutor to his father, domestic chaplain to his grandfather, and much indebted to the family. Here he was a candidate for a fellowship, but was rejected by the master's influence. This was a severe and unexpected disappointment, and but little alleviated afterwards by the Doctor's apology, that it was a pity that a gentleman of Mr Stillingfleet's parts should be buried within the walls of a college.

Perhaps, however, this ingratitude of Dr Bentley was not of any real difference to Mr Stillingfleet. By being thrown into the world, he formed many honourable and valuable connections. He dedicated some translations of Linnæus to the late lord Lyttelton, partly, he says, from motives of private respect and honour. The present lord Barrington gave him, in a very polite manner, the place of the master of the barracks at Kensington; a favour to which Mr Stillingfleet, in the dedication of his Calendar of Flora to that nobleman, alludes with equal politeness, as well as with the warmest gratitude. His Calendar of Flora was formed at Stratton in Norfolk in the year 1755, at the hospitable feat of his very worthy and ingenious friend Mr Marham, who had made several observations of that kind, and had communicated to the public his curious observations on the growth of trees. But it was to Mr Wyndham of Felbrig in Norfolk that he appears to have had the greatest obligations; he travelled abroad with him, spent much of his time at his house, and was appointed one of his executors (Mr Garrick was another), with a considerable addition to an annuity which that gentleman had settled upon him in his lifetime.

Mr Stillingfleet's genius seems, if we may judge from his works, to have led him principally to the study of natural history; which he prosecuted as an ingenious philosopher, an useful citizen, and a good man. In this walk of learning he mentions, as his friends, Dr Watson, Mr (now Dr) Solander, Mr Hudson, Mr Price of Foxley, and some others; to whom may be added the ingenious Mr Pennant. Nor can we omit the flattering mention which the late Mr Gray makes of him in one of his letters, dated from London in 1761: "I have lately made an acquaintance with this philosopher, who lives in a garret here in the winter, that he may support some near relations who depend upon him. He is always employed, consequently (according to my old maxim) always happy, always cheerful, and seems to me a very worthy honest man. His present scheme is to send some persons, properly qualified, to reside a year or two in Attica, to make themselves acquainted with the climate, productions, and natural history of the country, that we may understand Aristotle, Theophrastus, &c. who have been Heathen Greek to us for so many ages; and this he has got proposed to lord Bute, no unlikely person to put it in execution, as he is himself a botanist."

Mr Stillingfleet published a volume of miscellaneous tracts, which is in much esteem, and does

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stimulating great honour to his head and heart. They are chiefly translations of some essays in the *Amnitates Academicæ*, published by Linnæus, interperfed with some observations and additions of his own. In this volume he shows alfo a taste for claffical learning, and entertains us with fome elegant poetical effufions of his own. But his Essay on Conversation, published in the first volume of Dodfley's Collection of Poems, entitles him to a diftinguished rank among our English poets. This poem is addreffed to Mr Wyndham, with all that warmth of friendship which diftinguishes Mr Stillingfleet. As it is chiefly didactic, it does not admit of fo many ornaments as fome compositions of other kinds. However, it contains much good fenfe, shows a confiderable knowledge of mankind, and has feveral paffages that in point of harmony and eafy verification would not difgrace the writings of our moft admired poets. Here more than once Mr Stillingfleet shows himfelf ftill fore for Dr Bentley's cruel treatment of him; and towards the beautiful and moral clofe of it (where it is fuppofed he gives us a fketoh of himfelf), feems to hint at a mortification of a more delicate nature, which he is faid to have fuffered from the other fex.

Stipulation.

To thefe difappointments it was perhaps owing that Mr Stillingfleet neither married nor went into orders. His London refidence was at a fadler's in Piccadilly; where he died in 1771, aged above 70, leaving feveral valuable papers behind him. He was buried in St James's church, without the flightest monument of his having exifted.

STIMULATING, a property in bodies by which they vellicate, and caufe vibrations and inflections of the fibres of the nerves, and a greater derivation of nervous fluid into the parts affected. Stimulants produce pain, heat, rednefs, &c.

STIMULI, in botany, a species of armature or offensive weapon, with which fome plants, as nettle, caffada, acalypha, and tragia, are furnished. Their ufe, fays Linnæus, is by their venomous punctures to keep off naked animals that would approach to hurt them.

STING, an apparatus in the bodies of certain insects, in form of a little fpear, ferving them as a weapon of offence.

STING-Ray, in ichthyology. See **RAYA**.

STINK-POT, an earthen jar or fhell, charged with powder, grenades, and other materials of an offensive and fuffocating fmell. It is frequently ufed by privateers, in the western ocean, in the attack of an enemy whom he defigns to board; for which purpose it is furnished with a lighted fufe, at the opening or touch-hole. See **BOARDING**.

STIPEND, among the Romans, fignifies the fame with tribute; and hence *stipendarii* were the fame with *tributarii*.

STIPEND, in Scots law. See **LAW**, N^o cliv. 12, 13.

STIPULA, in botany, one of the fulcra or props of plants, defined by Linnæus to be a fcale, or fmall leaf, ftationed on each fide the bafe of the foot-ftalks of the flower and leaves, at their first appearance, for the purpose of fupport. Elmgren reftricts it to the foot-ftalks of the leaves only.

STIPULATION, in the civil law, the act of stipulating, that is, of treating and concluding terms

and conditions to be inserted in a contract. Stipulations were anciently performed at Rome, with abundance of ceremonies; the first whereof was, that one party fhould interrogate, and the other answer, to give his confent, and oblige himfelf. By the ancient Roman law, nobody could ftipulate but for himfelf; but as the Tabelliones were public fervants, they were allowed to ftipulate for their mafers; and the notaries fucceeding the Tabelliones, have inherited the fame privilege.

STIRIA, a province of Germany, in the circle of Aultria, with the title of a duchy. It is bounded on the north by the archduchy of Aultria, on the east by Hungary, on the fouth by Carniola, and on the west by Carinthia and the archbifhopric of Saltzburg; being 125 miles in length, and 17 in breadth. It is faid to contain 22 cities, 95 towns, 338-castles, 15 convents, and 200,000 inhabitants. Though it is a mountainous country, yet there is a great deal of land fit for tillage, and the foil is fo good, that the inhabitants never were in want of corn. It contains mines of very good iron; whence the arms made here are in great efteem. The women differ greatly from the Aultrians, and are very plain and downright. They have all fwellings on their throats, called *bronchocles*. The men are alfo very fimple, and are very zealous worshippers of the Virgin Mary. They delight to fit at home in the chimney-corner, never troubling their heads about foreign affairs. The chief town is Graz.

STIRLING, a town of Scotland, fituated on the river Forth, thirty miles north-west of Edinburgh, in W. Long. 3. 50. N. Lat. 56. 12. It is alfo called *Sterling*, and *Striveling*; from the former of which Boethius faifely derives the name *Sterling money*; becaufe, fays he, Olseit, a Saxon prince, after the overthrow of the Scots, eftablished here a mint. The name of *Striveling* is faid to have been derived from the frequency of ftrifes or conflicts in the neighbourhood. The town contains about 4000 inhabitants. It has a manufacture of tartans and fhalleons, and employs about 30 looms in that of carpets. The great ftreet is very broad. In it is the tolbooth, where is kept the ftandard for the wet meafures of Scotland. The other ftreets are narrow and irregular.—Stirling is in miniature a refemblance of Edinburgh; being built on a rock of the fame form, with a fortrefs on the fummit. The origin of the caftle is unknown. The rock of Stirling was ftrongly fortified by the Picts, amongst whom architecture and feveral other ufeul arts had made a confiderable progrefs. As it lay in the extremities of their kingdom, the poffeffion of it was the occafion of frequent contentts betwixt them and their neighbours the Scots and Northumbrians; each of whose dominions did, for fome time, terminate near it.

When the Scots, under Kenneth II. overthrew the Pictish empire near the middle of the ninth century, they endeavoured to obliterate every memorial of that people. They not only gave new names to provinces and towns, but, with all the rage of barbarians, demolished many magnificent and ufeul edifices which had been reared up by them, and this fortrefs among the reft. It was, however, foon rebuilt, though upon an occafion not very honourable to the Scots.

Upon the death of Kenneth II. in 855, his brother Donald V. mounted the throne of Scotland. In the begin-

Stiria,
Stirling.

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beginning of his reign the kingdom was invaded by Obrecht and Ella, two Northumbrian princes, who, uniting their forces with the Cumbrian Britons, and a number of Picts, who upon their expulsion from their native country had taken refuge in England, advanced to Jedburgh, where Donald encountered them; and, after a fierce and bloody battle, obtained a complete victory: but, having taken up his station in Berwick, in supine security, the Northumbrians, informed of the careless posture in which the Scottish army lay, surprised them by a hasty march, dispersed them, and made a prisoner of the king. Pursuing the advantage they had gained, they marched northward, and subdued all before them to the Frith of Forth and the town of Stirling. But the forlorn situation of the Scots, without a king and without an army, obliging them to sue for peace, they obtained it, upon condition that they should pay a sum of money for the ransom of the king, and yield up all their dominions upon the south side of the Forth to the conquerors.

The Northumbrians taking possession of the territories ceded to them by this treaty, rebuilt the castle of Stirling, and planted it with a strong garrison, in order to preserve their new conquests, upon the frontiers of which it was situated. Our authorities also inform us, that they erected a stone-bridge over the Forth, upon the summit of which a cross was raised, with the following inscription in monkish rhyme.

*Anglos a Scottis separat crux ista remotis;
Armis hic stant Bruti, Scotti stant hic, cruce tuti.*

Which is thus translated by Bellenden.

I am free marche, as passengeris may ken,
To Scottis, to Britonis, and to Inglismen.

None of the ancient English historians mention this conquest. The whole story, as well as the inscription, wears much of a monkish garb; yet its authenticity is not a little confirmed by the arms of the town of Stirling, upon which is a bridge, with a cross, and the last line of the above Latin distich is the motto around it.

We must not, however, imagine, that in those times that fortrefs bore any resemblance to the present structure, which is adapted to the use of fire-arms. Its size and form probably resembled those castles which, under the feudal constitution, the English and Scottish barons used to erect upon their estates for dwelling-houses; and which, in those barbarous ages, they found necessary to fortify for their defence, not only against foreign invaders, but often against the attacks of their own neighbours. It is directly such a Gothic figure as this which represents the *Castrum Strivelense* upon the arms of Stirling.

This fortrefs, after it had continued in the possession of the Northumbrian Saxons about 20 years, was, together with the whole country upon the south side of the Forth, restored to the Scots, upon condition of their assisting the Saxons against their turbulent invaders the Danes. Upon the arms of Stirling are two branches of a tree, to represent the *Nemus Strivelense*; but the situation and boundaries of that forest, which was probably a wing of the Caledonian, cannot be ascertained. Upon the south of Stirling, vestiges of a forest are still discernible for several miles. Banks of natural timber still remain in the castle-park, at

Murray's wood, and near Nether Bannockburn; and stumps of trees, with much brushwood, are to be seen in all the adjacent fields.

When Kenneth III. received intelligence of the Danes having invaded his dominions, he appointed the castle of Stirling to be the place of rendezvous for his army; and he marched from thence to the battle of Luncarty, where he obtained a victory over those rovers, in the end of the 10th century.

In the 12th century, this castle is spoken of as a place of great importance, and one of the strongest fortresses in the kingdom. In 1174, a calamity, not unusual amongst the Scottish monarchs, befel William, who at that time occupied the throne. He was taken prisoner in an unsuccessful expedition which he made into England; and, after having been detained 12 months in captivity, was released, upon stipulating to pay a large sum of money for his ransom; and, until payment thereof, delivering into the hands of the English the four principal fortresses in the kingdom, which in those days were Stirling, Edinburgh, Roxburgh, and Berwick. This was the first great ascendant that England obtained over Scotland; and indeed, the most important transaction which had passed between these kingdoms since the Norman conquest.

Though the Scottish monarchs, in their frequent perambulations thro' the kingdom, often visited Stirling, and held their courts for some time in the castle; yet it did not become a royal residence till the family of Stuart mounted the throne, and it was from different princes of this family that it received its present form. It was the place of the nativity of James II.; and, when raised to the throne, he frequently kept his court in it. It is well known to have been the place where that prince perpetrated an atrocious deed, the murder of William earl of Douglas, whom he stabbed with his own hand. The royal apartments were at that time in the north-west corner of the castle, and are now the residence of the major. The room where the murder was committed still goes by the name of *Douglas's room*. See SCOTLAND, n° 304, 305.

James III. contracting a fondness for the castle on account of its pleasant situation, made it the chief place of his residence, and added several embellishments to it. He built within it a magnificent hall, which in those days was deemed a noble structure, and is still entire. It now goes by the name of the *parliament house*, having been designed for the accommodation of that supreme court. It is covered with an oak-roof of exquisite workmanship, which is very little decayed, though it hath stood near 300 years. James also erected a college of secular priests in the castle, which he called the *chapel-royal*, and which proved one cause of his own ruin. As the expences necessary for maintaining the numerous officers of such an institution were considerable, he annexed to it the revenues of the rich priory of Coldingham in the Merse, which at that time happened to become vacant. This priory had for a long time been holden by persons connected with the family of Hume; and that family, considering it as belonging to them, strongly opposed the annexation. The dispute seems to have lasted several years; for one parliament had passed a vote, annexing the priory to the chapel-royal, and a subsequent one enacted a statute prohibiting

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every.

Stirling. every attempt that was contrary or prejudicial to that annexation.

James V. was crowned in the castle of Stirling; and the palace, which is the chief ornament of it, was the work of that prince. This is a stately and commodious structure, all of hewn stone, with much statuary work upon it. It is built in form of a square, with a small court in the middle, in which the king's lions are said to have been kept; and hence it still goes by the name of the *lions den*. The palace contains many large and elegant apartments; the ground-story is now converted into barrack-rooms for the soldiers of the garrison; the upper affords a house for the governor, with lodgings for some of the subaltern officers.

Opposite to the palace, upon the north, stands an elegant chapel, which was built by James VI. for the baptism of his son prince Henry in 1594. In this chapel is preserved the hull of a large boat, which that whimsical monarch caused to be built and placed upon carriages, in order to convey into the castle the provisions for that solemnity.

A strong battery, with a tier of guns pointing to the bridge over the Forth, was erected during the reignty of Mary of Lorraine, mother to queen Mary. It is called the *French battery*, probably because constructed by engineers of that nation. The last addition was made to the fortifications in the reign of queen Anne. Formerly they reached no farther than the old gate, upon which the flag-staff now stands; but in that reign they were considerably enlarged upon the side towards the town; and barracks, which are bomb-proof, with several other conveniences for a siege, were erected.

Upon the south-west of the castle lies a large park inclosed with a stone-wall, called the *king's park*, where the court used to divert themselves with hunting of the deer which were kept in it. At the east end of the park lay the royal gardens; vestiges of the walks and parterres, with a few stumps of fruit-trees, are still visible; but by long neglect, and the natural wetness of the soil, the place is now little better than a marsh. In the gardens is a mount of earth in form of a table, with benches of earth around it, where, according to tradition, the court sometimes held *fetes champetres*. In the castle-hill is an hollow, comprehending about an acre of ground, and having all the appearance of an artificial work, which was used for joustings, tournaments, and other feats of chivalry.

Northward of the castle lies the Govan-hill; in the middle of which is a small mount called *Hurly Haaky*, upon which duke Murdoch and his two sons were executed for treasonable practices in the reign of James I.

The prospect from the castle is most delightful as well as extensive, being greatly beautified, especially upon the east, by the windings of the Forth; which are so many, that though the distance by land, from the bridge of Stirling to Alloa, is only four miles, it is said to be 24 by water. As this river generally runs upon plain ground, it rolls its stream in so slow and silent a manner, that what Silius Italicus saith of the Ticinus is applicable to it, if, instead of *lucenti* in that poet, we should for once read *luteo*; for the clay-banks, together with the tide, which flows above Stirling, render the Forth perpetually muddy:

*Vix credas labi, ripis tam mitis apaci
Sonniferam ducit luteo gurgite lympham.*

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The lordship and castle of Stirling were a part of the usual dowry of the queens of Scotland, at least after the family of Stuart came to the throne, in which they were invelted at their marriage.

Robert lord Erskine was appointed governor of the castle by king David II. and the office continued in that family till 1715.

This fortress hath been the scene of many transactions. Being by its situation considered as a key to the northern parts of the kingdom, the possession of it hath been always esteemed of great importance to those who fought to be masters of Scotland. In the space of little more than forty years, the English were four times in possession of it, and as often was it wrested from them by the Scots. In 1296, Edw. I. enraged at John Baliol's renunciation of his allegiance to him, marched into Scotland with a great army, and carried all before him. Stirling being deserted by its garrison, made no defence at all. But the English dominion in Scotland was never of long duration, being usually lost by revolutions as quick as those by which it was acquired. In 1298, the Scots, recovering their spirits, drove the invaders out of most parts of the kingdom; and laying siege to this castle, soon forced the garrison to a capitulation. This revolution obliged Edward again to assemble an army, and to march into Scotland; and, amongst his other feats, he invested the castle of Stirling, and besieged it with his whole train of artillery. It was commanded by William Oliphant, a brave officer, who held it out three months. So vigorous a defence so provoked Edward, that he ordered two pair of gallows to be erected, and proclamation to be made in the audience of the garrison, that if they did not surrender against a certain day, every man of them should be hanged without mercy: they surrendered before the day prefixed, but rather from want of provisions than fear of Edward's menaces. They were not, however, so far reduced as not to be able to make an honourable capitulation: but the souls of conquerors have seldom been found to be so great as their names; instead of punctually observing the articles of the capitulation, the English monarch treated the garrison with great inhumanity.

After the celebrated victory at Rosling in 1303, the Scots again laid siege to this fortress. After a short defence, the garrison was obliged to capitulate for want of provisions, and the command of it was given to Oliphant its former governor. That same year, however, Edward began to besiege it; but was not able to reduce it till after a siege of more than 12 months. This was the most memorable siege that it ever underwent. Having been unsuccessful the first campaign, Edward was obliged to lead his army into winter-quarters; but during the recess, he made formidable preparations for resumming the siege early in the spring. He stripped all the lead from several roofs in St Andrew's to supply his battering machines, which, as soon as the season of the year was proper for action, he planted against the walls, and summoned the governor to surrender, but without effect. Upon which he collected all his artillery, and furiously battered the walls with stones, as we are told,

of

Stirling. of 200 pounds weight, which made wide breaches in them; but the governor still refused to yield. His defence was so vigorous, that numbers of the besiegers perished by arrows and stones shot from the engines of the castle. So intent was Edward upon the reduction of the place, that he exposed his own person to great danger. An arrow from the castle had killed him outright, if he had not been protected by the goodness of his armour. Holding up the weapon, he threatened to hang the man who shot it, and resolved upon a general assault. By this time, the reiterated attacks of the besiegers had made great breaches in the walls; and the garrison was diminished, as to consist of only 28 persons, and these extremely weakened with watching and fatigue: apprehending, therefore, that a general assault would overpower them, they offered to capitulate.

Some of the Scottish historians affirm, that a capitulation was signed and sealed; but that Edward, in direct violation thereof, sent the governor prisoner to England, where he remained several years in confinement.

In the spring of the year 1314, Edward Bruce, brother to king Robert, laid siege to it; but on account of the vigorous defence made by Moubray the governor, he found himself obliged to abandon the enterprise. Only, by a treaty between them, it was agreed, that if no relief came from England before a fixed time, the garrison should surrender to the Scots. The fate of the detachment of cavalry sent from the English camp, under the conduct of lord Clifford, to the relief of the garrison, has been related under the article SCOTLAND, n° 159. After the great victory at Bannockburn, the place surrendered to Robert, who treated the garrison with a humanity of which none of the Edwards had set an example.

In 1333, this castle yielded to the Baliol party; and, according to some accounts, it was at that time dismantled, probably by orders from the English king, who had learned, by the experience of his grandfather, how dangerous a weapon it would prove if it should again come into the possession of the Scots: but in 1335 it was rebuilt by the orders of that monarch, and planted anew with a strong garrison. Soon after the reparation, the Brucean party, recovering strength by supplies from France, attempted the reduction of it; but it was relieved by Edward in person. Next year the siege was renewed and raised again by that monarch; but in 1341 the Scots, under Sir William Douglas, conducted the siege with such indefatigable industry, that the garrison was forced to capitulate, though upon honourable terms.

The last reduction of this fortress by siege was in 1651. When Cromwell followed king Charles II. into England before the battle of Worcester, he left General Monk behind to complete the conquest of Scotland, which he soon accomplished. Upon his arrival at Stirling, he planted his batteries in the churchyard, and upon some eminences adjoining; and in a short time made himself master of the castle. The impression made by the bullets of the besiegers are still visible upon the walls of several buildings in the castle. The marks of those shot by the besieged also still remain upon the steeple of the church; some of the corner-stones of which have been broken by them.

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By this conquest Monk became master of the principal registers of the kingdom; which, upon the surrender of the castle of Edinburgh the year before, had been carried to Stirling. He sent them to England by Cromwell's orders, to be lodged in the Tower, where they remained until the restoration of Charles in 1660, when, by the orders of that monarch, they were packed up in no less than 50 hogheads, to be carried back to Scotland; but the ship in which they were being cast away in a storm near Berwick, they were all irrecoverably lost. This calamity, together with that which befel our more ancient records by the malicious policy of Edward I. hath involved the Scottish history in great obscurity, and obliges us to remain in ignorance and uncertainty with respect to many important transactions of the nation. In 1746, the castle, defended by general Blackney, resisted the utmost efforts of the rebels.

STIRLINGSHIRE, a county of Scotland, of which Stirling is the capital. It extends 20 miles in length and 12 in breadth; being bounded on the west by part of Lennox and Clydesdale; on the east, by Clackmannanshire, the river Forth, and part of Lothian; on the south-east, by Lothian; and on the north, by Monticith. The face of the country is open and agreeable, diversified by hill and dale, well watered with streams and rivers; the principal of which is the Forth, rising in the neighbourhood of an high mountain called *Ben-Lomond*, and, running eastward, forms the frith of Edinburgh. The southern part is hilly, affording plenty of game, and pasturage for sheep, horses, and black cattle. The eastern part is fertile, producing plentiful harvests of corn, and great abundance of coal. Lead-ore is found in different parts of the shire; and the rivers abound with pike, trout, and salmon.

STIRRUP, in the manege, a rest or support for the horseman's foot, serving to keep him firm in his seat, and to enable him to mount.

Stirrups are allowed to be a modern invention: Menage observes, that St Jerom is the first author who mentions them. Matthiolus relates, that the Turks have a knack of poisoning their stirrups, with so subtle and penetrating a poison, that it makes its way through the boots, and kills the rider. F. le Comte tells us, that the Tartars ride cross-legged, and with their stirrups exceedingly short.

STOBEÆUS (John), a laborious Greek writer, who lived at the end of the fourth century, composed many works, of which there are only his Collections remaining, and even these are not as he composed them; many things being inserted by later authors. This work contains many important sentiments collected from the ancient writers, poets, and philosophers.

STOCK, in gardening, &c. the stem or trunk of a tree.

Stock-Broker. See BROKER and STOCKS.

Stock-Jobbing, the art or mystery of trafficking in the public stocks or funds. See STOCKS.

STOCKHOLM, the capital of Sweden, is situated in the province of Upland. It derives its name from *stock*, "wood;" and *holm*, an "island;" alluding to the timber used in building the city. It is situated on a cluster of small islands, and the houses are founded upon piles. Including the two suburbs, one of which

Stockholm. stands on the peninsula of Toren, and the other in Athundria. The town is as large and populous as Bristol. Here the king usually resides, and here the estates always assemble. The island on which the greatest part of Stockholm stands, is surrounded by two branches of a river that runs with great rapidity out of the lake Mælar; and over each of these arms there is a wooden bridge: from the city, the eye is regaled with the prospect of the lake on one side, and the sea on the other. The sea-water is here potable, the freshness being owing to the great quantity which the lake discharges. The castle or palace is a spacious building, without taste or magnificence, furnishing lodging-room not only to the royal-family: but likewise to the greater part of the officers belonging to the household. It likewise comprehends the national or supreme court of justice, the colleges of war, chancery, treasury, and commerce; a chapel, armoury, library, and office for the public records; but the greater number of inferior officers and servants belonging to the court, are, with the foot-guards, quartered on the burghers. The castle, and all the stately edifices in the kingdom, are covered with copper. The palace of the nobility, in which this order sits during the session of the diet, is an elegant building, adorned on the outside with marble statues and columns, and on the inside with painting and sculpture. This and three other palaces stand on the banks of the lake, and are built on the same model, so as to compose an uniform piece of architecture. The bank, built at the expence of the city, is a noble edifice, and joins with many sumptuous houses belonging to the nobility in exhibiting a splendid appearance. The houses of the burghers are generally built of brick in the city; but in the suburbs they are commonly made up of timber, and therefore very subject to conflagrations. These houses are often framed in Finland, according to the plan and dimensions prescribed: from thence they are transported in pieces to Stockholm by water, and there set up by the carpenters. These wooden habitations, if kept in proper repair, will last 30 or 40 years, and are deemed warmer, neater, and more healthy, than those of brick or stone. To prevent the danger of conflagrations, the city is divided into 12 wards. In each of these there is a master and four assistants, who forthwith repair to the place where the fire breaks out; and all porters and labourers are obliged to range themselves under the master of the ward to which they belong. A fire-watch patrols the streets by night, to give warning or assistance as it may be wanted; and a centinel is maintained in the steeple of every church, to toll the bell on the first appearance of any such accident. The police of Stockholm is entirely subjected to the regulations of the grand governor, assisted by a deputy and bailiff of the castle. This city is the staple of Sweden, to which all the commodities of the kingdom are brought for exportation, and where almost all the imports from abroad are deposited. The port or haven formed by the lake Mælar, is large enough to contain 1000 sail of shipping; and furnished with a key or wharf about an English mile in length, to which the vessels may lie with their broadsides. The greatest inconveniences attending this situation are, the distance from the sea, which is not within less than 10

miles of the town; the want of tides; and the winding of the river, which is remarkably crooked. It opens into the Baltic; and the entrance, which is dangerous and rocky, the Swedes have secured with two small forts: within, it is perfectly safe and commodious. The northern suburbs are remarkable for the king's gardens, and for the great number of artificers who have chosen their habitations in this quarter. In the fourth-ern suburbs the Muscovite commodities are sold; and here is a magnificent exchange where the merchants daily assemble. The two warlike monarchs, Gustavus Adolphus and Charles Gustavus, are buried in chapels belonging to the church of Redderholm, which formerly belonged to the Cordeliers, and is still known by the name of *Clooster-kirk*. E. Long. 19. 30. N. Lat. 59. 20.

STOCKING, that part of the clothing of the leg and foot which immediately covers their nudity, and screens them from the cold, &c. Anciently, the only stockings in use were made of cloth, or of milled fluffs sewed together; but since the invention of knitting and weaving stockings of silk, wool, cotton, thread, &c. the use of cloth stockings is quite out of fashion. The modern stockings, whether woven or knit, are a kind of plexuses, formed of an infinite number of little knots called *stitches*, *loops*, or *masses*, intermingled in one another.—Knit stockings are wrought with needles made of polished iron or brass wire, which interweave the threads, and form the masses the stocking consists of. This operation is called *knitting*; the invention whereof is commonly attributed to the Scots, on this ground, that the first works of this kind came from thence. It is added, that it was on this account that the company of stocking-knitters established at Paris in 1527, took for their patron St Fiacre, who is said to be the son of a king of Scotland.—Woven stockings are ordinarily very fine; they are manufactured on a frame, or machine of polished iron, the structure and apparatus whereof are exceedingly ingenious. The English and French have greatly contested the honour of the invention of the stocking-loom; but we are assured, whatever pretensions the French claim to this invention, that the same was certainly devised by William Lee, of St John's College, Cambridge, in the year 1589, though it is true, that he first made it public in France, after despairing of success in his own country.

STOCKTON upon Tees, a town of England in the county of Durham, about 16 miles south of the city of Durham. It is now a port of considerable trade; though, at the Restoration, it was a despicable village, the best house in which could hardly boast of any thing better than clay-walls and a thatched roof. About 40 years ago it sent out in one year 75 vessels for the port of London; and the trade is much increased since.

STOCKS, or **PUBLIC FUNDS** in England. By the word *stock* was originally meant, a particular sum of money contributed to the establishing a fund to enable a company to carry on a certain trade, by means of which the person became a partner in that trade, and received a share of the profit made thereby, in proportion to the money employed. But this term has been extended farther, though improperly, to signify any sum of money which has been lent to the governa-

Stocking
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Stocks.

government, on condition of receiving a certain interest till the money is repaid, and which makes a part of the national debt. As the security both of the government and of the public companies is esteemed preferable to that of any private person, as the stocks are negotiable and may be sold at any time, and as the interest is always punctually paid when due; so they are thereby enabled to borrow money on a lower interest than what could be obtained from lending it to private persons, where there must be always some danger of losing both principal and interest.

But as every capital stock or fund of a company is raised for a particular purpose, and limited by parliament to a certain sum, it necessarily follows, that when that fund is completed, no stock can be bought of the company; though shares already purchased may be transferred from one person to another. This being the case, there is frequently a great disproportion between the original value of the shares and what is given for them when transferred: for if there are more buyers than sellers, a person who is indifferent about selling will not part with his share without a considerable profit to himself; and, on the contrary, if many are disposed to sell, and few inclined to buy, the value of such shares will naturally fall, in proportion to the impatience of those who want to turn their stock into specie.

These observations may serve to give our readers some idea of the nature of that unjustifiable and dishonest practice called *stock-jobbing*, the mystery of which consists in nothing more than this. The persons concerned in that practice, who are denominated *stock-jobbers*, make contracts to buy and sell, at a certain distant time, a certain quantity of some particular stock: against which time they endeavour, according as their contract is, either to raise or lower such stock, by raising rumours and spreading fictitious stories, in order to induce people either to sell out in a hurry, and consequently cheap, if they are to deliver stock, or to become unwilling to sell, and consequently to make it dearer, if they are to receive stock.

The persons who make these contracts are not in general possessed of any real stock: and when the time comes that they are to receive or deliver the quantity they have contracted for, they only pay such a sum of money as makes the difference between the price the stock was at when they made the contract, and the price it happens to be at when the contract is fulfilled; and it is no uncommon thing for persons not worth 100l. to make contracts for the buying or selling 100,000l. stock. In the language of Exchange Alley, the buyer in this case is called the *Bull*, and the seller the *Bear*.

Besides these, there are another set of men, who, though of a higher rank, may properly enough come under the same denomination. These are your great monied men, who are dealers in stock, and contractors with the government whenever any new money is to be borrowed. These indeed are not fictitious, but real buyers and sellers of stock; but, by raising false hopes or creating groundless fears, by pretending to buy or sell large quantities of stock on a sudden, by using the fore-mentioned set of men as their instruments, and other like practices, are enabled to raise or lower the stocks one or two *per cent.* at pleasure.

However, the real value of one stock above another, on account of its being more profitable to the proprietors, or any thing that will really, or only in imagination, affect the credit of company, or endanger the government, by which that credit is secured, must naturally have a considerable effect on the stocks. Thus, with respect to the interest of the proprietors, a share in the stock of a trading company which produces 5l. or 6l. *per cent. per annum* must be more valuable than an annuity with government-security, that produces no more than 3l. or 4l. *per cent. per annum*; and consequently such stock must sell at a higher price than such an annuity. Though it must be observed, that a share in the stock of a trading-company producing 5l. or 6l. *per cent. per annum*, will not fetch so much money at market as a government annuity producing the same sum; because the security of the company is not reckoned equal to that of the government, and the continuance of their paying so much *per annum* is more precarious, as their dividend is, or ought to be, always in proportion to the profits of their trade.

As the prices of the different stocks are continually fluctuating above and below par; so, when a person who is not acquainted with transactions of that nature, reads in the papers the prices of stocks, where bank-stock is marked perhaps 127l. India ditto 134 1/2 134 1/2. South-Sea ditto 97 1/2, &c. he is to understand that a 100l. of those respective stocks fell at such a time for those several sums.

In comparing the prices of the different stocks one with another, it must be remembered, that the interest due on them from the time of the last payment, is taken into the current price; and the seller never receives any separate consideration for it, except in the case of India bonds, where the interest due is calculated to the day of the sale, and paid by the purchaser over and above the premium agreed for. But as the interest on the different stocks is paid at different times, this, if not rightly understood, would lead a person, not well acquainted with them, into considerable mistakes in his computation of their value; some always having a quarter's interest due on them more than others, which makes an appearance of a considerable difference in the price, when in reality there is none at all. Thus, for instance, old South Sea annuities fell at present for 85 1/2 l. or 85 l. 10 s. while new South-Sea annuities fetch only 84 1/2 l. or 84 l. 15 s. though each of them produce the same annual sum of l. 3 *per cent.* but the old annuities have a quarter's interest more due on them than the new annuities, which amounts to 15 s. the exact difference. There is, however, one or two causes that will always make one species of annuities sell somewhat lower than another, though of the same real value; one of which is, the annuities making but a small capital, and there not being for that reason so many people at all times ready to buy into it as into others, where the quantity is larger; because it is apprehended, that whenever the government pays off the national debt, they will begin with that particular species of annuity the capital of which is the smallest.

A stock may likewise be affected by the court of chancery; for if that court should order the money, which is under their direction, to be laid out in any

particular stock, that stock, by having more purchasers, will be raised to a higher price than any other of the like value.

By what has been said, the reader will perceive how much the credit and interest of the nation depends on the support of the public funds. While the annuities and interest for money advanced is there regularly paid, and the principal infused by both prince and people (a security not to be had in other nations), foreigners will lend us their property, and all Europe be interested in our welfare; the paper of the companies will be converted into money and merchandize, and Great Britain can never want cash to carry her schemes into execution.

In other nations, credit is founded on the word of the prince, if a monarchy; or that of the people, if a republic: but here, it is established on the interests of both prince and people; which is the strongest security: for however lovely and engaging honesty may be in other respects, interest, in money-matters, will always obtain confidence; because many people pay great regard to their interest, who have but little veneration for virtue. See the article FUNDS.

STOCKS, a frame erected on the shore of a river or harbour, whereon to build shipping. It generally consists of a number of wooden blocks, ranged parallel to each other, at convenient distances, and with a gradual declivity towards the water.

STOCKS, a wooden machine to put the legs of offenders in, for the securing of disorderly persons, and by way of punishment in divers cases, ordained by statute, &c.

STOICS, a sect of ancient philosophers, the followers of Zeno, thus called from the Greek *στοα*, which signifies a "porch or portico," in regard Zeno used to teach under a portico or piazza.

To the praise of the Stoics in general, it must be confessed, that, less intent than other philosophers upon frivolous and often dangerous speculations, they devoted their studies to the clearing up of those great principles of morality which were the firmest supports of society; but the driness and stiffness that prevailed in their writings, as well as in their manners, disgusted most of their readers, and abundantly lessened their utility. Zeno's chief followers, among the Greeks, were Lucippus, Cleanthes, Chrysippus, Diogenes Babylonius, Antipater, Panæzius, Posidonius, and Epictetus; among the Romans, Cato, Varro, Cicero, Seneca, the emperor Antoninus, &c. The Stoics cultivated logic, physics, metaphysics, &c. but especially ethics. The principles of their dogmata of the former kinds, are, That there are certain catalepsias or comprehensions, called *innate ideas* or *principles*, naturally found in the mind; that God is the seminal cause of the universe; and, with the Platonists, that the world is an animal, by reason of God's inhabiting and informing every part thereof; that nature is an artificial fire tending to generation; and that the world is at last to be destroyed by a conflagration. As for the morality of the Stoics, it was couched much in paradoxes; as, that a wise man is void of all passions or perturbation of mind; that pain is no real evil, but that a wise man is happy in the midst of torture, is always the same, and is always joyful; that there is none else free; that none else ought to be esteemed

king, magistrate, poet, or philosopher; that all wise men are great men; that they are the only friends or lovers; that nothing can happen to them beyond their expectations; that all virtues are insensibly connected together; that all good things are equal, and equally to be desired; that goodness admits of no increase or diminution. They own but one God, whom they however call by various names, as *Fate, Jupiter, &c.* by which they did not mean various things, but various powers and relations of the same thing. Providence they expressed under the name *Fate*, which Chrysippus defines to be a natural series or composition of things mutually following each other, by an immutable nexus or tie, fixed from all eternity. They held the immortality of the soul.

STOLBERG, a small town of Germany, in the circle of Upper Saxony, and territory of Thuringia, of which it is the capital place. It is seated among the mountains, 8 miles north-west of Leipzig. E. Long. 11. 12. N. Lat. 51. 46.

STOLE, a sacerdotal ornament wore by the Romish parish-priests over their surplice, as a mark of superiority in their respective churches; and by other priests over the alb, at celebrating of mass, in which case it goes across the stomach; and by deacons, over the left-shoulder, scarf-wise: when the priest reads the gospel for any one, he lays the bottom of his stole on his head. The stole is a broad swath, or slip of stuff, hanging from the neck to the feet, with three crosses thereon.

Groom of the STOLE, the eldest gentleman of his Majesty's bed-chamber, whose office and honour it is to present and put on his majesty's first garment, or shirt, every morning, and to order the things in the chamber.

STOMACH, in anatomy. See ANATOMY, n° 352. STOMACHIC, medicines that strengthen the stomach and promote digestion, &c.

Stomachic corroboratives are such as strengthen the tone of the stomach and intestines; among which are carminatives, as the roots of galangals, red gentian, zedoary, pimpinella, calamus aromaticus, and arum. Of barks and rinds, those of canella alba, cassia, citrons, Seville and China oranges, &c. Of spices, pepper, ginger, cloves, cinnamon, cardamoms, and mace.

STONEHIVE, or STONEHAVEN, a small town in the county of Merns, in Scotland, 12 computed miles south from Aberdeen. It was built in the time of Charles II. and stands at the foot of some high cliffs, in a small bay, with a rocky bottom, opening a little in one part, so that small vessels may find admittance but only at high water. A pier laps over this harbour from the north side to secure them after their entrance. The town contains about 800 inhabitants. The manufactures are sail-cloths and Osna-burghs, knit worsted and thread stockings.

STONES, in natural history, are defined to be essentially compound fossils, not inflammable, nor soluble in water or oil, nor at all ductile: found in continued strata, or beds, of great extent: formed either of a congeries of small particles, in some degree resembling sand, and lodged in a smoother cementitious matter; or else of this cementitious matter, and the gritt or sand-like particles, running together into one smooth

smooth mafs; or, finally, of granules cohering by contact, without any cementitious matter among them; or composed of crystal or spar, usually debafed by earth, and often mixed with talc and other extraneous particles.

Of this class of fossils there are three orders; and under these, eight genera.

The first order comprehends all the coarse, harfh, and rough stones, of a lax texture, and composed of a visible grit, resembling fand in form, and usually immersed in a cementitious matter, and of little natural brightness; scarce capable of any polish, and naturally mouldering away in form of powder from the tools of the workmen. The genera of this order are two, viz. the amnochista and psaduria; the former of which constitute our grey and rough flates; and the latter comprehends most of the stones used in building, particularly Portland stone.

The second order consists of stones moderately fine, of a more compact and even texture, scarce distinguishable construction, and affording no fand-like particles to the view; of some natural brightness, capable of a tolerable polish, and flying off from the tools of the workmen in form of small chips. Under this order are comprehended the iuxpexia and flegania.

The third order consists of stones of a very fine substance and elegant structure, naturally of a great brightness, and capable of an elegant polish; composed of granules of various shapes and sizes, but usually flatish, sometimes more sometimes less distinct; and, in some species, running together into uniform masses, but never lodged in any cementitious substance. Of this order are the marbles, alabasters, porphyries, and granites.

For the Origin and Formation of STONES, M. Tournefort, on his return from the east in the year 1702, proposed to the Royal Academy a new theory.—On a curious survey of the famous labyrinth of Crete, he observed, that several people had engraven their names in the living rock whereof its walls are formed; and, what was very extraordinary, the letters whereof they consisted, instead of being hollow, as they must have been at first (being all cut with knife-points), were prominent, and stood out from the surface of the rock like so many basso-relievo's. This is a phenomenon no otherwise accountable for than by supposing the cavities of the letters filled insensibly with a matter issuing from out of the substance of the rock, and which even issued in greater abundance than was necessary for filling the cavity. Thus is the wound made by the knife healed up, much as the fracture of a broken bone is consolidated by a callus formed of the extravasated nutritious juice which rises above the surface of the bone; and this resemblance is the more just, as the matter of the letters was found whitish, and the rock itself greyish. Something very like it is observed in the barks of trees, wherein letters have been cut with the knife; so that the poet had reason to say, that the characters grew as the trees themselves grew: *Crescent illas, crescentis amores*.—M. Tournefort supports his opinion by similar causes apparently formed in several other stones, which had reunited after by accident they had been broken.—From these observations it follows, that there are stones which grow in the quarries, and of consequence that are fed; that

the same juice which nourishes them serves to rejoin their parts when broken, just as in the bones of animals and the branches of trees when kept up by bandages; and in a word; that they vegetate.

M. Tournefort examines several kinds of stones, and finds them under the same necessity of feed. The immense quantity of flints wherewith the Crau of Arles is covered, he uses as an argument in behalf of this theory. The country there, for 20 miles round, is full of roundish flints, which are still found in equal abundance to whatever depth you dig. M. Peirese, who first proposed the generation of stones by means of seeds, (though he took the word *feed* in a very different sense from M. Tournefort), first brought this extraordinary campagne as a proof thereof. In effect, how could so many similar flints be formed? There is no saying they are coeval with the world, without asserting at the same time that all the stones in the earth were produced at once; which were to go directly contrary to the observations above-mentioned.

Among the seeds of stones, M. Tournefort observes, there are some which do not only grow soft by the juices of the earth, but even become liquid. These, then, if they penetrate the pores of certain bodies, grow hard, petrify, and assume the figure or impression of the body: thus what we call *peñitres*, *conchites*, *mytilites*, *ostracites*, *nautilites*, *echinites*, &c. are real stones, the liquid seeds whereof have insinuated into the cavities of the shells called *peñen*, *concha*, *mytilus*, *ostrea*, *nautilus*, *echinus*. On the contrary, if those liquid seeds fall on flints, on shells, sand, &c. they inclose those several bodies, and fixing between them, form a kind of cement, which yet grows like other stones. It is highly probable, he thinks, that such rocks as are only an assemblage of matted flints, have been formed by a number of these liquid seeds, in like manner as the quarries full of shells; unless the rocks have enveloped these bodies in their growth. He adds, that there are seeds of real stones inclosed in the spawn of certain shell-fish, as well as that hard solid matter destined to the forming their shells.

There is a particular kind of shell-fish called *pholas*, which is never found anywhere but in the cavities of flints, which are always found exactly fitted to receive them. Now it is highly improbable the fish should come and dig such a niche to spawn in; it is much more likely the stones they are found inclosed in were at first soft, and that the matter they are formed of was originally found in the spawn, in like manner as the matter which forms the egg-shell is really found in the seed thereof. See PHOLAS.

From the whole, he concludes, that the seed of stones, and even of metals, is a kind of dust which probably falls from them while they are alive, i. e. while they continue to vegetate as above. This dust may be compared to the seeds of several plants, as those of ferns, mosses, truffles, &c. which no microscope ever yet discovered, though their existence is not at all to be doubted.

M. Geoffroy accounts for the origin and formation of stones in a different manner. He lays it down as a principle, that all stones without exception have been fluid; or at least a soft paste, now dried and hardened; witness the stones wherein are found foreign bodies; witness also figured stones, &c.

On this principle he examines the formation of the different kinds of stones; and shows, that the earth alone suffices for the same, independent of all salts, sulphure, &c. The metallic particles contained in flints give them their colour, but these are only accidents; for proof of which, he instances the sapphires and emeralds of Auvergne, which lose all their colour by a moderate fire consuming their metallic parts, but without any damage to their transparency, they being hereby rendered mere crystals. M. Geoffroy conceives two kinds of primitive particles in the earth. Those of the first kind are exceedingly fine thin lamellæ, equal to each other, or nearly so. Now, when these meet together, from any cause whatever, in a sufficient quantity, the regularity and equality of their figures determine them to range themselves equally and regularly; and thus to form a homogeneous compound, which is very hard from the immediate contact of the parts, and very transparent by reason of their regular disposition, which leaves a free passage to the rays of light every way: and this is crystal. The parts of the second kind have all sorts of irregular figures, and must accordingly form assemblages that are much opaker and less hard. Now crystal is formed wholly of part of the first kind, and all other stones of a mixture of the two kinds of parts put together; this mixture is absolutely necessary in order to unite and bind together the parts of the second kind, and give them a hardness and consistence, without which they would only make a sand or dust. Water now appears to be the fittest vehicle to carry the parts of the first kind. This is seen from several petrifying springs, which inculate the pipes through which their waters are conveyed, or even solid bodies laid in them for some time. The water does not dissolve those earthy parts; it only keeps them in fusion, as it does the juices wherewith plants are fed. This water, thus charged with earthy particles of the first kind. M. Geoffroy calls the *stony or crystalline juice*, whereof those bodies are primarily formed.

STONES are of various kinds, with regard to the places they are produced in: the most ordinary are under ground; others in the bodies of men and other animals; others seem to be generated by the sea, as pumice, &c.; and others the effect of a petrifying virtue in certain waters. See PETRIFACTION, &c.

Artificial Stone. See STUCCO.

STONE in the Bladder. See MEDICINE, n° 486. and SURGERY.

STONE also denotes a certain quantity or weight of some commodities. A stone of beef at London is 8 pounds; in Hertfordshire, 12 pounds; and in Scotland, 16 pounds.

STONE-Chatter, in ornithology. See MOTACILLA.

STONEHENGE, a celebrated monument of antiquity in Salisbury Plain, six miles distant from that city. The particular spot on which it stands is in the lordship of West or Little Ambresbury in the possession the duke of Queensberry. The soil is chalky, and perfectly hard; so that the vast numbers of coaches and horses, which almost daily bring visitors to view this celebrated pile, have not been able to obliterate the track of the banks and ditches. It is situated near the summit of a hill, to which there is a very gentle ascent from the lower ground. The whole is inclosed with a circular ditch; which having passed, you ascend 35

yards before you come to the work itself; and the distance of the verge of the ditch within-side quite round to the building, is equal to the diameter of the building itself. The whole fabric consisted of four circles, or rather ovals, of stones, the most considerable of which had ten uprights, and five architraves or imposts, making up five trilithons, each trilithon consisting of two uprights and one impost, which locked them together at the top by tenons and mortises. These trilithons are not all of the same height, but each of them raised its head or impost somewhat higher as it drew nearest to that before which the altar is judged to have stood, and which appears to have been not only the highest, but finest, both for the smoothness and beauty of the stones. The height of these trilithons, with their architraves or cornices, is computed, at a medium, to be 24 feet, for there is no coming at an exact dimension in a work so decayed by time and weather; the uprights being between 20 and 21 feet high, and lessening a little upwards to the top, and the cornice computed about three feet and an half, making up the complement of 24 feet. These imposts, on the outward face, bore the same sweep with the oval which they composed; but on the inside within a straight line. They seem likewise to have been somewhat broader on the top than at the bottom, so that their sides bear a little slant downwards, whether to preserve them the better from the weather, or to make up the shortening which is caused by their elevation from the sight. The gradual ascent of these three orders, as they may be termed, of trilithons, is 13, 14, and 15 druidish cubits. The breadth of each trilithon is computed, in a medium, about 10 cubits of the same measure, and is consequently the length at least of the impost. Each upright is about 3 feet 9 nine inches thick, and twice that, *i. e.* 7 feet and an half in breadth, or 4 cubits and an half druidish. Each trilithon which composes this oval cell stands at such convenient distance from the other, as to yield a beautiful prospect into it; which is not a little heightened by the space which stands between the two uprights, and which widens upwards as these lessen in their breadth, and form an oval from its two centres, whose longest radius is 15, and shortest 12, druidish cubits; so that the ellipsis is formed by a line of 60 cubits, which being joined at the two ends, and turned round the two centres, give a diameter of 30 cubits at the longest, and 25 at the shortest, 5 cubits being the supposed distance between the two centres. Within this grand oval is another, of much lesser thorougher and finer stones. This circle (together with the long stone now broken, which is supposed to have been the altar, and is of a darkish-blue marble, such as is often set upon common altar-tombs, and about 16 feet in length) consists of 20 stones, the greatest part of which are broken and mangled; but not so much as to hinder a curious observer from recovering the order in which they stood, though their use and design is hard to be guessed at. Another circle or oval of 40 stones surrounded the cell or adytum at a proper distance. These were likewise of a much lesser size; after which one comes out to the greatest or outer circle, composed of 30 stones, likewise harder, and somewhat of a pyramidal form. It seems as if the founders had wisely provided, that their lesser bulk should

Stonchenge should be compensated by their solidity. The difference between this outward circle and that of the cell or adytum consisted in this, that the architraves of the triflithons of the latter did not touch one another, but preserved the same distance with the two uprights on which they were locked; whereas, in the former or outward circle, the flanders were joined by a continued cornice. Each flander or upright here had two tenons, at equal distances on the top, by which the two imposts were locked by their mortises, and so continued quite round in the form of a crown or cornice. The whole was surrounded by a vallum or deep ditch at a proportionate distance, as we have hinted above; and this, with the grand avenue and the gradual ascent up to the fabric, afforded a noble prospect, both as you advanced towards it, and much more when you viewed from it all the champaign country round it.

According to the unthinking vulgar, these stones were brought hither by magic, by the help of demons, or by giants, either of which were readily enough supposed able to bring them upon their backs from Africa; whilst the wiser sort rather imagined them to be scissitious, and cast from some such composition as sand and mortar and the like, and hardened by the weather. This notion, however, has been disproved, though to the great detriment and disfiguring of the stones themselves, and the endangering of the structure.

These stones, rough and battered as they have been by these pretended curiosists, as well as by a long series of ages, appear to have been originally smoothed by the chisel, at least as far as they stand above-ground; for as to that part which lies buried in the earth, it shows itself, upon digging round it, to be in its primitive roughness; and as it was dugged up out of the quarry, or, more probably, as they were found lying on the surface of the ground in great numbers and various dimensions, perhaps ever since the creation of the world, and as they are to be seen still in vast quantities upon Marlborough Downs near Abury, at a place called from thence the *Grey Wethers*, and are of the same kind, to wit, a baldrick white marble.

The difficulty is, to conceive how stones of that immense weight, one of which, though neither the largest nor heaviest, has been computed by proper judges to weigh between 30 and 40 tons, and consequently would have required about 150 oxen to have drawn it, could be conveyed from their original seat to Stonehenge, which is 16 computed miles, and along such uneven grounds and in such quantities as compose the fabric. Sure it is, that no carriage can be conceived which would not have been sunk into the ground by such monstrous weight, unless it be that of rollers: but even this must appear a more than Herculean labour; the arduousness of which cannot be extenuated, but by the supposition that the whole, or at least the greatest part, of the nation contributed their help towards it in their turns.

The rearing of them afterwards in such form and situation was a work of no less difficulty; for though we may reasonably suppose that they were all pecked and chisled, had their mortises and tenons wrought, and every thing done that could lighten and fit them for the design, at the place where they were brought from; yet every man will easily perceive what an im-

mense labour it must have been to rear stones of that vast bulk and weight, to place them in their proper places, and at such due distances, that the architraves or imposts that locked them to each other at the top should fall so exactly every mortise upon its own tenon, as we find they actually do to this day: for it is plain to every eye that views them carefully, that each of these tenons are so exactly fitted to its mortise, that if either of the standing stones had been set ever so little out of its place, and perpendicular, they could never have locked one in the other till they were reduced to their due distance and position; especially considering that there were at least 15 in number of this large sort, set up two and two, the whole in a beautiful oval, nearest to a circle, and exactly locked each to the other by architraves of proportionable bigness. Each tenon is a druidish cubit, somewhat above 20 inches in diameter on the broadest side; for they are of an oval figure, and the mortises exactly answerable to it. By this contrivance the imposts or architraves lie firm locked upon the uprights, and these are kept firm to each other. Where the imposts are heaviest, the tenons are shortest; and where those are lightest, and consequently more in danger to be shaken, as in those of the outward circle, these are made longest, and the mortises deeper accordingly. If the bottom-face of the impost be divided into three squares, the two mortises will be found in the middle of the two outward ones: draw diagonal lines from corner to corner, and where they intersect is the centre of the mortise; which central distance from one to the other is seven druidish cubits, or about eight of ours. Some other particulars show the whole to have been done geometrically, and from such plain and simple principles as would best answer every purpose of the grand design. And hence we may frame an idea of the curiosities as well as arduousness of the work, which must be owned to outvie all that we read of single obelisks, pillars, and statues, how gigantic soever, if we except the pyramids of Egypt and the Rhodian colossus.

The first account of this structure we meet with is in Geoffroy of Monmouth, who, in the reign of king Stephen, wrote the history of the Britons in Latin. He tells us, that it was erected by the counsel of Merlin the British inchanter, at the command of Aurelius Ambrosius the last British king, in memory of 460 Britons who were murdered by Hengist the Saxon. The next account is that of Polydore Virgil, who says that the Britons erected this as a sepulchral monument of Aurelius Ambrosius. Others suppose it to have been a sepulchral monument of Boadicea the famous British Queen. Inigo Jones is of opinion that it was a Roman temple; from a stone 16 feet long and 4 broad, placed in an exact position to the eastward, altar-fashion. However, the opinion of Dr Stukely is the most probable, who thinks that it was the chief temple of the Druids in Britain; of which a very strong proof is, that it can be measured only by the cubit used by the Druids.

STOOL, in medicine, an evacuation or discharge of the feces by the anus.

STOPS. See **POINTS and PUNCTUATION**.

STORAX, or **STYRAX**, an odoriferous resinous substance, exuding, in the warmer climates, from a tree called by C. Bauhine *styrax folio mali cotonei*. It has

has been customary to distinguish three sorts of storax, though only one is usually met with in the shops.

1. *Styrax calamita*, or storax in the cane, so called from its having been formerly brought inclosed in reeds from Pamphylia: it is either in small distinct tears, of a whitish or reddish colour, or in larger masses composed of such.

2. Storax in the lump, or red storax. This is in masses of a uniform texture, and yellowish red or brownish colour, though sometimes likewise interpersed with a few whitish grains. Of this sort there has been some lately to be met with in the shops, under the name of *storax in the tear*.

3. The common storax of the shops is in large masses, considerably lighter and less compact than the foregoing: it appears upon examination to be composed of a fine resinous juice, mixed with a quantity of saw-dust. For what purpose this addition is made we shall not here inquire; observing only, that it can scarce be supposed to be done with any fraudulent view, since the saw-dust appears at sight. This common storax is much less esteemed than the two first sorts; though, when freed from the woody matter, it proves superior in point of fragrantcy to either of them. Rectified spirit, the common menstruum of resins, dissolves the storax, leaving the wood behind; nor does this tincture lose considerably of its valuable parts, in being inspissated to a solid consistence; whilst aqueous liquors elevate almost all the fragrantcy of the storax.

Storax is one of the most agreeable of the odoriferous resins, and may be exhibited to great advantage in languors and debilities of the nervous system: it is not, however, much used in common practice, unless as an ingredient in the traumatic balm, the compound powder and electuary of scordium, the storax pill, *confectio Paulina*, mithridate, and theriaca.

Liquid STORAX. What is most commonly met with under this name, is a soft resinous substance, of a grey colour, a weak smell, similar to that of the foregoing solid storax: it is supposed to be compounded of solid storax, resin, wine, and oil, beaten up together into a proper consistence. The genuine liquid storax, according to Petiver's account, (Phil. Transact, n° 313), is obtained from a tree growing in the island Cobros in the Red Sea. The preparers of this commodity yearly clear off the bark of the trees, and boil it in sea-water to the consistence of bird-lime: the resinous matter which floats upon the surface is taken off, liquefied again in boiling water, and passed through a strainer. The purer part which passes through, and the more impure which remains on the strainer, and contains a considerable portion of the substance of the bark, are both sent to Mocco, from whence they are sometimes, though very rarely, brought to us. The first is of the consistence of honey, tenacious, of a reddish or ash-brown colour, an acrid unctuous taste, approaching in smell to the solid storax, but so strong as to be disagreeable; the other is full of woody matter, and much weaker in smell. Liquid storax among us is scarce ever made use of in medicine, and not often found in the shops.

STORK, in ornithology. See ARDEA.

STOVES, in gardening, are buildings erected for the preservation of tender exotic plants, which, without that assistance, will not bear the cold of our win-

ter, because they require an artificial warmth.

Stoves are of two kinds, distinguished by the names of the *dry* and the *bark stoves*.

The *dry stove* has the flues, in which the smoke is carried, either laid under the pavement of the floor, or erected in the back-part of the house over each other, and returned six or eight times all along the stove. In these stoves the plants are placed on scaffolds and benches of boards, raised above one another; and the plants principally preserved in these, are the aloes, cereuses, euphorbiums, tithymals, and other succulent plants, which are impatient of moisture in winter; and therefore are not to be kept among trees or herbaceous plants, which perish freely.

The *bark stoves* are made with a large pit, nearly of the length of the house, which is three feet deep, and six or seven feet wide. This pit is to be filled with fresh tanner's bark to make a hot-bed; and in this the pots, containing the tender plants, are to be plunged.

Stoves for heating Rooms. The most simple contrivance of this kind is that described by Dr Lewis in his *Commercium Philosophico-technicum*. He there recommends the two crucibles which he makes use of for a chemical furnace*, the one inverted over the other, and the joining secured by a hoop. These furnaces, says he, may be used likewise as a common stove, for keeping a room warm with a little quantity of fuel.—There are three general intentions which have been pursued in contrivances for this purpose: 1. Making the fuel take fire by degrees, and consume slowly; 2. conducting its heat, or the air warmed by it, through a number of passages or circulations, that the heat, instead of being carried up the chimney and thus lost, may be detained in these passages, and thence communicated to the air of the room to which they lie exposed; and 3. applying to the fire a quantity of solid matter, which, being once heated, preserves its heat long. Some ingenious furnaces, on these principles, are described in the Transactions of the Swedish academy, and in the second edition of Reaumur's Art of hatching Birds. All these contrivances are united in the following combination of the two pots and the hoop.

The undermost pot has the small grate introduced into its lower part, the fire-place door closed, and the ash-pit door or the bottom hole open for admitting air. Being then charged with small pieces of charcoal, and some lighted coals thrown above them, its top is covered by the largest of the grates; and on this is placed the hoop and dome, filled with balls of baked earth, or with pieces of bricks, so disposed as to leave small vacancies between them. If the stove is placed in the middle of a room, its injurious burnt air may be carried off by a pipe inserted laterally into the larger door of the dome, and communicating at the other end, which should be raised eight or ten inches, with the chimney of the room; all the other apertures of the dome being closed.

The furnace thus charged, will keep up a moderate and nearly equal warmth for many hours, without injury or offence; the charcoal burning down exceedingly slowly, and the heated balls or bricks continuing the warmth for a considerable time after the fuel is consumed. Fresh charcoal may be occasionally supplied

Stonbridge Stow, plied through the door above the grate: the check which the balls give to the motion of the air through the furnace renders the consumption of this also slow; and it may still be made more so at pleasure, by stopping a part of the aperture which admits the air, or of the pipe or chimney which carries it off.

STOURBRIDGE, or STURBICH, the name of a field near Cambridge, noted for its famous fair kept annually on the 7th of September, and which continues for a fortnight. The commodities are, horses, hops, iron, wool, leather, cheese, &c. This place is also noted for an excellent species of clay capable of resisting an intense heat. It is used in making pots for glasshouses, fire-bricks, &c. and is sold at an high price.

STOW, the name of a market-town in Gloucestershire in England, situated in W. Long. 1. 45. N. Lat. 51. 50. It is also the name of a fine seat of the earl of Temple in Buckinghamshire. Here are the best gardens in England, adorned with busts, statues, obelisks, pavilions, and temples. It is two miles from the town of Buckingham.

STOW (John), the industrious historian, son of Thomas Stow merchant-taylor of St Michael's, Cornhill, in London, was born about the year 1525. Of the early part of his life we know very little, except that he was bred to his father's business, which in the year 1560 he relinquished, devoting himself entirely to the study of our ancient historians, chronicles, annals, charters, registers, and records. Of these he made a considerable collection, travelling for that purpose to different parts of the kingdom, and transcribing such manuscripts as he could not purchase. But this profession of an antiquary being attended with no present emolument, he was obliged for subsistence to return to his trade. It happened, however, that his talents and necessities were made known to Dr Parker archbishop of Canterbury; who being himself an antiquary, encouraged and enabled Mr Stow to prosecute his darling study. In these times of persecution, though Elizabeth was then upon the throne, honest John Stow did not escape danger. His collection of Popish records were deemed cause of suspicion. His younger brother Thomas preferred no less than 140 articles against him before the ecclesiastical commission; but the proof being insufficient, he was acquitted. In 1565 he first published his Summary of the Chronicles of England. About the year 1584 he began his Survey of London. In 1585 he was one of the two collectors for a great muster of Limestreet ward: in the same year he petitioned the corporation of London to bestow on him the benefit of two freemen, to enable him to publish his survey; and in 1589 he petitioned again for a pension. Whether he succeeded, is not known. He was principally concerned in the second edition of Hollinshed's chronicle, published in 1587. He also corrected, and twice augmented, Chaucer's works, published in 1561 and in 1597. His survey of London was first published in 1598. To these laborious works he would gladly have added his large Chronicle, or History of England; but he lived only to publish an abstract of it, under the title of *Flores Historiarum*. The folio volume, which was printed after his death, with the title of *Stow's Chronicle*, was taken from his papers by Edmund

Howes. Having thus spent his life and fortune in these laborious pursuits, he was at last obliged to solicit the charitable and well-disposed for relief. For this purpose, king James I. granted him, in 1603, a brief, which was renewed in 1604, authorising him to collect in churches the benefactions of his fellow-citizens. He died in April 1605, aged 80; and was buried in his parish-church of St Andrew's Underhaft, where his widow erected a decent monument to his memory. John Stow was a most indefatigable antiquarian, a faithful historian, and an honest man.

STOWMARKET, a town of Suffolk in England, situated in E. Long. 1. 10. N. Lat. 52. 20. It is a large handsome place, situated between the branches of the rivers Gyppe and Orwell, and is remarkable for having the best cherries in England.

STOWAGE, the general disposition of the several materials contained in a ship's hold, with regard to their figure, magnitude, or solidity.

In the stowage of different articles, as ballast, casks, cases, bales, and boxes, there are several general rules to be observed, according to the circumstances or qualities of those materials. The casks which contain any liquid, are, according to the sea-phrase, to be *burg-up* and *bilge-free*, i. e. closely wedged up in an horizontal position, and resting on their quarters: so that the bilges, where they are thickest, being entirely free all round, cannot rub against each other by the motion of the vessel. Dry goods, or such as may be damaged by the water, are to be carefully inclosed in casks, bales, cases, or wrappers; and wedged off from the bottom and sides of the ship, as well as from the bow, masts, and pump-well. Due attention must likewise be had to their disposition with regard to each other, and to the trim and centre of gravity of the ship; so that the heaviest may always be nearest the keel, and the lightest gradually above them.

STRABISMUS, squinting. See MEDICINE, n^o 476.

STRABO, a celebrated Greek geographer, philosopher, and historian, was born at Amasia, and was defended from a family settled at Gnosias in Crete. He was the disciple of Xenarchus, a Peripatetic philosopher, and at length attached himself to the Stoics. He contracted a strict friendship with Cornelius Gallus, governor of Egypt; and travelled into several countries to observe the situation of places, and the customs of nations. He flourished under Augustus; and died under Tiberius about the year 25, in a very advanced age. He composed several works; all of which are lost, except his *Geography* in 17 books; which are justly esteemed very precious remains of antiquity. The two first books are employed in showing, that the study of geography is not only worthy of, but even necessary to, a philosopher; the third describes Spain; the fourth, Gaul and the Britannie isles; the fifth and sixth, Italy and the adjacent isles; the seventh, which is imperfect at the end, Germany, the countries of the Getæ and Illyrii, Taurica, Chersonesus, and Epirus; the eighth, ninth, and tenth, Greece with the neighbouring isles; the four following, Asia within Mount Taurus; the fifteenth and sixteenth, Asia without Taurus, India, Persia, Syria, Arabia; and the seventeenth, Egypt, Ethiopia, Carthage, and other places of Africa. Strabo's work

Stow-market
Strabo.

Strada,
Strand.

was published with a Latin version by Xylander, and notes by Isaac Casaubon, at Paris, 1620, in folio; but the best edition is that of Amsterdam in 1707, in two volumes folio, by the learned Theodore Janfonius ab Almelooveen, with the entire notes of Xylander, Casaubon, Meursius, Cluver, Holstenius, Salmasius, Bochart, Ez. Spanheim, Cellarius, and others. To this edition is subjoined the *Chresmatibus*, or epitome of Strabo; which, according to Mr Dodwell, who has written a very elaborate and learned dissertation about it, was made by some unknown person between the years of Christ 676 and 956. It has been found of some use, not only in helping to correct the original, but in supplying in some measure the defect in the seventh book. Mr Dodwell's dissertation is prefixed to this edition.

STRADA (Famianus), a very ingenious and learned Jesuit, was born at Rome the latter end of the 16th century, and taught rhetoric there, in a public manner, for fifteen years. He wrote several pieces upon the art of oratory, and published some orations with a view of illustrating by example what he had inculcated by precept. But his *Prolusiones Academicæ*, and his *Historia de Bello Belgico*, are the works which raised his reputation, and have preserved his memory. His history of the war of Flanders was published at Rome; the first deced in 1640, the second in 1647; the whole extending from the death of Charles V. which happened in 1558, to the year 1590. It is written in good Latin, as all allow; but its merit in other respects has been variously determined. His *Prolusiones Academicæ* show great ingenuity, and a masterly skill in classical literature; that prolusion especially in which he introduces Lucan, Lucretius, Claudian, Ovid, Statius, and Virgil, each of them versifying according to his own strain. They have been often printed.—We know not the year of Strada's birth or of his death.

STRAIN, in surgery, a pain occasioned by the violent extension of some membranous or tendinous part. See SURGERY.

STRAIT, a narrow channel, or arm of the sea, contained between two opposite shores; as the straits of Gibraltar, the straits of Sundra, the straits of Dover, &c.

STRALSUND, a strong and rich sea-port town of Germany, in Hither Pomerania, and was formerly an important trading-place. In 1678 it was forced to surrender to the elector of Brandenburg, after 1800 houses had been burnt to ashes in one night's time. After this the Swedes defended it to the last extremity; and Charles XII. in 1714, came hither after his return out of Turkey. But the crown of Sweden not being able to hold out against five great powers, it was forced to submit in 1715. In 1720, it was rendered back to Sweden, but in a very poor condition. It is almost surrounded by the sea and the lake Francken, and has a harbour separated from the isle of Rugen by a narrow strait. It is 15 miles north-west of Grippswald, and 32 north-east of Gustrow. E. Lon. 13. 37. N. Lat. 54. 23.

STRAND (*Saxon*), any shore or bank of a sea or great river. Hence the street in the west suburbs of London, which lay next the shore or bank of the Thames, was called the *Strand*. An immunity from custom, and all impositions upon goods or vessels by

land or water, was usually expressed by *strand* or *stream*.

STRANDED (from the Saxon *Strand*), is when a ship is by tempest, or by ill steerage, run on ground, and so perishes. Where a vessel is stranded, justices of the peace, &c. shall command constables near the sea-coasts to call assistance for the preservation of the ship; and officers of men of war are to be aiding and assisting thereto.

STRANGLES, in farriery. See there, § x.

STRANGURY, a suppression of urine. See MEDICINE, n° 234.

STRASBURG, an ancient, large, handsome, populous, and strong city of France in Alsace. It contains about 200 streets, part of which are very narrow, and most of the houses are built after the ancient taste. However, there are a great number of handsome buildings, such as the hotel of the marshal of France, who is commander of the city; the hotel of the cardinal of Rouen, the bishop's palace, the Jesuits college, the royal hospital, the hotel of Hesse-Darmstadt, the arsenal, the town-house, and the cathedral. It has a wooden bridge over the Rhine, which is thought to be one of the finest in Europe; as is likewise the cathedral church, whose tower is the handsomest in Germany, and the clock is greatly admired by all travellers. Some look upon it as one of the wonders of the world, and the steeple is allowed to be the highest in Europe. The clock not only shows the hours of the day, but the motion of the sun, moon, and stars. Among other things there is an angel, which turns an hour-glass every hour; and the twelve apostles proclaim noon, by each of them striking a blow with a hammer on a bell. There is likewise a cock, which is a piece of clock-work, that crows every hour. There are 700 steps up to the tower or steeple, it being 500 feet high. It was a free and imperial city; but the king of France became master of it in 1681, and greatly augmented the fortifications, though before it had as many cannon as there are days in the year. The inhabitants were formerly Protestants, and carried on a great trade; but most of them have been obliged to embrace the Romish superstition, though there is still a sort of toleration. It is seated on the river Ill, 55 miles N. of Basil, 112 S. W. of Mentz, and 255 E. of Paris. E. Lon. 7. 51. N. Lat. 34. 35.

STRATA, in natural history, the several beds or layers of different matters whereof the earth is composed.

The strata whereof the earth is composed are so very different in different countries, that it is impossible to say any thing concerning them that may be generally applicable: and indeed the depths to which we can penetrate are so small, that only a very few can be known to us at any rate; those that lie near the centre, or even a great way from it, being for ever hid. The reason why we cannot penetrate to any great depth is, that as we go down, the air becomes foul, loaded with pernicious vapours, inflammable air, fixed air, &c. which destroy the miners, and there is no possibility of going on. In many places, however, these vapours become pernicious much sooner than others, particularly where sulphureous minerals abound, as in mines of metal, coal, &c.

But however great differences there may be among
the

Stranded

Strata.

Strata.

the under strata, the upper one is in some respects the same all over the globe, at least in this respect, that it is fit for the support of vegetables, which the others are not, without long exposure to the air. Properly speaking, indeed, the upper stratum of the earth all round, is composed of the pure vegetable mold, tho' in many places it is mixed with large quantities of other strata, as clay, sand, gravel, &c.; and hence proceed the differences of soils so well known to those who practise agriculture.

It has been supposed, by some naturalists, that the different strata of which the earth is composed were originally formed at the creation, and have continued in a manner immutable ever since: but this cannot possibly have been the case, since we find that many of the strata are strangely intermixed with each other; the bones of animals both marine and terrestrial are frequently found at great depths in the earth; beds of oyster-shells are found of immense extent in several countries; and concerning these and other shell-fish, it is remarkable, that they are generally found much farther from the surface than the bones or teeth either of marine or terrestrial animals. Neither are the shells or other remains of fish found in those countries adjoining to the seas where they grow naturally, but in the most distant regions. Mr Whitehurst, in his Inquiry into the original state and formation of the earth, has given the following account of many different kinds of animals, whose shells and other remains or *exuvie* are found in England; though at present the living animals are not to be found except in the East and West Indies.

A CATALOGUE of EXTRANEOUS FOSSILS, showing where they were dug up; also their native Climates. Mostly selected from the curious Cabinet of Mr NEILSON, in King-Street, Red-Lion Square.

Their Names, and Places where found.	Native Climates.
CHAMBERED NAUTILUS. Sheppy Islands; Richmond in Surrey; Sherbone in Dorsetshire,	Chinese Ocean and other Parts of that great Sea.
TEETH OF SHARKS. Sheppy Island, Oxfordshire, Middlesex, Surrey, Northamptonshire,	East and West Indies.
SEA-TORTOISE, several kinds; the Hawk-bill, Loggerhead, and Green species. Sheppy Island,	West Indies.
MANGROVE TREE OYSTERS. Sheppy Island,	West Indies.
COXCOMB TREE OYSTERS. Oxfordshire, Gloucestershire, Dorsetshire, and Hanover,	Coast of Guinea.
VERTEBRAE and PALATES of the ORBES. Sheppy Islands, and many other parts of England,	East and West Indies.
CROCODILE. Germany, Derbyshire, Nottinghamshire, Oxfordshire, and Yorkshire,	East and West Indies.
ALLIGATOR'S TEETH. Oxfordshire, Sheppy Island,	East and West Indies.
THE BANDED BUCCINUM. Oxfordshire, and the Alps,	West Indies.
THE DIPPING SNAIL, and STAR FISH. Sheppy Island,	West Indies.
TAIL BUCCINUM. Sheppy Island, Hordel Cliff, Hampshire,	East Indies.

Strata.

Nothing has more perplexed those who undertake to form theories of the earth than these appearances. Some have at once boldly asserted, from these and other phenomena, that the world is eternal. Others have had recourse to the universal deluge. Some, among whom is the Count de Buffon, endeavour to prove that the ocean and dry land are perpetually changing places; that for many ages the highest mountains have been covered with water, in consequence of which the marine animals just mentioned were generated in such vast quantities, that the waters will again cover these mountains, the habitable part of the earth become sea, and the sea become dry land as before, &c. Others have imagined that they might be occasioned by volcanoes, earthquakes, &c. which confound the different strata, and often intermix the productions of the sea with those of the dry land.

These subjects have been discussed under the article EARTH, to which therefore we refer the reader; and shall conclude with some account of the strata in those places where they have been most particularly observed.

Under the article NATURAL HISTORY, Sect. I. it is observed, that the upper strata of the earth and mountains generally consist of rag-stone, the next of slate, the third of marble filled with petrifications, the fourth again of slate; and the next of free-stone. But we are far from considering this as a rule which holds universally. The strata differ exceedingly in a great number of places; some instances of which we shall give from Mr Whitehurst.—At Alfreton Common in Derbyshire, the strata are,

A TABLE of the STRATA at ALFRETON-COMMON.

Numb.	Feet. Inch.
1 CLAY	7 0
2 RATCHELL, fragments of stone	9 0
3 BIND, indurated clay	13 4
4 STONE argillaceous, or concreted clay	6 0
5 BIND	8 8
6 BIND	25 0
7 STONE, a black colour	5 0
8 BIND	2 0
9 STONE	2 0
10 BIND	5 0
11 BIND	5 0
12 COAL	1 6
13 BIND	1 6
14 STONE	23 0
15 STONE	14 0
16 BIND	7 0
17 SMUTT, a black substance, resembling a stratum of coal-dust	3 0
18 BIND	3 0
19 STONE	20 0
20 BIND	16 0
21 COAL	7 4
	184 4

A TABLE of the STRATA at WEST-HALLAN.

Numb.	Feet. Inch.
1 CLAY	7 6
2 BIND	48 0
3 SMUTT	1 6
4 CUNCH, or indurated clay	4 9

Strata.	Numb.	Brought over	Fect. inch.
5	BIND	-	3 0
6	STONE	-	2 3
7	BIND	-	1 0
8	STONE	-	1 0
9	BIND	-	3 0
10	STONE	-	1 0
11	BIND	-	16 0
12	SHALE	-	2 0
13	BIND	-	12 0
14	SHALE	-	3 0
15	CLUNCH, <i>stone and sometimes cank</i>	-	54 0
16	SOFT COAL	-	4 0
17	CLAY	-	0 6
18	SOFT COAL	-	4 6
19	CLUNCH and BIND	-	21 0
20	COAL	-	1 0
21	BIND	-	1 0
22	<i>Strong, broad BIND</i>	-	25 0
23	COAL	-	6 0

222 3

Mr Forster has given an account of some of the strata of the South-Sea islands, the substance of which may be seen in the following table.

SOUTH GEORGIA.

1. No soil, except in a few crevices of the rocks.
2. Ponderous slate, with some iron particles, in horizontal strata, perpendicularly intersected with veins of quartz.

Southern Isle of New Zealand.

1. Fine light black mould, in some places nine inches deep, but generally not so much.
2. An argillaceous substance, nearly related to the clafs of TALCONS, turned into earth by the action of the air.
3. The same substance farther indurated, in oblique strata, generally dipping to the south.

EASTER ISLAND.

1. Reddish-brown dusty mould, looking as if it had been burnt.
2. Burnt rocks, resembling slags or dross and other volcanic matters.

MARQUESAS.

1. Clay mixed with mould.
2. An earthy argillaceous substance mixed with tarras and puzzolana.

O-TAHITEE.

The shores are coral rock, extending from the reef encircling these isles to the very high water-mark. There begins the sand, formed in some places from small shells and rubbed pieces of coral; but in others the shores are covered with blackish sand, consisting of the former sort mixed with black, sometimes glittering, particles of mica, and here and there some particles of the refractory iron ores called in England SKIM, the *ferrum micaceum* of Linnæus, and KALL the *molybdenum spuma lupi* of the same author. The plains from the shores to the foot of the hills are covered with a very fine thick stratum of black mould, mixed with the above-mentioned sand, which the natives manure with shells. The first and lower range of hills are formed of a red ochreous earth,

sometimes so intensely red, that the natives use it to paint their canoes and cloth. The higher hills consist of a hard, compact, and stiff clayey substance, hardening into stone when out of the reach of the sun and air. At the top of the valleys, along the banks of the rivers, are large masses of coarse granite stones of various mixtures; in one place are pillars of a grey, solid basalt; and, in several others, fragments of black basalt.

FRIENDLY ISLANDS and NEW HEBRIDES.

The same with the above.

MALLICOLLO.

Yellowish clay mixed with common sand.

TANNA, a Volcanic Island.

The chief strata here are clay mixed with aluminous earth, interperfed with lumps of pure chalk. The strata of the clay are about six inches, deviating very little from the horizontal line.

NEW CALEDONIA and the adjacent Isles.

The shores consist of shell-sand, and particles of quartz; the soil in the plains a black mould mixed with this sand. The sides of the hills composed of a yellow ochreous clay, richly spangled with small particles of cat-silver, or a whitish kind of daze, the *mica argentea* of Linnæus. The higher parts of the hills consist of a stone called by the German miners *gestelstein*, composed of quartz and great lumps of the above cat-silver. The latter is sometimes of an intensely red or orange colour, by means of an iron ochre.

“ From the above account, “ says Mr Forster, “ it appears, I think, evidently, that all the high tropical isles of the South Sea have been subject to the action of volcanoes. Pyritical and sulphureous substances, together with a few iron-stones, and some vestiges of copper, are no doubt found in several of them: but the mountains of New Caledonia are the most likely to contain the richest metallic veins; and the same opinion, I suspect, may be formed of the mountains in New Zealand.”

In the city of Modena in Italy, and for some miles round that place, there is the most singular arrangement of strata perhaps in the whole world. From the surface of the ground to the depth of 14 feet, they meet with nothing but the ruins of an ancient city. Being come to that depth, they find paved streets, artificers shops, floors of houses, and several pieces of inland work. After these ruins they find a very solid earth, which one would think had never been removed; but a little lower they find it black and marshy, and full of briars. Signior Ramazzini in one place found a heap of wheat entire at the depth of 24 feet; in another, he found silbert-trees with their nuts. At the depth of about 28 feet, they find a bed of chalk, about 11 feet deep, which cuts very easily; after this a bed of marshy earth of about two feet, mixed with rushes, leaves, and branches. After this bed comes another of chalk, nearly of the same thickness; and which ends at the depth of 42 feet. This is followed by another bed of marshy earth like the former; after which comes a new chalk-bed, but thinner, which also has a marshy bed underneath it. This ends at the depth of 63 feet; after which they find sand mingled with small gravel, and several marine shells. This

Stratum

Stratagem

Strix.

stratum is usually about five feet deep, and underneath it is a vast reservoir of water. It is on account of this water that the soil is so frequently dug, and the strata so well known in this part of the world. After coming to the sandy bottom above-mentioned, the workmen pierce the ground with a terebra or auger, when the water immediately springs up with great force, and fills the well to the brim. The flow is perpetual, and neither increases by rain, nor decreases by drought. Sometimes the auger meets with great trees, which give the workmen much trouble; they also sometimes see at the bottom of these wells, great bones, coals, flints, and pieces of iron.

It has been asserted by some, that the specific gravity of the strata constantly increased with the depth from the surface. But Dr Leigh, in his Natural History of Lancashire, speaking of the coal-pits, denies the strata to lie according to the laws of gravitation: observing, that the strata there are first a bed of marl, then free-stone, next iron-stone, then coal, or channel mire, then some other strata, then coal again, &c. This determined Mr Derham to make a nicer inquiry into the matter; accordingly, in 1712, he caused divers places to be bored, laying the several strata by themselves; and afterwards determined very carefully their specific gravity. The result was, that in his yard the strata were gradually specifically heavier and heavier, the lower and lower they went; but in another place in his fields, he could not perceive any difference in the specific gravities.

Acquainting the Royal Society therewith, their operator Mr Haukbee was ordered to try the strata of a coal-pit, which he did to the depth of 30 strata: the thickness and specific gravity of each whereof he gives us in a table in the Philosophical Transactions; and from the whole makes this inference, that it evidently appears the gravities of the several strata are in no manner of order, but purely casual, as if mixed by chance.

STRATAGEM, in the art of war, any device for deceiving and surprising an enemy.

STRATH, in the Scottish language, signifies a long narrow valley, with a river running along the bottom.

STRATHNAVER, a subdivision or district of the county of Sutherland in Scotland; bounded on the north by the ocean, on the east by Caithness, on the south by Sutherland properly so called, and on the west partly by Ross and partly by the ocean.

STRAWBERRY, in botany. See FRAGARIA.

STRAWBERRY-Tree. See ARBUTUS.

STRENGTH, in physiology, the same with force or power.

STRENGTHENERS, or CORROBORANTS, such medicines as add to the bulk and firmness of the solids; and such are all agglutinating and astringent medicines. See MATERIA MEDICA, n° 30. 36.

STRATED LEAF, among botanists, one that has a number of longitudinal furrows on its surface.

STRIKE, a measure of capacity, containing four bushels.

STRIX, the owl; in ornithology, a genus belonging to the order of accipitres. The bill is hooked, but has no cere or wax; the nostrils are covered with fetaceous feathers; the head is very large, as are also the ears and eyes; and the tongue is bifid. There

are 12 species; the most remarkable are,

1. The *Bubo*, or eagle-owl, in size is almost equal to an eagle. Irides bright yellow; head and whole body finely varied with lines, spots and specks of black, brown, cinereous, and ferruginous. Wings long; tail short, marked with dusky bars. Legs thick, covered to the very end of the toes with a close and full down of a testaceous colour. Claws great, much hooked, and dusky.—It has been shot in Scotland and in Yorkshire. It inhabits inaccessible rocks and desert places; and preys on hares and feathered game. Its appearance in cities was deemed an unlucky omen; Rome itself once underwent a lustration because one of them strayed into the capitol. The ancients had them in the utmost abhorrence; and thought them, like the screech-owls, the messengers of death. Pliny styles it *bubo funebris*, and *noctis monstrum*.

Solique culminibus ferali carmine bubo

Sape queri et longas in fletum ducere voces. VIRGIL.

Perch'd on the roof, the bird of night complains,

In lengthen'd shrieks and dire funeral strains.

2. The *otus*, or long-eared owl, is found, though not frequently, in the north of England, in Cheshire, and in Wales. Mr Hasselquist has seen it alive in Cairo, and it is not unfrequent all over Egypt. The weight of the female, according to Mr Willughby, is 10 ounces; the length 14 and a half; the breadth 3 feet 4 inches; the irides are of a bright yellow; the bill black; the breast and belly are of a dull yellow, marked with slender brown strokes pointing downwards; the thighs and vent-feathers of the same colour, but unpotted. The back and coverts of the wings are varied with deep brown and yellow; the quill-feathers of the same colour, but near the ends of the outmolt is a broad bar of red; the tail is marked with dusky and reddish bars, but beneath appears ash-coloured; the horns or ears are about an inch long, and consist of six feathers variegated with yellow and black; the feet are feathered down to the claws.

3. The short-eared owl, is 14 inches; extent three feet; the head is small and hawk-like; the bill is dusky; weight 14 ounces; the circle of feathers that immediately furrounds the eyes is black; the larger circle white, terminated with tawny and black; the feathers on the head, back, and coverts of the wings, are brown, edged with pale dull yellow; the breast and belly are of the same colour, marked with a few long narrow streaks of brown pointing downwards; the quill-feathers are dusky, barred with red; the tail is of a very deep brown, adorned on each side the shaft of the four middle feathers with a yellow circle which contains a brown spot; the tip of the tail is white. The horns of this species are very small, and each consists of only a single feather; these it can raise or depress at pleasure; and in a dead bird they are with difficulty discovered. This kind is scarcer than the former; both are solitary birds, avoiding inhabited places. These species may be called *long-winged owls*; the wings when closed reaching beyond the end of the tail; whereas in the common kinds they fall short of it.—This is a bird of passage, and has been observed to visit Lincolnshire in the beginning of October, and to retire early in the spring; so probably, as it performs its migrations with the woodcock, its summer-retreat is Norway. During day it lies hid in long:

long old grafs; when difturbed, it feldom flies far, but will light, and fit looking at one, at which time the horns may be feen very diftinctly. It has not been obferved to perch on trees like other owls; it will alfo fly in fearch of prey in cloudy hazy weather. Farmers are fond of feeing thefe birds in the fields, as they clear them from mice. It is found frequently on the hill of Hoy in the Orkneys, where it flies about and preys by day like a hawk. It is found alfo in Lancafhire, which is a hilly and wooded country; and in New-England and Newfoundland.

4. The flammae, or common white owl. The elegant plumage of this bird makes amends for the uncouthnefs of its form: a circle of foft white feathers furround the eyes. The upper part of the body, the coverts, and fecondary feathers of the wings, are of a fine pale yellow; on each fide the shafts are two grey and two white fots placed alternate: the exterior fides of the quill-feathers are yellow; the interior white, marked on each fide with four black fots: the lower fide of the body is wholly white; the interior fides of the feathers of the tail are white; the exterior marked with fome obfcure dusky bars; the legs are feathered to the feet: the feet are covered with fhort hairs: the edge of the middle claw is ferrated. The ufual weight is 11 ounces; its length 14 inches; its breadth 3 feet.—This fpecies is almoft domeftic; inhabiting, for the greateft part of the year, barns, hay-lofts, and other out-houfes; and is as ufe-ful in clearing thofe places from mice as the congenial cat: towards twilight it quits its perch, and takes a regular circuit round the fields, fkimming along the ground in queft of field-mice, and then returns to its ufual refidence: in the breeding-feafon it takes to the caves of churches, holes in lofty buildings, or hollows of trees. During the time the young are in the neft, the male and female alternately fall out in queft of food, make their circuit, beat the fields with the regularity of a fpaniel, and drop infantly on their prey in the grafs. They very feldom flay out above five minutes; return with their prey in their claws; but as it is neceffary to fhift it into their bill, they always alight for that purpofe on the roof, before they attempt to enter their neft. This fpecies does not hoot; but fnores and hiffes in a violent manner; and while it flies along will often fcream moft tremendously. Its only food is mice. As the young of thefe birds keep their neft for a great length of time, and are fed even long after they can fly, many hundreds of mice will fcarcely fuffice to fupply them with food. Owls caft up the bones, fur, or feathers of their prey, in form of fmall pellets, after they have devoured it, in the fame manner as hawks do. A gentleman, on grubbing up an old pollard-afh that had been the habitation of owls for many generations, found at the bottom many bufhels of this rejected ftuff. Some owls will, when they are fatisfied, like dogs, hide the remainder of their meat.

5. The ulula, or tawny owl. The female of this fpecies weighs 19 ounces; the length is 14 ounces; the breadth 2 feet 8 inches; the irides are dusky: the ears in this, as in all owls, very large; and their fenfe of hearing very exquifite. The colour of this kind is fufficient to diftinguifh it from every other: that of the back, head, coverts of the wings, and on

the fcapular feathers, being a fine tawny red, elegantly spotted and powdered with black or dusky fots of various fizes: on the coverts of the wings, and on the fcapulars, are feveral large white fots: the coverts of the tail are tawny, and quite free from any marks: the tail is variously blotched, barred and spotted with pale red and black; in the two middle feathers the red predominates: the breaft and belly are yellowifh, mixed with white, and marked with narrow black ftrokes pointing downwards: the legs are covered with feathers down to the toes.—This is a hardier fpecies than the former; and the young will feed on any dead thing, whereas thofe of the white owl muft have a conftant fupply of frefh meat. It is the *Strix* of *Aldrovandus*, and what we call the *screech-owl*; to which the folly of fuperftition had given the power of prefaging death by its cries. The ancients believed that it fucked the blood of young children: a faft not incredible; for *Hafelquift* defcribes a fpecies found in Syria, which frequently in the evening flies in at the windows, and deftroys the helpless infant.

Noctē volant, pueroque petunt matricis egentem,

Et vitulum cunctis corpora reptā laia.

Corpere dicuntur laetitia vincta regifris,

Et plenum potu fanguine guttur habent.

Et illis ftrigibus nomen, fed nominis hujus

Caufa quod horrenda ftridere nocte folent. Ovid *Faft.* vi. 135.

6. The ulula, or brown owl, agrees with the former in its marks; differing only in the colours: in this, the head, wings, and back, are of a deep brown, spotted with black in the fame manner as the former: the coverts of the wings and the fcapulars are adorned with fimilar white fots: the exterior edges of the four firft quill-feathers in both are ferrated: the breaft in this is of a very pale afh-colour mixed with tawny, and marked with oblong jagged fots: the feet, too, are feathered down to the very claws: the circle round the face is afh-coloured, spotted with brown.—Both thefe fpecies inhabit woods, where they refide the whole day: in the night they are very clamorous; and when they hoot, their throats are inflated to the fize of an hen's egg. In the dusk they approach our dwellings; and will frequently enter pigeon-houfes, and make great havoc in them. They deftroy numbers of little leverets, as appears by the legs frequently found in their nefts. They alfo kill abundance of moles, and fkin them with as much dexterity as a cook does a rabbit. Thefe build in hollow trees or ruined edifices; lay four eggs, of an elliptic form, and of a whitifh colour.

7. The pafferina, or little owl, is very rare in England; it is fometimes found in Yorkfhire, Flintfhire, and alfo near London: in fize it fcarcely exceeds a thrufh, though the fulnefs of its plumage makes it appear larger: the irides are of a light yellow; the bill of a paper-colour; the feathers that encircle the face are white tipped with black; the head brown, spotted with white; on the breaft is a mixture of white and brown; the belly is white, marked with a few brown fots; the tail of the fame colour with the back; in each feather barred with white; in each adorned with circular white fots, placed oppofite to one another on both fides the shaft; the legs and feet are covered with feathers down to the claws.—The Italians made ufe of this owl to decoy fmall birds to the lime twig: the method

Strobilus method of which is exhibited in Olina's *Uccelliera*, p. 65. Mr Stuart, author of the *Antiquities of Athens*, informed Mr Pennant, that this species of owl was very common in Attica; that they were birds of passage, and appeared there the beginning of April in great numbers; that they bred there; and that they retired at the same time as the flocks, whose arrival they a little preceded.

8. The *orientalis*, or oriental owl, is of the size of the common owl, living in the ruins and old deserted houses of Egypt and Syria, and sometimes in those that are inhabited. The Arabs in Egypt call it *massafa*; the Syrians, *bana*. It is very ravenous in Syria; and in the evenings, if the windows are left open, it flies into houses, and kills infants, unless they are carefully watched; wherefore the women are much afraid of it.

STROBILUS, in botany. See there, p. 1293.

STROMBOLI, the most northerly of the Lipari islands, lying on the Tuscan Sea, towards the coast of Sicily. There are but a few families which inhabit one side of it; for the middle parts are raised up into an high volcano, continually throwing out fire and smoke. Sir William Hamilton passed by this island in his voyage to Sicily, but did not land. He observed that the volcano threw out great quantities of stones, and ashes; but no lava, excepting now and then a very little, which would run a small way down the side of the mountain, and there congeal.

STROPHE, in ancient poetry, a certain number of verses, including a perfect sense, and making the first part of an ode. See **POETRY**, p. 6305.

STRUMÆ, scrophulous tumours arising on the neck and throat, constituting what is commonly called the *king's evil*. See **MEDICINE**, n° 446.

STRUTHIO, the ostrich; a genus belonging to the order of grallæ. The bill is somewhat conical; the nostrils are oval; the wings short, and not fit for flying; and the feet are of the running kind. There are three species.

1. The camelus, or common ostrich, is the largest of all birds. Travellers affirm that they are seen as tall as a man on horseback; and even some of those that have been brought into England were above seven feet high. The head and bill somewhat resemble those of a duck; and the neck may be likened to that of a swan, but that it is much longer; the legs and thighs resemble those of an hen; though the whole appearance bears a strong resemblance to that of a camel. But though usually seven feet high from the top of the head to the ground, from the back it is only four; so that the head and neck are above three feet long. From the top of the head to the rump, when the neck is stretched out in a right line, it is six feet long, and the tail is about a foot more. One of the wings, without the feathers, is a foot and an half; and being stretched out, with the feathers, is three feet.

The plumage is much alike in all; that is, generally black and white; though some of them are said to be grey. There are no feathers on the sides, nor yet on the thighs, nor under the wings. The lower part of the neck, about half way, is covered with still smaller feathers than those on the belly and back; and those also are of different colours.

All these feathers are of the same kind, and pecu-

liar to the ostrich; for other birds have several sorts, some of which are soft and downy, and others hard and strong. Ostrich-feathers are almost all as soft as down, being utterly unfit to serve the animal for flying, and still less adapted to be a proper defence against external injury. The feathers of other birds have the webs broader on one side than the other, but those of the ostrich have their shaft exactly in the middle. The upper part of the head and neck are covered with a very fine clear white hair, that shines like the bristles of a hog; and in some places there are small tufts of it, consisting of about twelve hairs, which grow from a single shaft about the thickness of a pin.

At the end of each wing, there is a kind of spur almost like the quill of a porcupine. It is an inch long, being hollow and of an horny substance. There are two of these on each wing; the largest of which is at the extremity of the bone of the wing, and the other a foot lower. The neck seems to be more slender in proportion to that of other birds, from its not being furnished with feathers. The skin in this part is of a livid flesh-colour, which some, improperly, would have to be blue. The bill is short and pointed, and two inches and an half at the beginning. The external form of the eye is like that of a man, the upper eyelid being adorned with eye-lashes which are longer than those on the lid below. The tongue is small, very short, and composed of cartilages, ligaments, and membranes, intermixed with fleshy fibres. In some it is about an inch long, and very thick at the bottom; others it is but half an inch, being a little forked at the end.

The thighs are very fleshy and large, being covered with a white skin, inclining to redness, and wrinkled in the manner of a net, whose meshes will admit the end of a finger. Some have very small feathers here and there on the thighs; and others again have neither feathers nor wrinkles. What are called the legs of birds, in this are covered before with large scales. The end of the foot is cloven, and has two very large toes, which, like the leg, are covered with scales. These toes are of unequal sizes. The largest, which is on the inside, is seven inches long, including the claw, which is near three-fourths of an inch in length, and almost as broad. The other toe is but four inches long, and is without a claw.

The internal parts of this animal are formed with no less surprising peculiarity. At the top of the breast, under the skin, the fat is two inches thick; and on the fore-part of the belly it is as hard as suet, and about two inches and an half thick in some places. It has two distinct stomachs. The first, which is lowermost, in its natural situation somewhat resembles the crop in other birds; but it is considerably larger than the other stomach, and is furnished with strong muscular fibres, as well circular as longitudinal. The second stomach, or gizzard, has outwardly the shape of the stomach of a man; and upon opening is always found filled with a variety of discordant substances; hay, grass, barley, beans, bones, and stones, some of which exceed in size a pullet's egg. The kidneys are eight inches long and two broad, and differ from those of other birds in not being divided into lobes. The heart and lungs are separated by a midriff as in quadrupeds; and the parts of generation also bear a very strong

Struthio. strong resemblance and analogy.

The ostrich is a native only of the torrid regions of Africa, and has long been celebrated by those who have had occasion to mention the animals of that region. Its flesh is proscribed in Scripture as unfit to be eaten; and most of the ancient writers describe it as well known in their times. Like the race of the elephant, it is transmitted down without mixture; and has never been known to breed out of that country which first produced it. It seems formed to live among the sandy and burning deserts of the torrid zone; and, as in some measure it owes its birth to their genial influence, so it seldom migrates into tracts more mild or more fertile. The Arabians assert that the ostrich never drinks; and the place of its habitation seems to confirm the assertion. In these formidable regions ostriches are seen in large flocks, which to the distant spectator appear like a regiment of cavalry, and have often alarmed a whole caravan. There is no desert, how barren soever, but what is capable of supplying these animals with provision; they eat almost every thing; and these barren tracts are thus doubly grateful, as they afford both food and security. The ostrich is of all other animals the most voracious. It will devour leather, grass, hair, iron, stones, or any thing that is given. Those substances which the coats of the stomach cannot soften, pass whole; so that glass, stones, or iron, are excluded in the form in which they were devoured. In an ostrich dissected by Ranby, there appeared such a quantity of heterogeneous substances, that it was wonderful how any animal could digest such an overcharge of nourishment. Valsineri also found the first stomach filled with a quantity of incongruous substances; grass, nuts, cords, stones, glass, brass, copper, iron, tin, lead, and wood; a piece of stone was found among the rest that weighed more than a pound. He saw one of these animals that was killed by devouring a quantity of quick-lime. It would seem that the ostrich is obliged to fill up the great capacity of its stomach in order to be at ease; but that nutritious substances not occurring, it pours in whatever offers to supply the void.

In their native deserts, however, it is probable, they live chiefly upon vegetables, where they lead an inoffensive and social life; the male, as Thevenot assures us, assorting with the female with connubial fidelity. They are said to be very much inclined to venery; and the make of the parts in both sexes seems to confirm the report. It is probable also they copulate like other birds, by compression; and they lay very large eggs, some of them being above five inches in diameter, and weighing above fifteen pounds. These eggs have a very hard shell, somewhat resembling those of the crocodile, except that those of the latter are less and rounder.

The season for laying depends on the climate where the animal is bred. In the northern parts of Africa, this season is about the beginning of July; in the south, it is about the latter end of December. These birds are very prolific, and lay generally from 40 to 50 eggs at one clutch. It has been commonly reported, that the female deposits them in the sand, and covering them up, leaves them to be hatched by the heat of the climate, and then permits the young to

shift for themselves. Very little of this, however, is true: no bird has a stronger affection for her young than the ostrich, nor none watches her eggs with greater assiduity. It happens, indeed, in those hot climates, that there is less necessity for the continual incubation of the female; and she more frequently leaves her eggs, which are in no danger of being chilled by the weather: but though she sometimes forsakes them by day, she always carefully broods over them by night; and Kolben, who has seen great numbers of them at the Cape of Good Hope, affirms, that they sit on their eggs like other birds, and that the male and female take this office by turns, as he had frequent opportunities of observing. Nor is it more true what is said of their forsaking their young after they are excluded the shell. On the contrary, the young ones are not even able to walk for several days after they are hatched. During this time, the old ones are very assiduous in supplying them with grass, and very careful to defend them from danger; nay, they encounter every danger in their defence. It was a way of taking them among the ancients, to plant a number of sharp stakes round the ostrich's nest in her absence, upon which she pierced herself at her return. The young, when brought forth, are of an ash-colour the first year, and are covered with feathers all over. But in time these feathers drop; and those parts which are covered assume a different and more becoming plumage.

The beauty of a part of this plumage, particularly the long feathers that compose the wings and tail, is the chief reason that man has been so active in pursuing this harmless bird to his deserts, and hunting it with no small degree of expence and labour. The ancients used those plumes in their helmets; the ladies of the east make them an ornament in their dress; and among us, our undertakers and our fine gentlemen still make use of them to decorate their hearse and their hats. Those feathers which are plucked from the animal while alive, are much more valued than those taken when dead, the latter being dry, light, and subject to be worm-eaten.

Beside the value of their plumage, some of the savage nations of Africa hunt them also for their flesh; which they consider as a dainty. They sometimes also breed these birds tame, to eat the young ones, of which the female is said to be the greatest delicacy. Some nations have obtained the name of *Struthophagi*, or *ostrich-eaters*, from their peculiar fondness for this food; and even the Romans themselves were not averse to it. Even among the Europeans now, the eggs of the ostrich are said to be well-tasted, and extremely nourishing; but they are too scarce to be fed upon, although a single egg be a sufficient entertainment for eight men.

As the spoils of the ostrich are thus valuable, it is not to be wondered at that man has become their most assiduous pursuer. For this purpose, the Arabians train up their best and swiftest horses, and hunt the ostrich still in view. Perhaps, of all other varieties of the chase, this, though the most laborious, is yet the most entertaining. As soon as the hunter comes within sight of his prey, he puts on his horse with a gentle gallop, so as to keep the ostrich still in sight; yet so as to terrify him from the plain into the moun-

Fig. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840,



Fig. 2. Tape.



Aug. 6.



Fig. 4. Ostreich.



Fig. 3. Calloway.



Fig. 3



Struthio.

tains. Of all known animals, the ostrich is by far the swiftest in running: upon observing himself, therefore, pursued at a distance, he begins to run at first but gently; either insensible of his danger, or sure of escaping. In this situation, he somewhat resembles a man at full speed; his wings, like two arms, keep working with a motion correspondent to that of his legs; and his speed would very soon snatch him from the view of his pursuers; but, unfortunately for the silly creature, instead of going off in a direct line, he takes his course in circles; while the hunters still make a small course within, relieve each other, meet him at unexpected turns, and keep him thus still employed, till followed, for two or three days together. At last, spent with fatigue and famine, and finding all power of escape impossible, he endeavours to hide himself from those enemies he cannot avoid, and covers his head in the sand or the first thicket he meets. Sometimes, however, he attempts to face his pursuers; and though in general the most gentle animal in nature, when driven to desperation, he defends himself with his beak, his wings, and his feet. Such is the force of his motion, that a man would be utterly unable to withstand him in the flock.

The Struthophagi have another method of taking this bird: they cover themselves with an ostrich's skin, and passing up an arm through the neck, thus counterfeited all the motions of this animal. By this artifice they approach the ostrich, which becomes an easy prey. He is sometimes also taken by dogs and nets: but the most usual way is that mentioned above.

When the Arabians have thus taken an ostrich, they cut its throat; and making a ligament below the opening, they shake the bird as one would rattle a barrel: then taking off the ligature, there runs out from the wound in the throat a considerable quantity of blood mixed with the fat of the animal; and this is considered as one of their greatest dainties. They next flea the bird; and of the skin, which is strong and thick, sometimes make a kind of vest, which answers the purposes of a cuirass and a buckler.

There are others who, more compassionate or more provident, do not kill their captive, but endeavour to tame it, for the purposes of supplying those feathers which are in so great request. The inhabitants of Dara and Lybia breed up whole flocks of them, and they are tamed with very little trouble. But it is not for their feathers alone that they are prized in this domestic state; they are often ridden upon and used as horses. Moore assures us, that at Joar he saw a man travelling upon an ostrich; and Adanson asserts, that at the factory of Podore he had two ostriches, which were then young, the strongest of which ran swifter than the best English racer, although he carried two negroes on his back. As soon as the animal perceived that it was thus loaded, it set off running with all its force, and made several circuits round the village; till at length the people were obliged to stop it by barring up the way. How far this strength and swiftness may be useful to mankind, even in a polished state, is a matter that perhaps deserves inquiry.

2. The emu.—Of this bird, which many call the *American ostrich*, but little is certainly known. It is an inhabitant of the new continent, and is chiefly found in Guiana, along the banks of the Oronoko,

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in the inland provinces of Brazil and Chili, and the vast forests that border on the mouth of the river Plata. Many other parts of South America were known to have them; but as men multiplied, these large and timorous birds either fell beneath their superior power, or fled from their vicinity.

The emu, though not so large as the ostrich, is only second to it in magnitude. It is generally found to be six feet high, measuring from its head to the ground. Its legs are three feet long, and its thigh is near as thick as that of a man. The toes differ from those of the ostrich, as there are three in the American bird, and but two in the former. Its neck is long, its head small, and the bill flatted like that of the ostrich; but in all other respects it more resembles the third species called the *casowary*. The form of the body appears round; the wings are short, and entirely unsuited for flying; and it entirely wants a tail. It is covered from the back and rump with long feathers, which fall backward, and cover the anus: these feathers are grey upon the back, and white on the belly. It goes very swiftly, and seems assisted in its motion by a kind of tubercle behind, like an heel, upon which, on plain ground, it treads very securely: in its course it uses a very odd kind of action, lifting up one wing, which it keeps elevated for a time, till, letting it drop, it lifts up the other. What the bird's intention may be in thus keeping only one wing up, is not easy to discover; whether it makes use of this as a sail to catch the wind, or whether as a rudder to turn its course, in order to avoid the arrows of the Indians, yet remains to be ascertained: however this be, the emu runs with such a swiftness, that the fleetest dogs are thrown out in the pursuit. One of them, finding itself surrounded by the hunters, darted among the dogs with such fury, that they made way to avoid its rage; and it escaped, by its amazing velocity, in safety to the mountains.

As this bird is but little known, so travellers have given a loose to their imaginations in describing some of its actions, which they were conscious could not be easily contradicted. This animal, says Nierenberg, is very peculiar in the hatching of its young. The male compels 20 or 30 of the females to lay their eggs in one nest; he then, when they have done laying, chafes them away, and places himself upon the eggs; however, he takes the singular precaution of laying two of the number aside, which he does not sit upon. When the young ones come forth, these two eggs are added; which the male having foreseen, breaks one, and then another, upon which multitudes of flies are found to settle; and these supply the young brood with a sufficiency of provision till they are able to shift for themselves.

On the other hand, Wafer asserts, that he has seen great quantities of this animal's eggs on the desert shores north of the river Plata; where they were buried in the sand, in order to be hatched by the heat of the climate. Both this, as well as the preceding account, may be doubted; and it is more probable that it was the crocodile's eggs which Wafer had seen, which are undoubtedly hatched in that manner.

When the young ones are hatched, they are familiar, and follow the first person they meet. I have been followed myself, says Wafer, by many of these

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young

Struthio.

Struthio. young ostriches; which at first are extremely harmless and simple; but as they grow older, they become more cunning and distrustful, and run so swift, that a greyhound can scarcely overtake them. Their flesh, in general, is good to be eaten, especially if they be young. It would be no difficult matter to rear up flocks of these animals tame, particularly as they are naturally so familiar; and they might be found to answer domestic purposes, like the hen or the turkey. Their maintenance could not be expensive, if, as Narborough says, they live entirely upon grass.

3. The cassowary is a bird which was first brought into Europe by the Dutch from Java in the East Indies; in which part of the world it is only to be found. Next to the preceding, it is the largest and the heaviest of the feathered species.

The cassowary, though not so large as the former, yet appears more bulky to the eye; its body being nearly equal, and its neck and legs much thicker and stronger in proportion; this conformation gives it an air of strength and force, which the fierceness and singularity of its countenance conspire to render formidable. It is five feet and an half long from the point of the bill to the extremity of the claws. The legs are two feet and an half high from the belly to the end of the claws. The head and neck together are a foot and an half; and the largest toe, including the claw, is five inches long. The claw alone of the least toe is three inches and a half in length. The wing is so small that it does not appear, it being hid under the feathers of the back. In other birds, a part of the feathers serve for flight, and are different from those that serve for merely covering; but in the cassowary all the feathers are of the same kind, and outwardly of the same colour. They are generally double, having two long shafts, which grow out of a short one which is fixed in the skin. Those that are double are always of an unequal length; for some are 14 inches long, particularly on the rump, while others are not above three. The beards that adorn the stem or shaft are about half-way to the end, very long, and as thick as an horse-hair, without being subdivided into fibres. The stem or shaft is flat, shining, black, and knotted below; and from each knot there proceeds a beard; likewise the beards at the end of the large feathers are perfectly black, and towards the root of a grey tawny colour; shorter, more soft, and throwing out fine fibres like down; so that nothing appears except the ends, which are hard and black; because the other part, composed of down, is quite covered. There are feathers on the head and neck; but they are so short and thinly sown, that the bird's skin appears naked, except towards the hinder part of the head, where they are a little longer. The feathers which adorn the rump are extremely thick; but do not differ in other respects from the rest, excepting their being longer. The wings, when they are deprived of their feathers, are but three inches long; and the feathers are like those on other parts of the body. The ends of the wings are adorned with five prickles, of different lengths and thickness, which bend like a bow; these are hollow from the roots to the very points, having only that slight substance within which all quills are known to have. The longest of these prickles is

11 inches; and it is a quarter of an inch in diameter at the root, being thicker there than towards the extremity; the point seems broken off.

The part, however, which most distinguishes this animal is the head; which, though small, like that of an ostrich, does not fail to inspire some degree of terror. It is bare of feathers, and is in a manner armed with an helmet of horny substance, that covers it from the root of the bill to near half the head backwards. This helmet is black before and yellow behind. Its substance is very hard, being formed by the elevation of the bone of the skull; and it consists of several plates, one over another, like the horn of an ox. Some have supposed that this was shed every year with the feathers; but the most probable opinion is, that it only exfoliates slowly like the beak. To the peculiar oddity of this natural armour, may be added the colour of the eye in this animal, which is a bright yellow; and the globe being above an inch and a half in diameter, give it an air equally fierce and extraordinary. The hole of the ear is very large and open, being only covered with small black feathers. The sides of the head, about the eye and ear, being deltitute of any covering, are blue, except the middle of the lower eye-lid, which is white. The part of the bill which answers to the upper jaw in other animals, is very hard at the edges above, and the extremity of it like that of a turkey-cock. The end of the lower mandible is slightly notched, and the whole is of a greyish brown, except a green spot on each side. As the beak admits a very wide opening, this contributes not a little to the bird's menacing appearance. The neck is of a violet-colour, inclining to that of slate; and it is red behind in several places, but chiefly in the middle. About the middle of the neck before, at the rise of the large feathers, there are two processes formed by the skin, which resemble somewhat the gills of a cock, but that they are blue as well as red. The skin which covers the fore-part of the breast, on which this bird leans and rests, is hard, callous, and without feathers. The thighs and legs are covered with feathers, and are extremely thick, strong, straight, and covered with scales of several shapes; but the legs are thicker a little above the foot than in any other place. The toes are likewise covered with scales, and are but three in number; for that which should be behind is wanting. The claws are of a hard solid substance, black without and white within.

The internal parts are equally remarkable. The cassowary unites with the double stomach of animals that live upon vegetables, the short intestines of those that live upon flesh. The intestines of the cassowary are 13 times shorter than those of the ostrich. The heart is very small, being but an inch and an half long, and an inch broad at the base. Upon the whole, it has the head of a warrior, the eye of a lion, the defence of a porcupine, and the swiftness of a courser.

Thus formed for a life of hostility, for terrifying others, and for its own defence, it might be expected that the cassowary was one of the most fierce and terrible animals of the creation. But nothing is so opposite to its natural character: it never attacks others; and instead of the bill, when attacked, it rather makes use of its legs, and kicks like a horse, or runs against

Struthio.

Struthio
Stucco.

its pursuer, beats him down, and treads him to the ground.

The manner of going of this animal is not less extraordinary than its appearance. Instead of going directly forward, it seems to kick up behind with one leg; and then making a bound onward with the other, it goes with such prodigious velocity, that the swiftest racer would be left far behind.

The same degree of voraciousness which we perceived in the ostrich, obtains as strongly here. The cassowary swallows every thing that comes within the capacity of its gullet. The Dutch assert, that it can devour not only glass, iron, and stones, but even live and burning coals, without testifying the smallest fear or feeling the least injury. It is said, that the passage of the food through its gullet is performed so speedily, that even the very eggs which it has swallowed whole pass through it unbroken in the same form they went down. In fact, the alimentary canal of this animal, as was observed above, is extremely short; and it may happen, that many kinds of food are indigestible in its stomach, as wheat or currants are to man, when swallowed whole.

The cassowary's eggs are of a grey-ash colour, inclining to green. They are not so large nor so round as those of the ostrich. They are marked with a number of little tubercles of a deep green, and the shell is not very thick. The largest of these is found to be 15 inches round one way, and about twelve the other.

The southern parts of the most eastern Indies seems to be the natural climate of the cassowary. Its domain, if we may so call it, begins where that of the ostrich terminates. The latter has never been found beyond the Ganges; while the cassowary is never seen nearer than the islands of Banda, Sumatra, Java, the Molucca islands, and the corresponding parts of the continent. Yet even here this animal seems not to have multiplied in any considerable degree, as we find one of the kings of Java making a present of one of these birds to the captain of a Dutch ship, considering it as a very great rarity.

STRYMON, (anc. geog.), formerly *Conopus*; a river constituting the ancient limits of Macedonia and Thrace; rising in mount Scombrus, (Aristotle). Authors differ as to the modern name of this river.

STRYPE (John), was descended from a German family, born at London, and educated at Cambridge. He was vicar of Low Layton in Essex, and distinguished himself by his compilations of *Lives and Memoirs*; in which, as Dr Birch remarks, his fidelity and industry will always give a value to his writings, however destitute they may be of the graces of style. He died in 1737, after having enjoyed his vicarage near 68 years.

STUCCO, in building, a composition of white

marble pulverized, and mixed with plaster of lime; and the whole being sifted and wrought up with water is to be used like common plaster: this is called by Pliny *marmoratum opus*, and *albarium opus*.

A patent has lately been granted to Mr B. Higgins for inventing a new kind of stucco or water-cement, more firm and durable than any heretofore. Its composition, as extracted from the specification signed by himself, is as follows. "Drift-sand, or quarry (A) sand, which consists chiefly of hard quartzose flat-faced grains with sharp angles; which is the freest, or may be most easily freed by washing, from clay, salts, and calcareous, gypseous, or other grains less hard and durable than quartz; which contains the smallest quantity of pyrites or heavy metallic matter inseparable by washing; and which suffers the smallest diminution of its bulk in washing in the following manner, is to be preferred before any other. And where a coarse and a fine sand of this kind, and corresponding in the size of their grains with the coarse and fine sands hereafter described, cannot be easily procured, let such sand of the foregoing quality be chosen as may be sorted and cleaned in the following manner.

"Let the sand be sifted in streaming clear water, through a sieve which shall give passage to all such grains as do not exceed one-sixteenth of an inch in diameter; and let the stream of water and the sifting be regulated so that all the sand, which is much finer than the Lynn-sand commonly used in the London glass-houses, together with clay and every other matter specifically lighter than sand, may be washed away with the stream, whilst the purer and coarser sand, which passes through the sieve, subsides in a convenient receptacle, and whilst the coarse rubbish and rubble remain on the sieve to be rejected.

"Let the sand which thus subsides in the receptacle be washed in clean streaming water, through a finer sieve, so as to be further cleaned and sorted into two parcels; a coarser, which will remain in the sieve which is to give passage to such grains of sand only as are less than one-thirtieth of an inch in diameter, and which is to be saved apart under the name of *coarse sand*; and a finer, which will pass through the sieve and subside in the water, and which is to be saved apart under the name of *fine sand*.—Let the coarse and the fine sand be dried separately, either in the sun or on a clean iron-plate set on a convenient furnace, in the manner of a sand-heat (B).

"Let lime be chosen (C) which is stone-lime, which heats the most in flaking, and flakes the quickest when duly watered; which is the freshest made and closest kept; which dissolves in distilled vinegar with the least effervescence, and leaves the smallest residue insoluble, and in this residue the smallest quantity of clay, gypsum, or martial matter.

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"Let

(A) "This is commonly called *pit-sand*.

(B) "The sand ought to be stirred up continually until it is dried, and is then to be taken off; for otherwise the evaporation will be very slow, and the sand which lies next the iron plate, by being overheated, will be discoloured.

(C) "The preference given to stone-lime is founded on the present practice in the burning of lime, and on the closer texture of it, which prevents it from being so soon injured by exposure to the air, as the more spongy chalk-lime is; not on the popular notion that stone-lime has something in it whereby it excels the best chalk in the cementing properties. The gypsum contained in lime-stone remains unaltered, or very little altered, in the lime, after the burning; but it is not to be expected that clay or martial matter should be found in their native state, in well-burned lime; for they concrete or vitrify with a part of the calcareous earth, and constitute the hard grains or lumps, which remain undissolved in weak acids, or are separable from the slaked lime by sifting it immediately through a sieve.

" Let the lime chosen according to these important rules, be put in a brags-wired sieve to the quantity of 14 pounds. Let the sieve be finer than either of the foregoing; the finer, the better it will be: let the lime be flaked (b) by plunging it in a butt filled with soft water, and raising it out quickly and suffering it to heat and fume, and by repeating this plunging and raising alternately, and agitating the lime, until it be made to pass through the sieve into the water; and let the part of the lime which does not easily pass through the sieve be rejected: and let fresh portions of the lime be thus used, until as many (c) ounces of lime have passed through the sieve as there are quarts of water in the butt. Let the water thus impregnated stand in the butt closely covered (e) until it becomes clear; and through wooden (g) cocks placed at different heights in the butt, let the clear liquor be drawn off as fast (h) and as low as the lime subsides, for use. This clear liquor I call the *cementing liquor* (i). The freer the water is from saline matter, the better will be the cementing liquor made with it.

" Let 56 pounds of the aforesaid chosen lime be flaked, by gradually sprinkling on it, and especially on the unflaked pieces, the cementing liquor, in a close (k) clean place. Let the flaked part be immediately (l) sifted thro' the last-mentioned fine brags-wired sieve: Let the lime which passes be used instantly or kept in air-tight vessels, and let the part of the lime which does not pass through the sieve be rejected (m).—This finer richer part of the lime which

passes through the sieve I call *purified lime*.

" Let bone-ash be prepared in the usual manner by grinding the whitest burnt bones, but let it be sifted to be much finer than the bone-ash commonly sold for making cupels.

" The most eligible materials for making my cement being thus prepared, take 56 pounds of the coarse sand and 42 pounds of the fine sand; mix them on a large plank of hard wood placed horizontally; then spread the sand so that it may stand to the height of six inches with a flat surface on the plank; wet it with the cementing liquor; and let any superfluous quantity of the liquor, which the sand in the condition described cannot retain, flow away off the plank. To the wettest sand add 14 pounds of the putrefied lime in several successive portions, mixing and beating them up together in the mean time with the instruments generally used in making fine mortar: then add 14 pounds of the bone-ash in successive portions, mixing and beating all together. The quicker and the more perfectly these materials are mixed and beaten together, and the sooner the cement thus formed is used, the better (n) it will be. This I call the *water-cement coarse-grained*, which is to be applied in building, pointing, plastering, stuccoing, or other work, as mortar and stucco now are; with this difference chiefly, that as this cement is shorter than mortar or common stucco, and dries sooner, it ought to be worked expeditiously in all cases; and in stuccoing, it ought to be laid on by sliding the trowel upwards

(b) " This method of impregnating the water with lime is not the only one which may be adopted. It is however preferred before others, because the water clears the sooner in consequence of its being warmed by the flaking lime; and the gypseous part of the lime does not diffuse itself in the water so freely in this way as it does when the lime is flaked to fine powder in the common method, and is then blended with the water; for the gypseous part of the lime flakes at first into grains rather than into fine powder, and will remain on the sieve after the pure lime has passed through, long enough to admit of the intended separation; but when the lime is otherwise flaked, the gypseous grains have time to flake to a finer powder, and passing through the sieve, dissolve in the water along with the lime. I have imagined that other advantages attended this method of preparing the lime-water, but I cannot yet speak of them with precision.

(c) " If the water contains no more acidulous gas than is usually found in river or rain water, a fourth-part of this quantity of lime, or less, will be sufficient.

(f) " The calcareous crust which forms on the surface of the water ought not to be broke, for it assists in excluding the air, and preventing the absorption of acidulous gas whereby the lime-water is spoiled.

(g) " Brags-cocks are apt to colour a part of the liquor.

(h) " Lime-water cannot be kept many days unimpaired, in any vessels that are not perfectly air-tight. If the liquor be drawn off before it clears, it will contain whitening, which is injurious; and if it be not instantly used after it is drawn limpid from the butt into open vessels, it will grow turbid again, and deposit the lime changed to whitening by the gas absorbed from the air. The calcareous matter which subsides in the butt resembles whitening the more nearly as the lime has been more sparingly employed; in the contrary circumstances, it approaches to the nature of lime; and in the intermediate state, it is fit for the common composition of the plasterers for inside stucco.

(i) " At the time of writing this specification, I preferred this term before that of lime-water, on grounds which I had not sufficiently examined.

(k) " The vapour which arises in the flaking of lime contributes greatly to the flaking of these pieces which lie in its way; and an unnecessary waste of the liquor is prevented, by applying it to the lime heaped in a pit or in a vessel, which may restrain the issue of the vapour, and direct it through the mails. If more of the liquor be used than is necessary to flake the lime, it will create error in weighing the flaked powder, and will prevent a part of it from passing freely through the sieve. The liquid is therefore to be used sparingly, and the lime which has escaped its action is to be sprinkled apart with fresh liquor.

(l) " When the aggregation of the lumps of lime is thus broken, it is impaired much sooner than it is in the former state, because the air more freely pervades it.

(m) " Because it consists of heterogeneous matter or of ill-burnt lime; which last will flake and pass through the sieve, if the lime be not immediately sifted after the flaking, agreeable to the text.

(n) " These proportions are intended for a cement made with sharp sand, for incrustation in exposed situations, where it is necessary to guard against the effects of hot weather and rain. In general, half this quantity of bone-ashes will be found sufficient; and although the incrustation in this latter case will not harden deeply so soon, it will be ultimately stronger, provided the weather be favourable.

" The injuries which lime and mortar sustain by exposure to the air, before the cement is finally placed in a quiescent state, are great; and therefore our cement is the worse for being long beaten, but the better as it is quickly beaten until the mixture is effected, and no longer.

upwards on it; that the materials used along with this cement in building, or the ground on which it is to be laid in stuccoing, ought to be well wetted with the cementing liquor in the instant of laying on the cement; and that the cementing liquor is to be used when it is necessary to moisten the cement, or when a liquid is required to facilitate the floating of the cement.

"When such cement is required to be of a finer texture, take 8 pounds of the fine sand, wet it with the cementing liquor, and mix it with the purified lime and the bone-ash in the quantities and in the manner above described; with this difference only, that 15 pounds of lime, or (o) thereabouts, are to be used instead of 14 pounds, if the greater part of the sand be as fine as Lynn sand. This I call *water-cement fine-grained*. It is to be used in giving the last coating, or the finish to any work intended to imitate the finer-grained stones or stucco. But it may be applied to all the uses of the water-cement coarse-grained, and in the same manner.

"When for any of the foregoing purposes of pointing, building, &c. such a cement is required much cheaper and coarser-grained, then much coarser clean sand than the foregoing coarse sand, or well-washed fine rubble, is to be provided. Of this coarsest sand or rubble take 56 pounds, of the foregoing coarse sand 28 pounds, and of the fine sand 14 pounds; and after mixing these, and wetting them with the cementing liquor in the foregoing manner, add 14 pounds, or somewhat less, of the (p) purified lime, and then 14 pounds, or somewhat less, of the bone-ash, mixing them together in the manner already described. When my cement is required to be white, white sand, white lime, and the whitest bone-ash, are to be chosen. Grey sand, and grey bone-ash formed of half-burnt bones, are to be chosen to make the cement grey; and any other colour of the cement is obtained, either by choosing coloured sand, or by the admixture of the necessary quantity of coloured talc in powder, or of coloured vitreous or metallic powders, or other durable colouring ingredients commonly used in paint.

"To the end that such a water-cement as I have

described may be made as useful as it is possible in all circumstances; and that no person may imagine that my claim and right under these letters-patent may be eluded by divers variations which may be made in the foregoing process without producing any notable defect in the cement; and to the end that the principles of this art, as well as the art itself, of making my cement, may be gathered from this specification and perpetuated to the public; I shall add the following observations.

"This my water-cement, whether the coarse or fine grained, is applicable in forming artificial stone, by making alternate layers of the cement and of flint, hard stone, or brick, in moulds of the figure of the intended stone, and by exposing the masses so formed to the open (q) air to harden.

"When such cement is required for water (s) fences, two-thirds of the prescribed quantity of bone-ashes are to be omitted; and in the place thereof an equal measure of powdered terras is to be used; and if the sand employed be not of the coarsest sort, more terras must be added, so that the terras shall be by weight one-sixth part of the weight of the sand.

"When such a cement is required of the finest grain (s) or in a fluid form, so that it may be applied with a brush, flint-powder, or the powder of any quartzose or hard earthy substance, may be used in the place of sand; but in a quantity smaller as the flint or other powder is finer; so that the flint-powder, or other such powder, shall not be more than six times the weight of the lime, nor less than four times its weight. The greater the quantity of lime within these limits, the more will the cement be liable to crack by quick drying, and *vice versa*.

"Where such sand as I prefer cannot be conveniently procured, or where the sand cannot be conveniently washed and sorted, that sand which most resembles the mixture of coarse and fine sand above prescribed, may be used as I have directed, provided due attention is paid to the quantity of the lime, which is to be the greater (r) as the sand is the finer, and *vice versa*.

"Where sand cannot be easily procured, any durable stony body, or baked earth grossly powdered (u) and sorted nearly to the sizes above prescribed for sand,

(o) "The quantity of bone-ashes is not to be increased with that of the lime; but it is to be lessened as the exposure and purposes of the work will admit.

(p) "Because less lime is necessary, as the sand is coarser.

(q) "But they must not be exposed to the rain until they are almost as strong as fresh Portland stone; and even then they ought to be sheltered from it as much as the circumstances will admit. These stones may be made very hard and beautiful, with a small expence of bone-ash, by soaking them, after they have dried thoroughly and hardened, in the lime-liquor, and repeating this process twice or thrice, at distant intervals of time. The like effect was experienced in incrustations.

(r) "In my experiments, mortar made with terras-powder, in the usual method, does not appear to form so strong a cement for water-fences as that made, according to the specification, with coarse sand; and I see no more reason for avoiding the use of sand in terras-mortar, than there would be for rejecting stone from the embankment. The bone-ashes meant in this place are the dark grey or black sort. I am not yet fully satisfied about the operation of them in this instance.

(s) "The qualities and uses of such fine calcareous cement are recommended chiefly for the purpose of smoothing and finishing the stronger crustaceous works, or for washing walls to a lively and uniform colour. For this last intention, the mixture must be as thin as new cream, and laid on briskly with a brush, in dry weather; and a thick and durable coat is to be made by repeated washing; but is not to be attempted by using a thicker liquor; for the coat made with this last is apt to scale, whilst the former endures the weather much longer than any other thin calcareous covering that has been applied in this way. Fine yellow ochre is the cheapest colouring-ingredient for such wash, when it is required to imitate Bath-stone, or the warm-white stones.

(t) "If sea-sand be well washed in fresh water, it is as good as any other round sand.

(u) "The cement made with these and the proper quantities of purified lime and lime-water, are inferior to the best,

Stucco;
||
Stuff.

fand, may be used in the place of fand, measure for measure, but not weight for weight, unless such gross powder be as heavy specifically as fand.

“ Sand may be cleaned from every softer, lighter, and less durable matter, and from that part of the fand which is too fine, by various methods preferable (x), in certain circumstances, to that which I have described.

“ Water may be found naturally free from fixable gas, selenite, or clay: such water may, without any notable inconvenience, be used in the place of the cementing liquor; and water approaching this state will not require so much lime as I have ordered to make the cementing liquor; and a cementing liquor sufficiently useful may be made by various methods of mixing lime and water in the described proportions, or nearly so.

“ When stone-lime cannot be procured, chalk-lime or shell-lime, which best resembles stone-lime, in the characters above written of lime, may be used in the manner described, except that fourteen pounds and a half of chalk-lime will be required in the place of fourteen pounds of stone-lime. The proportion of lime which I have prescribed above may be increased without inconvenience, when the cement or stucco is to be applied where it is not liable to dry quickly; and in the contrary circumstance this proportion may be diminished; and the defect of lime in quantity or quality may be very advantageously supplied (y), by causing a considerable quantity of the cementing liquor to soak into the work, in successive portions and at distant intervals of time, so that the calcareous matter of the cementing liquor, and the matter attracted from the open air, may fill and strengthen the work.

“ The powder of almost every well-dried or burnt animal-substance may be used instead of bone-ash; and several earthy powders, especially the micaceous and the metallic; and the elixated ashes of divers vegetables whose earth will not burn to lime; and the ashes of mineral fuel, which are of the calcareous kind, but will not burn to lime, will answer the ends of bone-ash in some degree.

“ The quantity of bone-ash described may be lessened without injuring the cement, in those circumstances especially which admit the quantity of lime to be lessened, and in those wherein the cement is not liable to dry quickly. And the art of remedying the defects of lime may be advantageously practised to supply the deficiency of bone-ash, especially in building and in making artificial stone with this cement.

STUDDING SAILS, certain light sails extended, in moderate and steady breezes, beyond the skirts of the principal sails, where they appear as wings upon the yard arms.

STUFF, in commerce, a general name for all kinds of fabrics of gold, silver, silk, wool, hair, cotton, or thread, manufactured on the loom; of which number

are velvets, brocades, mohairs, satins, taffeties, cloths, serges, &c.

STUKELY (Dr William), a celebrated antiquarian, descended from an ancient family in Lincolnshire, was born at Holbech in 1687, and educated in Bennet college, Cambridge. While an undergraduate, he often indulged a strong propensity to drawing and designing; but made physic his principal study, and first began to practise at Boston in his native country. In 1717, he removed to London; where, on the recommendation of Dr Mead, he was soon after elected a fellow of the royal society: he was one of the first who revived that of the antiquarians in 1718, and was their secretary for many years during his residence in town. In 1729, he took holy orders by the encouragement of archbishop Wake; and was soon after presented by lord chancellor King with the living of All-Saints in Stamford. In 1741, he became one of the founders of the Egyptian society, which brought him acquainted with the benevolent duke of Montague, one of the members; who prevailed on him to leave Stamford, and presented him to the living of St George the Martyr, Queen Square. He died of a stroke of the palsy in 1765. In his physical capacity, his *Dissertation on the Spleen* was well received; and his *Itinerarium Curiosum*, the first-fruit of his juvenile excursions, was a good specimen of what was to be expected from his riper age. His great learning and profound researches into the dark remains of antiquity, enabled him to publish many elaborate and curious works: his friends used to call him the *arch-druid* of his age. His discourses, intitled *Palaeographia Sacra*, on the vegetable creation, bespeak him a botanist, philosopher, and divine.

STUM, in the wine-trade, denotes the unfermented juice of the grape after it has been several times racked off and separated from its sediment. The casks are for this purpose well matched or fumigated with brimstone every time, to prevent the liquor from fermenting, as it would otherwise readily do, and become wine.

STUPIDITY. The Greek word *μωροτης* corresponds most with our English word *stupidity* or *foolishness*, (in the common acceptation of it), which is, when reason is rendered somewhat defective. The immediate causes are, a deficiency of vital heat, or a defect in the brain. Stupid children sometimes become sprightly youths; but if stupidity continues to the age of puberty, it is hardly ever removed. If stupidity follows upon a violent passion, an injury done to the head, or other evident cause, if it continues long, it becomes incurable. But the stupidity which consists in a loss of memory, and succeeds a lethargy, spontaneously ceases when the lethargy is cured.

STUPOR, a numbness in any part of the body, whether occasioned by ligatures obstructing the blood's motion, by the palsy, or the like.

STUPPA,

best, as the grains of these powders are more perishable and brittle than those of sand. They will not therefore be employed, unless for the sake of evasion, or for want of sand: in this latter case, the finer powder ought to be washed away.

(x) “ This and the next paragraph is inserted with a view to evasions, as well as to suggest the easier and cheaper methods which may be adopted in certain circumstances, by artists who understand the principles which I endeavoured to teach.

(y) “ This practice is noticed, as the remedy which may be used for the defects arising from evasive measures, and as the method of giving spongy incrustations containing bone-ashes the greatest degree of hardness.”

Stukely
||
Stupor.

STUPPA, or STURP, in medicine, is a piece of cloth dipped in some proper liquor, and applied to an affected part.

STURGEON. See ACCIPENSER.

STURMIUS (John), a learned philologist and rhetorician, was born at Sleida in Eifel near Cologne in 1507. He studied at first in his native country with the sons of count de Manderfcheid, whose receiver his father was. He afterward pursued his study at Liege in the college of St Jerom, and then went to Louvain in 1524. Five years he spent there, three in learning and two in teaching. He set up a printing-press with Rudger Rescius professor of the Greek tongue, and printed several Greek authors. He went to Paris in 1529, where he was highly esteemed, and read public lectures on the Greek and Latin writers, and on logic. He married there, and kept a great number of boarders; but as he liked what were called the *new opinions*, he was more than once in danger; and this undoubtedly was the reason why he removed to Strasburg in 1537, in order to take possession of the place offered him by the magistrates. The year following he opened a school, which became famous, and by his means obtained of Maximilian II. the title of an university in 1566. He was very well skilled in polite literature, wrote Latin with great purity, and was a good teacher. His talents were not confined to the school; for he was frequently intrusted with deputations in Germany and foreign countries, and discharged these employments with great honour and diligence. He showed extreme charity to the refugees on account of religion: He not only laboured to assist them by his advice and recommendations; but he even impoverished himself for them. He died in his 82d year, after he had been for some time blind. He published many books; the principal of which are, 1. *Partitiones Dialecticæ*. 2. *De Educatione Principum*. 3. *De Nobilitate Anglicana*. 4. *Lingue Latine resoluende Ratio*. 5. *Excellent Notes on Aristotle's and Hermogenes's Rhetoric*, &c.

He ought not to be confounded with *John Sturm*, a native of Mechlin, and physician and professor of mathematics at Louvain, who also wrote several works.

STURNUS, the STARLING; a genus belonging to the order of passers. The beak is subulated, depressed, and somewhat blunt; the superior mandible is entire, and somewhat open at the edges; the nostrils are marginated above; and the tongue is sharp and emarginated. There are five species, the principal of which are,

1. The vulgaris, or flare. The weight of the male of this species is about three ounces; that of the female rather less. The length is eight inches three quarters: the breadth fourteen inches. Bill, in old birds, yellow. The whole plumage is black, very resplendent, with changeable blue, purple, and copper: each feather marked with a pale yellow spot. The lesser coverts are edged with yellow, and slightly glossed with green. The quill-feathers and tail dusky: the former edged with yellow on the exterior side; the last with dirty white. The legs of a reddish brown.—The flare breeds in hollow trees, caves of houses, towers, ruins cliffs, and often in high rocks over the sea, such as that of the Isle of Wight. It lays four or five eggs, of a pale-greenish ash-colour; and makes its nest of straw, small fibres of roots, and the like.

In winter, flares assemble in vast flocks: they collect in myriads in the fens of Lincolnshire, and do great damage to the fen-men, by roosting on the reeds, and breaking them down by their weight; for reeds are the thatch of the country, and are harvelled with great care. These birds feed on worms and insects; and it is said that they will get into pigeon-houses, for the sake of sucking the eggs. Their flesh is so bitter as to be scarce eatable. They are very docile, and may be taught to speak.

2. The cinclus, or water-ouzel, weighs two ounces and a half: the length seven inches one quarter: the breadth eleven: the bill is narrow, and compressed sideways: the eyelids are white; the head, cheeks, and hinder part of the neck, are dusky, mixed with rust-colour: the back, coverts of the wings, and of the tail, also dusky, edged with bluish ash-colour: the throat and breast white: the belly ferruginous, vent-feathers a deep ash-colour: the legs are of a pale blue before, black behind: the tail short and black, which it often flirts up as it is sitting.—This bird frequents small brooks, particularly those with steep banks, or that run through a rocky country. It is of a very retired nature, and never seen but single or with its mate. It breeds in holes in the banks, and lays five white eggs adorned with a fine blush of red. It feeds on insects and small fish; and, as Mr Willughby observes, though not web-footed, will dart itself after them quite under water. The nest is constructed in a curious manner, of hay and fibres of roots, and lined with dead oak-leaves, having a portico or grand entrance made with green moss.

STYLE, or STYTHE, in the eye. See CRITHE.

STYLE, a word of various significations, originally deduced from *stylus*, a kind of bodkin wherewith the ancients wrote on plates of lead, or on wax, &c. and which is still used to write on ivory-leaves and paper prepared for that purpose, &c.

STYLE, in dialling, denotes the gnomon or cock of a dial raised on the plane thereof to project a shadow.

STYLE, in botany. See there, p. 1296.

STYLE, in matters of language, a particular manner of expressing one's thoughts agreeably to the rules of syntax; or, as F. Buffier more accurately defines it, the manner wherein the words are arranged among themselves suitably to the genius of the language. See ORATORY, n° 99—121.

STYLE, in jurisprudence, the particular form or manner of proceeding in each court of jurisdiction, agreeably to the rules and orders established therein: thus we say, the style of the court of Rome, of chancery, of parliament, of the privy-council, &c.

STYLE, in music, denotes a peculiar manner of singing, playing, or composing; being properly the manner that each person has of playing, singing, or teaching; which is very different both in respect of different geniuses, of countries, nations, and of the different matters, places, times, subjects, passions, expressions, &c. Thus we say, the style of Palestrina, of Lully, of Corelli, of Handel, &c.; the style of the Italians, French, Spaniards, &c.

Old STYLE, the Julian method of computing time, as the

New STYLE is the Gregorian method of computation. See ASTRONOMY, n° 295.

STYLET, a small dangerous kind of poniard which

Stylices
Subject.

which may be concealed in the hand, chiefly used in treacherous assassinations. The blade is usually triangular, and so small that the wound it makes is almost imperceptible.

STYLITES, or **PILLAR SAINTS**, an appellation given to a kind of solitaries who spent their lives on the tops of columns, to be, as they imagined, the better disposed for meditation, &c. See ECCLESIASTICAL HISTORY, n° 79. The extremity of these columns were only three feet in diameter, with a kind of rail or ledge about it, that reached almost to the girdle, somewhat resembling a pulpit. The faquirs, or devout people of the east, imitate this extraordinary kind of life even to this day.

STYLO GLOSSUS,

STYLO-HYOIDEUS,

STYLO-PHARYNGEUS,

STYLOIDES,

STYPTIC, in pharmacy, medicines which by their astringency stop hæmorrhages, &c.

STYRAX, the **STORAX-TREE**; a genus of the monogynia order, belonging to the dodzændria class of plants. There is but one species, viz. the officialis. It is a native of Palestine, Syria, the islands of the Archipelago, and also grows plentifully in the neighbourhood of Rome. It rises with a woody stalk 12 or 14 feet high, sending out many ligneous branches covered with a greyish bark. The flowers come out from the sides of the branches upon footstalks, which sustain five or six flowers in a bunch; these have one very white petal, which is funnel-shaped, the lower part being tubulous and cylindrical, and the upper divided into five obtuse segments which spread open, not flat, but rather inclining to an angle.—It may be propagated by sowing the seeds in pots plunged in a moderate hot-bed, towards the latter end of summer. The gum of this tree is very fragrant, and is used in medicine. See **STORAX**.

STYX, (anc. geog.), a fountain dropping a deadly water, accounted sacred, between Monacris and Pheneus in Arcadia.—*Syx*, a lake of Thessaly, from which the river Titaresius ran, (Pliny).—A river of hell, (Homer, Hesiod, Virgil, Ovid); held in such veneration by the gods, that an oath of any god by it was inviolable; and whatever god presumed to break it was stripped of divinity, and debarred nectar for 100 years.

SUBALTERN, a subordinate officer, or one who discharges his post under the command and subject to the direction of another; such are lieutenants, sub-lieutenants, coronets, and ensigns, who serve under the captain.

SUBCLAVIAN, in anatomy, is applied to any thing under the arm-pit or shoulder, whether artery, nerve, vein, or muscle.

SUBDOMINANT, in music, a name given by M. Rameau to the fourth note of the tone, which of consequence is the same interval from the tonic when descending as the dominant in rising. This denomination arises from the affinity which this author finds by inversion between the minor mode of the subdominant and the major mode of the tonic.

SUBER, the **CORK-TREE**, in botany. See **QUERCUS**.

SUBJECT, a person under the rule and dominion

of a sovereign prince or state.

SUBJECT is also used for the matter of an art or science, or that which it considers, or whereon it is employed: thus the human body is the subject of medicine.

SUBINFEUDATION, was where the inferior lords, in imitation of their superiors, began to carve out and grant to others minuter estates than their own, to be held of themselves; and were so proceeding downwards in infinitum, till the superior lords observed, that by this method of subinfeudation they lost all their feudal profits, of wardships, marriages, and escheats, which fell into the hands of these mesne or middle lords, who were the immediate superiors of the terretenant, or him who occupied the land. This occasioned the stat. of Westm. 3. or *quia emptores*, 18 Ed. 1. to be made; which directs, that, upon all sales or feoffments of lands, the feoffee shall hold the same, not of his immediate feoffee, but of the chief lord of the fee of whom such feoffee himself held it. And from hence it is held, that all manors existing at this day must have existed by immemorial prescription; or at least ever since the 18 Ed. 1. when the statute of *quia emptores* was made.

SUBJUNCTIVE, in grammar. See **GRAMMAR**.

SUBLIMATE, a chemical preparation, consisting of quicksilver united with the marine acid. See **CHEMISTRY**, n° 251.

SUBLIMATION, in chemistry, the condensing and collecting, in a solid form, by means of vessels aptly constructed, the fumes of bodies raised from them by the application of a proper heat. See **CHEMISTRY**, n° 82.

SUBLIME, or **SUBLIMITY**. See **GRANDEUR**, and **ORATORY**, n° 111, 112.

SUBORDINATION, a relative term, expressing the degree of inferiority betwixt one thing and another.

SUBORNATION, in law, a secret, underhand, preparing, instructing or bringing in a false witness; and from hence *subornation of perjury* is the preparing or corrupt alluring to perjury. Subornation of witnesses we read of in the 32 Hen. 8. c. 9. And in procuring or suborning a witness to give false testimony in any court of record concerning lands or goods, the offender shall forfeit 40 l. or suffer imprisonment for half a year, stand on the pillory, &c. by 6th Eliz. c. 9.

SUBPOENA, in law, a writ whereby common persons are called into chancery, in such cases where the common law hath provided no ordinary remedy; and the name of it proceeds from the words therein, which charge the party called to appear at the day and place assigned, *sub pena centum librarum*, &c. The subpoena is the leading process in the courts of equity; and by statute, when a bill is filed against any person, process of subpoena shall be taken out to oblige the defendant to appear and answer the bill, &c.

SUBPOENA ad testificandum, a writ or process, to bring in witnesses to give their testimony. If a witness on being served with this process does not appear, the court will issue an attachment against him; or a party, plaintiff or defendant, injured by his non-attendance, may maintain an action against the witness. See *Blackst. Com.* vol. III. p. 369.

SUBPOENA in Equity, a process in equity, calling on a defendant to appear and answer to the complainant's

Subject
Subject.

Subreptitious
Subulated. ant's bill. See stat. 5th Geo. II. c. 25. which enacts, that where the party cannot be found to be served with a subpoena, and absconds (as believed) to avoid being served, a day shall be appointed him to appear to the bill of the plaintiff; which is to be inserted in the London Gazette, read in the parish-church where the defendant last lived, and fixed up at the Royal Exchange: and if the defendant doth not appear upon that day, the bill shall be taken *pro confesso*.

SUBREPTITIOUS, a term applied to a letter, licence, patent, or other act, fraudulently obtained of a superior, by concealing some truth which, had it been known, would have prevented the concession or grant.

SUBSCRIPTION, in general, signifies the signature put at the bottom of a letter, writing, or instrument.

In commerce, it is used for the share or interest which particular persons take in a public stock or a trading-company, by writing their names, and the shares they require, in the books or register thereof.

SUBSCRIPTION, in the commerce of books, signifies an engagement to take a certain number of copies of a book intended to be printed, and a reciprocal obligation of the bookseller or publisher to deliver the said copies, on certain terms.—These subscriptions, which had their rise in England about the middle of the last century, are now become frequent in France and Holland, but exceedingly more so of late among ourselves.

SUBSEQUENT, something that comes after another, particularly with regard to the order of time.

SUBSIDY, in law, signifies an aid or tax granted to the king by parliament, for the necessary occasions of the kingdom; and is to be levied on every subject of ability, according to the rate or value of his lands or goods: but this word, in some of our statutes, is confounded with that of customs. See TAX.

SUBSTANCE, something that we conceive to subsist of itself, independently of any created being, or any particular mode or accident. See METAPHYSICS, n° 50, 52, 87—93, 137, 148, &c.

SUBSTANTIAL, in the schools, something belonging to the nature of substance.

SUBSTANTIVE, in grammar. See GRAMMAR.

SUBSTITUTE, a person appointed to officiate for another, in case of absence or other legal impediment.

SUBSTITUTION, in the civil law, a disposition of a testament, whereby the testator substitutes one heir for another, who has only the usufruct, and not the property, of the thing left him.

SUBTRACTION, or **SUBTRACTION**, in arithmetic, the second rule, or rather operation, in arithmetic, whereby we deduct a less number from a greater, to learn their precise difference. See ARITHMETIC.

SUBTRACTION, in algebra. See ALGEBRA.

SUBTERRANEAN, whatever is under ground: thus naturalists speak of subterranean fires, subterranean damps, &c.

SUBTILE, in physics, an appellation given to whatever is extremely small, fine, and delicate; such as the animal-spirits, the effluvia of odorous bodies, &c. are supposed to be.

SUBULATED, something shaped like an awl.

SUCCEDANEUM, in pharmacy, denotes a drug substituted in the place of another, in medical composition.

SUCCESSION, in philosophy, an idea which we get by reflecting on that train of ideas constantly following one another in our minds when awake. See METAPHYSICS, n° 61.

SUCCESSION, in law. See DESCENT.

SUCCESSION to the Crown. See HEREDITARY Right.

—From the days of Egbert, the first sole monarch of England, even to the present, the four cardinal maxims mentioned in that article have ever been held constitutional canons of succession. It is true, as Sir William Blackstone observes, this succession, through fraud or force, or sometimes through necessity, when in hostile times the crown descended on a minor or the like, has been very frequently suspended; but has generally at last returned back into the old hereditary channel, though sometimes a very considerable period has intervened. And, even in those instances where the succession has been violated, the crown has ever been looked upon as hereditary in the wearer of it. Of which the usurpers themselves were so sensible, that they for the most part endeavoured to vump up some feeble show of a title by descent, in order to amuse the people, while they gained the possession of the kingdom. And, when possession was once gained, they considered it as the purchase or acquisition of a new estate of inheritance, and transmitted or endeavoured to transmit it to their own posterity, by a kind of hereditary right of usurpation. See *Blackst. Com.* v. i. 197—216. From the historical view there given, it appears, that the title to the crown is at present hereditary, though not quite so absolutely hereditary as formerly: and the common stock, or ancestor, from whom the descent must be derived, is also different. Formerly, the common stock was king Egbert; then William the conqueror; afterwards, in James I.'s time, the two common stocks united; and so continued till the vacancy of the throne in 1688: now it is the princess Sophia, in whom the inheritance was vested by the new king and parliament. Formerly, the descent was absolute, and the crown went to the next heir without any restriction: but now, upon the new settlement, the inheritance is conditional; being limited to such heirs only, of the body of the princess Sophia, as are Protestant members of the church of England, and are married to none but Protestants.

And in this due medium consists the true constitutional notion of the right of succession to the imperial crown of these kingdoms. The extremes between which it steers are each of them equally destructive of those ends for which societies were formed and are kept on foot. Where the magistrate, upon every succession, is elected by the people, and may by the express provision of the laws be deposed (if not punished) by his subjects, this may found like the perfection of liberty, and look well enough when delineated on paper; but in practice will be ever productive of tumult, contention, and anarchy. And, on the other hand, divine indefeasible hereditary right, when coupled with the doctrine of unlimited passive obedience, is surely of all constitutions the most thoroughly slavish and dreadful. But when such an hereditary right as our laws have created and vested in the royal stock, is closely inter-

woven with those liberties which are equally the inheritance of the subject; this union will form a constitution, in theory the most beautiful of any, in practice the most approved, and, we trust, in duration the most permanent.

SUCCORY, in botany. See CICHORIUM.

SUCCOTH, (anc. geog.); a place beyond Jordan, over-against Zortan on this side; so called from Jacob's fixing his tents there.—Another *Succoth*, the first mansion of the Israelites after their departure from Ramefes towards the Red Sea.

SUCCUBUS, a term used by some writers for a dæmon who assumes the shape of a woman, and as such lies with a man; in which sense it stands opposed to *incubus*, which was a dæmon in form of a man, that lies with a woman. But the truth is, the succubus is only a species of the night-mare. See MEDICINE, n° 430.

SUCKER, in ichthyology. See CYCLOPTERUS.

SUCKERS, in gardening, the same with OFFSETS.

SUCKING-FISH. See ECHENEIS.

SUCKLING (Sir John), an English poet and dramatic writer, was the son of Sir John Suckling, comptroller of the household to king Charles I. and born at Witham in Essex in 1613. He discovered an uncommon propensity to the acquiring of languages, inasmuch that he is reported to have spoken Latin at five years of age, and to have wrote it at nine. When he was grown up, he travelled; but seems to have affected nothing more than the character of a courtier and fine gentleman; which he so far attained, that he was allowed to have the peculiar happiness of making every thing he did become him. In his travels he made a campaign under the great Gustavus Adolphus; and his loyalty, if not his valour, appeared in the beginning of our civil wars: for, after his return to England, he raised a troop of horse for the king's service, entirely at his own charge; and mounted them so completely and richly, that they are said to have cost him 12,000*l*. This troop, with Sir John at its head, behaved so ill in the engagement with the Scots, upon the English borders, in 1639, as to occasion the famous lampoon composed by Sir John Mennis; "Sir John he got him an ambling nag, &c." This ballad, which was set to a brisk tune, was much sung by the parliamentarians, and continues to be sung to this day. This disastrous expedition, and the ridicule that attended it, was supposed to have hastened his death; being seized by a fever, of which he died, at 28 years of age. He was a sprightly wit, and an easy versifier, but no great poet. His works, consisting of a few poems, letters, and plays, have nevertheless gone thro' several editions.

SUCTION, the act of sucking or drawing up a fluid, as air, water, milk, or the like, by means of the mouth and lungs; or, in a similar manner, by artificial means. See PNEUMATICS and HYDROSTATICS.

SUDATORY, a name given by the ancient Romans to their hot or sweating rooms; sometimes also called *Laconica*.

SUDORIFIC, an appellation given to any medicine that causes or promotes sweat.

SUESSIONES, a branch of the Remi, a people of Gallia Belgica, (Pliny); called sometimes *Suessones*, in the lower age *Suessi*; situated between the Remi to

the east, the Nervii to the north, the Veromandui to the west, and the Meldæ to the south, in the tract now called *le Soissonois*.—*Suessiones*, *Suessones*, and *Suessine*, the name of their city in the lower age; thought to have been formerly called *Nevidunum*, (Cæsar.) Now *Soissons*.

SUET, SEVUM, or *Sebum*, in anatomy, the solid fat found in several animals, as sheep, oxen, &c. but not in the human species. See the article FAT.—It is of the sebum that tallow is made. See TALLOW.

SUETONIUS TRANQUILLUS (Caius), a famous Latin historian, was born at Rome, and became secretary to the emperor Adrian about the 118th year of the Christian æra; but that post was taken from him three years after, when several persons fell under that prince's displeasure for not showing the empress Sabina all the respect she deserved. During his disgrace he composed many works, which are lost. Those now extant are his History of the XII first Emperors, and a part of his Treatise of the illustrious Grammarians and Rhetoricians. Pliny the Younger was his intimate friend, and persuaded him to publish his books. His History of the XII Roman Emperors is very much commended by most of our learned humanists. He represents, in a continued series of choice and curious particulars, without any digressions or reflections, the actions of the emperors, without omitting their vices, which he exposes with all their deformity, and with the same freedom mentions the good qualities of the very same persons; but the horrid dissoluteness and obscene actions he relates of Tiberius, Caligula, Nero, &c. have made some say, that he wrote the lives of the emperors with the same licentiousness with which they lived. The edition of this history procured by Grævius at Utrecht in 1672, with the excellent Commentaries of Torrentius and Casaubon, and the notes of some other learned critics, is much esteemed. That edition was reprinted in 1691.

SUEVI, the Catti or Chatti of Cæsar, (Strabo); placed on the Rhine: the reason of Cæsar's calling them thus does not appear, though considerably distant from the proper Suevi or Alemanni.

SUEVI, (Tacitus); a common name of the people situated between the Elbe and the Vistula, distinguished otherwise by particular names; as in Ptolemy, *Suevi Angeli*, *Suevi Sennones*.

SUEVUS, (anc. geog.) a river of Germany; thought to be the same with the Viadrus or Oder, emptying itself at three mouths into the Baltic, the middlemost of which is called *Swine* or *Swene*; which last comes nearer the name *Suevius*.

SUEZ, a small city, from which the isthmus that joins Africa with Asia hath its name. It stands about 30 hours east from Cairo, by the road called *Tauriche Beni Israel*, i. e. the road of the children of Israel, at the bottom of the Heroopolitan Gulph, or western branch of the Red Sea; and has about 200 houses, and an old castle. Here also is a small haven, but so shallow that ships of any burden cannot get into it; however, there is a good road by it, where they can ride safely and at ease. The greatest inconvenience of the place is, that it has no sweet water nearer than four or five miles. We are even told, that there are not above half a dozen wells betwixt Cairo and Mecca, at least in the road the pilgrims go, which lies to the northward.

Suez
||
Suffolk.

northward of this, and even these are bitterish and brackish. Suez was formerly a place of great trade; but since the way to the East Indies by the Cape of Good Hope hath been discovered, it hath been upon the decline. The place on the west coast of the gulph, where the children of Israel are supposed to have entered it, is called *Badeah*, about six miles to the north of Cape Korondel, on the other side of the gulph, as we are informed in a letter from the ingenious Edward Wortley Montague, F. R. S. to Dr Watfon, containing an account of his journey from Cairo to the Written Mountains in the desert of Sinai. Opposite to *Badeah* is a strong current, which sets to the opposite shore, about south-east, with a whirlpool called *Birque Pharaon*, the well or pool of *Pharaoh*, being the place where his host is said to have been destroyed. We are told by the same gentleman, that the Egyptian shore from Suez to *Badeah* is so rocky and steep, that there was no entering upon the gulph but at one of these two places; that it is high water in the gulph always when the moon is at her meridian height; that at Suez it flows six feet; that the spring-tides are nine feet, and in the variable months, from the beginning of November to the end of April, sometimes twelve; that, from the beginning of May to the beginning of October, a northerly wind generally rises and goes down with the sun, which is often very strong; that this wind never fails in these months, unless there be some violent storm; that the rest of the year the winds are variable, and when they blow hard at south south-east, set up the sea through the narrow strait of *Babel-Mandel*, and up this western branch or gulph, through its mouth, between *Gebel El-Zait* on the west, and the southernmost point of the Bay of Tor on the east, where it is not above 12 or 14 miles over. This wind, it is probable, hindering the water from going out, is the occasion of the extraordinary increase in the spring-tides. The Egyptian, Western, or Thebaic shore, from *Badeah* southward to opposite Tor on the eastern shore, is all mountainous and steep; and at *Elim*, the northernmost point of the bay of Tor, ends the ridge of mountains which begin on the eastern shore of this western branch at *Korondel*.

SUFFOCATION, in medicine, the privation of respiration or breathing. See the articles *DROWNING*, *HANGING*, &c.

SUFFOLK, a county of England. Its name is contracted from *Southfolk*, so called from its situation in regard to Norfolk. It is bounded on the west by Cambridgeshire; on the south by Essex, from which it is parted by the river Stour; on the east, by the German ocean; and on the north by Norfolk, separated from it by the lesser Ouse and the Waverley. It is upwards of 40 miles in length; about 25, at a medium, in breadth; and 156 in circumference. It contains 22 hundreds, 32 market-towns, 275 parishes, upwards of 34,000 houses, and more than 200,000 inhabitants. The whole is divided into two parts; viz. the liberty of St Edmund, and the *Geldable*; the former of which contain the west parts of the county, and the other the east; and there is a grand jury for each at the assizes. The air is reckoned as wholesome and pleasant as any in the kingdom; nor is it otherwise upon the sea coast, which is dry and sandy, and free

from salt-marshes. The soil, except to the west and upon the sea-coast, is very rich, being a compound of clay and marle. Towards the sea there are large heaths and tracts of sand; but these produce hemp, rye, and pease, and feed great flocks of sheep. About Newmarket, the soil is much the same; but in high Suffolk or the woodlands, besides wood, there are very rich pastures, where abundance of cattle are fed. In other parts of the county, as about Bury, there is plenty of corn. As this county is noted for the richness of its pastures, so is it for butter and cheese, especially the former, which is said to be extraordinary fine; so that being packed up in firkins, it is sold for all uses both by sea and land, and conveyed to many parts of England, especially to London. The inland parts of the county are well supplied with wood for fuel, and those upon the sea-coast with coals from Newcastle. The manufactures of the county are chiefly woollen and linen cloth. It lies in the diocese of Norwich; has two archdeacons, viz. of Sudbury and Suffolk; gives title of earl to a branch of the Howards; sends two members to parliament for the county; and two for each of the following places, Ipswich, Dunwich, Orford, Aldborough, Sudbury, Eye, and St Edmund's-Bury. The county is extremely well watered by the following rivers, which either traverse its borders or run across into the German ocean, viz. the lesser Ouse, the Waverley, the Blithe, the Deben, the Orwell or Gipping, and the Stour.

SUFFRAGAN, an appellation given to simple bishops with regard to archbishops, on whom they depend, and to whom appeals lie from the bishops courts.

SUFFRAGE, denotes a vote given in an assembly, where something is deliberated on, or where a person is elected to an office or benefice.

SUFFRUTEX, among botanists, denotes an under-shrub, or the lowest kind of woody plants, as lavender.

SUGAR, in natural history, is properly the essential part of the sugar-cane.

The sugar-cane grows naturally in both Indies; where it is likewise cultivated for its juice.

In the manner of their growth, form of their leaves, and make of their panicle, the sugar-canes resemble the reeds which grow in wet marshy grounds in England or elsewhere; except that the canes are far larger, and, instead of being hollow as the reeds, are filled with a white pith, containing the sweet juice or liquid, which stamps such an amazing value upon these plants. The intermediate distance between each joint of a cane is of different lengths, according to the nature of the soil, richness of the manure, and different temperature of the weather during its growth; it seldom exceeds, however, four inches in length and an inch in diameter. The length of the whole cane likewise depends upon the above circumstances. It generally grows to perfection in about fourteen months, when its height, at a medium, is about six feet, sometimes more, sometimes less. The body of the cane is strong, but brittle; of a fine straw-colour, inclining to a yellow. The extremity of each is covered, for a considerable length, with many long grassy leaves or blades, sharply and finely sawed on their edges; the middle longitudinal rib being high and prominent.

The bottom part of the sugar-cane top is about the thickness of one's finger; and as it contains a good deal

Suffragan
||
Sugar.

deal of the natural sweetness of the plant, it is usually cut into pieces of an inch and a half long, and given to the fiddle-horses in the West Indies. It is very nourishing food, and fattens them apace. The mill-horses, mules, and asses, are likewise fed, during crop-time, on sugar-cane tops and the skimming of the sugar-coppers; which last must be administered sparingly at first, for fear of griping, and perhaps killing them.

The canes, when ripe, are squeezed between the iron-cased rollers of wind-mills or cattle-mills. The juice thus pressed out, is boiled first in a very large copper or cauldron, being mixed with a very small quantity of lime. In default of lime, a strong ley of ashes will answer the same purpose, and was indeed originally used, though the first is generally thought to have greater efficacy. The benefits arising from either substance are probably to be attributed, in great measure, to their alkaline qualities. The sugar-cane, when ripe, is of all plants the sweetest; there is, however, a latent acid still lurking in the juice, as is manifest by its turning sour if suffered to remain unboiled any considerable time after expression. The addition, therefore, of white lime, which the planters call *temper*, is necessary to destroy, in a great measure, the remaining acid, and to form a neutral salt.

Lime, or the strong ley just mentioned, likewise serves to carry off all impurities from the liquor. When the quantity of temper is duly proportioned, if the liquor is put into a glass, the immediate separation will follow; the sordes settle at the bottom, and the juice remains transparent at top. On the other hand, if there is a deficiency of temper, the separation will be imperfect; and if there is a superfluity, there will be no separation at all.

After the lime is mixed with the juice in the copper or cauldron, the impurities in question being no longer intimately united with the boiling liquor, and being forced about with the heat of the fire, are easily entangled in a viscous tough substance, naturally in the cane-juice, with which they rise to the top of the copper, forming a thick tough scum.

The clarification of the liquor, as far as is done in the first copper, is perfected after the more gross scum is taken off; the remaining impurity, as the liquor boils, is skimmed off from the four or five remaining coppers, into which the liquor is successively poured; each of the coppers being gradually less, as containing a less quantity of liquor.

In its passage to the fourth copper, the liquor is strained through a thick woolen cloth, where it leaves all the remaining impurities that had escaped the summer.

After this a light white scum is taken off; and when this ceases to arise in any considerable quantity, and the liquor, by long boiling, becomes more of a syrup than a thin liquid, it is then poured into the first tache, and from this to a lesser, till it is conveyed to the last. When it has here attained the due consistence necessary to become sugar, it may be asserted, says Hughes, from whom this account is chiefly extracted, that no more than a seventh part of the whole remains; which diminution is occa-

sioned by the impurities being skimmed off, and the watery particles evaporated.

From this last stage it is conveyed, whilst of the consistency of a thick granulated syrup, into a large brass cooler, where it shoots into crystals, which are the genuine and essential salts of the plant; these are forwarded by gently stirring the whole mass, by which means the air is admitted to every part, and the particles of sugar disengage themselves from the clammy substance, which is termed *melasses*.

When it has grained or crystallized, it is removed from the cooler into pots or moulds, which are earthen, and of a pyramidal form, containing from eight to thirteen gallons.

About twenty-four hours after the sugar is potted, the small round hole in the bottom of each pot is unstopped, and the pots put upon earthen jars, containing about four gallons each: into these vessels the *melasses* drain from the sugar; which, in this degree of perfection, is called *muscavado*, and is fit for exportation in a month, or sooner.

From the abovementioned skimmings, mixed with a quantity of water and *melasses*, and fermented, is extracted that spirituous liquor called *rum*; and from the great quantity of oil in the cane-juice, which is transmitted in abundance to the rum, proceeds the excellency of that spirit, compared with brandy. The latter wanting this oiliness, stimulates and lacerates the coats of the stomach; whereas the former, if meliorated by age and drank moderately, serves, by its oiliness, to lubricate and preserve the bowels. See *RUM*.

The most natural, and perhaps the only proper, method of producing canes, is by suckers, or with the tender tops of old canes. These being cut into pieces of about a foot long, planted in holes of about six inches deep and two feet wide, and covered with good manure, each piece will produce from its roots a great number of canes.

But it may not be unacceptable to give a more particular account both of the cultivation of the plant, and the process of sugar-making, according to the most approved methods.

1. *Best Method of cultivating Sugar-canes.*—In *Riff Martin's Essay on Planter'ship*, soils where canes require most age, half the quantity of land intended for the crop should be planted in September; but in hot loose soils in October, and November; and the whole planting-season should conclude with the month of January or February (A), when the tops of the first canes cut may furnish the last pieces planted. By strict observance of this method, the canes will be at full maturity in the proper season for yielding most sugar, which is from the 1st of January (if the weather permits) to the 29th of July. But by grinding later, we hazard not only the destruction of our wind-mills by hurricanes, but make bad sugar, at infinite expence of time and labour, both of negroes and cattle, when the juice of the canes becomes weak and waterish. There is not therefore a greater error in the whole practice of planter'ship, than to make sugar or to plant canes at improper seasons of the year; for, by mismanagements of this kind, every succeeding crop is put out of regular order.

The land being well manured and mellowed by fallowing,

(A) In light luxuriant soils, canes planted in April or May often produce largely; but it seems not prudent to delay so long, for fear of a disappointment by drought.

lowing, let it be lined into spaces of four feet distance, and then holed either backwards or sidewise (a) as the manager thinks best; taking particular care that the cane-holes be made square at the bottom, and heaping the banks high, so as to take up little space. After holing, the land should lie in that posture until every little lump crumbles into fine mould, and then be planted before weeds spring up in any great abundance; for if planting in due time is neglected, the soil subsides, grows compact again, and defeats much of all the former tillage. The land being thus holed and mellowed by fallowing, let two good plants be put into each hole at equal distance from the centre; for if many plants be put into an hole, the sprouts will rise too plentifully, so as to hinder each other's growth, and produce very small spindling canes, which can yield but little sugar; for sugar-canes require more air and sun-shine than most other vegetables.

The plants being thus placed in each hole, with the eyes horizontally, must be covered, in loose dry soils, not above two inches deep; but in stiff ground one inch is sufficient, leaving the banks to be added by small accessions at every weeding, and the one-third to be reserved for covering the stools of the ratoons, which will much forward their growth: but let the common custom of drawing mould into hillocks round each stool of young canes be avoided; because that practice breaks the young superficial fibres, and leaves them bare to perish by the scorching sun. Stiff or clay-soils, if well drained in the manner before directed, may be planted hollow, as the lightest, to the same advantage; for covering the stools of ratoons with one-third of the bank left for that purpose, is preferable to hoe-ploughing alone. As such level stiff soils, free from stones, are most improveable by the plough, the husbandman's chief care should be to plough the land into ridges, rising gradually from the sides to the centres: for then the rain-water will pass off with ease through the furrows, and save all the hand-labour of draining, except small trenches round each field, through which the water may pass gently without washing away the mould: for where all preceding arts are practised to pulverise the soil, peculiar care must be taken to prevent its washing away by floods of rain, or the land will soon become barren.

It has been suggested before, that two good plants are sufficient for an hole of the dimensions above-mentioned; but in smaller holes, one only is used by some judicious planters with good success. Drawn plants from ratoon-sprouts of six or eight months old are very good; and in some respects preferable to the tops of old canes, as having short joints, and of course more eyes, and plumper than the others. It is, however, generally observed, that the tops of old canes are the hardiest plants, capable of bearing the extremity of dry or wet weather better than any other; but if the fibrous roots of drawn plants are cut off, no man will have reason to complain. To use the tops of grown canes for the last pieces planted, from January to May, is very good management: but drawn

plants will answer perfectly well at all other seasons of the year; and of these an abundance may be provided by a right forecast, if unseasonable droughts do not prevent; and good allowance must be made for such events. By that the planter divides his plantation into three, four, or five equal parts, in proportion to his strength of hands and cattle, allowing one third, fourth, or fifth part to be planted every year: and if he contrives to cut plants always from a contiguous field, much cartage in wet weather will be prevented; much of his negroes time saved in passing from one distant field to another, and still more if mules are employed to carry plants.

But after all this care in the preceding process, sure disappointment will attend the planter who neglects timely weeding his young canes; which, by once being over-run by weeds, will be so flinted as never to become very good by any subsequent helps: let therefore every manager be as careful and nice in preserving his canes clean from all weeds, as the florist is of his parterre; postponing every other work when that calls for his labour. And if instead of scraping up these weeds with common hoes, according to the present practice, he could employ the Kentish hoe-plough, infinite hand-labour may be saved: or if the nature of his soil be stiff or stony, so that the hoe-plough cannot be used, it is very probable, that by digging all weeds into the soil with spades or hoes, and loosening it by that means, as gardeners do in England, the sugar-canes would be so invigorated, as to recompense the labour beyond our present conception. No devastation by that pernicious insect called the *blast* could then take place. All the schemes hitherto proposed for curing that evil are vain impracticable speculations, or a waste of time and labour to little purpose. But if it be a fact, that the blast commits most ravage in poor land, and affects not the luxuriant sugar-canes of a rich soil, the cure of the evil is certain and obvious. Manure and cultivate your lands so as to render them rich and fruitful, and you will prevent the blast (c); more especially if (according to the English husbandry) the produce is changed, by planting potatoes, yams, or corn, in dry soils, and eddoes or potatoes in stiff lands: for by these arts the planter may be sure (if favoured by natural seasons) of canes that will reward his labour by plentiful crops of sugar; and it must then be his interest, by skill and care, to make it as good as possible; which shall be the subject of the following section, after having given some new directions for the cultivation of ratoons.

It has been observed above, that the stools or roots from whence canes are cut, are apt to corrupt at the parts left above ground, and these of course canker the whole stool: hence it is that ratoons, or canes springing from those stools, are seldom very good, except in very rich soils; and therefore some good planters, to prevent those stubs above ground, draw their canes for sugar from the roots, which we believe effectual, but very laborious: but by a late experiment, it is found a less laborious method, after uncovering,

(b) If the holes are made four feet wide one way, and five feet from bank to bank, the bottom of the hole will be a true square.

(c) It is, however, certainly a mistake to say, that the blast infects not the canes of a rich soil. The contrary is known to be true by experience: and therefore the best and only effectual cure is wiping the blades by wet cloths, until wet weather completes the cure.

vering the stools, by taking off the trash, so soon as the canes are carried out of the field, to cut by a sharp hoe all the heads of the cane-stools, three inches below the surface of the soil, and then fill the hole with fine mould; by which means all the sprouts rising from below derive more nutriment, and grow with vigour far beyond expectation.

2. *Best Method of making Sugar.* In making good sugar, there is a great variety of incidents, of which if any one fails, the end is absolutely frustrated: the wife planter, therefore, must be very attentive to every minute step throughout the whole process. It must be his first care to keep his mill in perfect good order, so that common accidents may not retard his crop in the season when canes yield the most and best sugar: every part of his works must be very clean, and his coppers hung so judiciously, as to boil perfectly well with little fuel; for nothing contributes more to the making of good sugar than quick boiling, after the cane-juice is well clarified. To this end, therefore, the great coppers, or first clarifiers, should be hung singly, or to separate fires, and pinned about 10 or 12 inches from the bottom, that the scum may be separated by slow degrees, and kept floating upon the surface long enough to be taken off perfectly: for if the liquor be suffered to boil with violence, the scum will incorporate again with it, and never after be separable but by the refining-pan; and thus dark foul sugar is made of that cane-juice which might have produced, by good management, fine bright sugar of much greater value at the market. This is a point of great importance to every planter, whose profit depends much upon the goodness of his sugar; for the worst pays the same freight, duty, and charges, as the very best.

The cane-juice, therefore, after being strained at the mill through a brags-wire sieve, ought to run down to the boiling-house in spouts lined with lead, to preserve it from tainting (b); and being let into the first clarifier, must be there boiled over a moderate fire until perfectly freed from all scum; afterwards it must be strained through a thick coarse blanket, and then boiled to sugar with all possible celerity. But let the coppers be ever so judiciously hung, the liquor cannot be boiled with due quickness, unless the manager takes peculiar care to provide great plenty of dry fuel or mill-trash. The good planter, therefore, will lay up a stock of brush-wood cut from the hedges of his boundary before the crop begins; or, if he has plenty of wood, enough to serve the uses of his mill-house; by which means he may soon lay up a large fund of mill-trash, and pack it either in ricks or in a large trash-house, that the progress of his crop may not be hindered by every shower, or his sugar spoiled by dull fires.

The judicious boiler's next care is to provide quicklime of the best sort to temper his liquor; for otherwise the sugar will be clammy, than which it cannot have a worse quality. That defect in sugar arises from two very different causes; for slow boiling and bad temper-lime have the very same effect. The lime made from marble, or any other land lime-stones, is the strongest, and preferable to that made from white fa-coral; and the newer it is from the kiln, the better:

for by keeping it in the tightest casks for any long duration, some of its good qualities evaporate; and therefore, in the daily use of it, the air must be excluded.

It is impossible to prescribe exactly the quantity of lime necessary for every sort of cane-juice. It has, however, been observed, that five ounces of the best quicklime are sufficient for 100 gallons of good cane-juice. Instead of increasing the quantity of lime, Mr Martin advises the use of powdered alum; one quarter of an ounce of which, or less, to a strike of sugar, will give both firmness and largeness of grain: experiment will soon determine whether more or less alum will be requisite. It is a good rule in general to give a full quantity, which can only be determined precisely by the first sugar made; but by dipping a skimmer into the tach when the liquor is boiled to near a syrup height, and by giving it two or three quick twirls, and then hanging the edges of it downward, an observing eye will discern the liquor falling from the skimmer in glassy flakes. If these hang long, the liquor is not sufficiently tempered; but if short, breaking near to the edge of the skimmer, it is tempered enough. When cane-juice is tainted by excessive drought, so as to make foxy bad sugar, there are various methods in use of extracting the taint. Among these, Mr Martin never found any so effectual as by high tempering the liquor; and, when it is boiled to a thick syrup, throwing into the tach two or three gallons of fair water, which, by sudden solution, throws up the taint or viscous scum (consisting of the lightest particles) upon the surface; from whence it must be skimmed off with all expedition, and reserved for distillation. This is a very effectual method of making strong bright sugar from cane-juice very much tainted, provided it be rich or at full maturity; but if the sugar-canes are much tainted while the juice is waterish, all attempts to make good sugar of it are vain and fruitless: for then it is fit only for distillation. Indeed a strong or large-grained sugar cannot by any art be made from waterish juice, even though untainted by drought; and therefore, when the planter finds his cane-juice of that sort, let him strip his canes from all the trash, suffering them to stand for six weeks exposed to the air and sun; and he will find that labour amply recompensed by a large product of very good sugar, as experience has often evinced.

After duly tempering the cane-juice with the strongest quicklime, clarifying it over a moderate fire, and straining it as before described, let it be boiled with the utmost quickness to a middling sugar-height, which will give it a large grain, and a fair colour, never-failing qualities to procure the best price at market. This art of boiling sugar, though of the greatest importance to every planter, is generally least understood either by overseers or their makers; but that point of greatest consequence is trusted wholly to the skill of negro-boilers, who indeed arrive by long habit to some degree of judgment by the eye only. To that eye-art Mr Martin says he has attended with all diligence, but could never acquire a critical exactness: for the sight, of all the other senses, is most fallible and subject to deception: a little more or less butter

(b) Mill cisterns, and all receivers through which cane juice passes, should be lined with lead: because wood soon taints it; and the greatest artifice cannot make the best sugar with tainted juice.

Sugar.

thrown into the tach will alter the whole appearance, and often deceive the most attentive and experienced eye; and no doubt there are other causes less observable, which produce the like effect; and therefore he recommends boiling by the *touch* also, which is abundantly more certain, as two witnesses are better than one.

This art of boiling by the touch is called *taking a proof*; but to impart by words the knowledge of it is as impossible as to teach any other mechanic art, which can be attained by practice only. However, the method of doing it is by a pan-stick, of four feet and an half long, eighteen inches of which is made rounding for the grasp of the left hand, and three feet flatwise, about two inches broad, and an inch thick: by immersing this pan-stick into the liquor when boiled to a pretty thick consistence, it will be smeared; upon which the boiler puts his right thumb, taking up a sufficient quantity, and touching then the thumb with the fore-finger, draws the liquid sugar like a thread at the instant when the heat is going off: this thread, when broken, will shrink from the thumb to the suspended fore-finger in several lengths, as the boiler intends; for the different lengths at which this thread hangs to the fore-finger determine precisely the different degrees of boiling sugar; and these degrees are proportioned to the several sizes of moulds, or sugar-pots, in which it is cured. The denominations by which these degrees are determined by refiners, are, *piece*, *lump*, and *loaf-height*. *Piece-height* is the highest degree, and suited to the moulds of the largest size, which contain about nine gallons: the thread of *piece-height* is about three inches long: that of *lump-height*, suitable to moulds of half the former sizes, is when the thread stands at about an inch from the suspended fore-finger: and *loaf-height*, suitable to the smallest moulds, is determined by the thread of a quarter of an inch long from the suspended finger: and this *latter proof* is generally most suitable to the planter's purposes of making muscovado-sugar; which ought to be of a large grain, well separated from melasses. It has been said above, that the boiler must take a sufficient quantity of the liquid sugar upon his thumb, to make an exact proof. That sufficiency cannot be expressed in words precisely; but must be just enough to allow the drawing of a thread, and not more; for that will occasion some deception. In like manner, if the thread is drawn any other time than at the critical moment when the heat of the liquid sugar goes off the thumb, the boiler will be deceived; for, if the liquid sugar is either too hot or too cold when drawn into a string, it will vary the appearance. In taking proof, the young learner must expect to blister his thumb; but, to gave him as little pain as possible, when he takes up the liquid sugar, let him observe to keep his finger and thumb nimbly moving from and to each other in gentle contact, and then draw the string at that instant when the intense heat is going off; by which means he will save his thumb from blistering, and obtain an exact proof, according to the rules above prescribed.

Sugar.

The method of boiling muscovado-sugar is below loaf-height (π); and if then it is cooled with quickness in a broad superficies, and in a wooden cooler, the sugar will be of a larger grain than if cooled in a deep or copper vessel. But if the sugar is intended to be cured in pots or earthen moulds, it must be cooled in copper or deep wooden coolers, that it may be conveyed from thence into the pots while in the state of a thick liquid. This will occasion the grain of sugar to be smaller, (and more especially if judiciously stirred while in the cooler), which is an advantage to the colour of clayed sugar: for a multitude of surfaces will reflect more rays of light, and consequently appear whiter, than larger particles, which have fewer surfaces. For that reason the most expert planters of Barbadoes generally boil their sugar higher than most other people; but whether to so much profit, must be determined by future experience: for if a much less quantity of very white sugar is obtained by boiling high, then, by the contrary method, the question is, whether the greater price is an adequate recompence for so great a loss of weight. In Mr Martin's opinion, it is not: however, it is worth the trouble to determine that point by exact weight and measure. In such computations the refined Barbadoes managers exceed all our islanders.

The quantity and thinness of the clay-batter must be exactly proportioned, *not to the quantity of sugar* so much as to the degree of height to which it is boiled, which the *face* or surface of the sugar in each pot must determine: for if the crust breaks near the centre, the sugar is high-boiled, and will require a thinner batter; and so, *vice versa*, the nearer to the edge of the pot the surface cracks, the thicker must be the clay: for clay-batter is only the means of filtering the water through the sugar by easy degrees, so as to wash the grains from all the yellowness, or tinge of melasses, without dissolving the smallest particles. In this proportion, therefore, consists chiefly the art of claying, not to sink the pot of sugar by a double clay lower from the brim than five inches, and yet to whiten the whole mass alike to the bottom. But this cannot be effected without great judgment in boiling equally; and in separating the pots into several classes, so as to clay each parcel in a manner suitable to the degree of boiling: for want of this art it is that a planter may grow poorer by claying his sugar, than if he makes only plain muscovado: for the loss of sugar dissolved into melasses by claying injudiciously, cannot be compensated by converting it into rum. He therefore who proposes to clay sugar to advantage, must first learn the art of boiling by the *touch*, as the only criterion of boiling to a degree of exactness: he must learn also all the other process of halling and stirring the sugar after it is filled into the pots, by which small errors in boiling may be in some measure rectified. The same skill is requisite to boil sugar which is intended to be cured in pots, *without being clayed*; and therefore that practice is very unprofitable: for though sugar properly boiled will cure best in pots, yet if there be the least error in boiling,

(E) That is the greatest height for rich cane-juice; but when waterish, it will be high enough when a thread can be drawn.—It is a general maxim, that the weak cane-juice must be tempered very high and boiled low. The former is absolutely false; for a due temper must be observed: to boil it very low, is right, and that is a candy height.

boiling, it will occasion the sugar to be of a very small grain, as is generally the case of Jamaica-sugar. For if the same sugar, which is of a small grain, had, by being put into pots, been cooled with quickness in a broad wooden cooler, and cured in hogheads, the grain would have been much larger, as a single experiment will evince. But if, in conformity to old customs, a manager will choose to cure in pots, let him cool his sugar in a shallow broad cooler, till it becomes very thick, and only liquid enough to be taken up with a ladle, and put into the pots: for by that means he will have a much larger-grained sugar, than by the practice of putting it hot into pots. It is a common practice to stir hot sugar once or twice after being put into the coolers; which is a sure means of breaking the grain, at the very instant while the sugar is granulating.

3. *Refining of Sugar.*—Sugar is afterwards refined from the coarse state in which it generally comes from abroad, to various degrees of purity by new solutions, and is sold at different prices, and under different names, according to the degree of purity it is brought to. Our sugar-refiners first dissolve it in water, then clarify the solution by boiling with whites of eggs and despumation; and after due evaporation pour it into moulds; where the fluid part being drained off, and the sugar concreted, its surface is covered with moist clay as before. The sugar thus once refined, by repetition of the process, becomes the double-refined sugar of the shops.

The *candy-sugar*, or that in crystals, is prepared by boiling down solutions of sugar to a certain pitch, and then removing them into a hot room, with sticks placed across the vessel for the sugar to shoot upon: and these crystals prove of a white or brown colour, according as the sugar used in the process was pure or impure.

SUGAR from different Plants.—In some parts of North America, particularly in Canada, a kind of sugar is prepared from the juice which issues upon wounding or boring certain species of the maple-tree, one of which is named from hence the *sugar-maple*; as also from the wild or black birch, the honey-locust, and the hickory. The maple is most commonly made use of for this purpose, as being the richest, and as best enduring the long and severe winters of that climate. The juice is boiled down, without any addition, to a thick consistence; then taken off from the fire, kept stirring till its heat is abated, and set in a cold place; where the sugar quickly concretes into grains, resembling common brown powder-sugar.

The trees are tapped early in the spring, about the time that the snow begins to melt. It is observable, that when the weather begins to grow warm, they bleed no more; and that, after the bleeding has stopped, they begin to run again upon covering the roots with snow. The more severe the winter has been, the juice is found to be richer and in greater quantity. The trees which grow on hills or high land yield a richer juice than those which are produced in low countries; and the middle-aged than the young or the old.

Mr Kalm informs us, in the Swedish Transactions for the year 1751, that one tree, if the summer does not come on hastily, will yield about forty-two gallons of juice (English wine-measure), and that the quan-

tity which issues in one day from three to six gallons: that eleven gallons of juice of middling quality give a pound of sugar, and that sometimes a pound has been gained from three gallons and a half: that two persons can in one spring prepare commodiously 200 pounds. He observes, that this sugar is weaker than that from the sugar-cane; but that for some purposes it answers better, as for chocolate and preserves. It is likewise esteemed more medicinal. Considerable quantities are brought annually into Europe, particularly France, and there employed in disorders of the breast. It is reckoned that a pound of common sugar goes as far in sweetening as two pounds of maple-sugar.

The large maple, commonly called *sycamore tree*, bleeds also in Europe a sweet juice, from which an actual sugar has been prepared. In the Transactions above-mentioned, for the year 1754, there is an account of some experiments made in this view upon the Swedish maple. Eight trees, none of them under thirty years, bled in four days fourteen gallons of juice; which, inspissated, gave two pounds and a half of brown-sugar. Another time, the same eight trees bled in three days ten gallons and a half; which yielded one pound four ounces of sugar, with half a pound of syrup. It is the saccharine juice of the maple-tree, which, exuding upon the leaves, renders them so apt to be preyed upon by insects.

The common birch bleeds also a large quantity of a sweetish juice, which yields, on being inspissated, a sweet saline concrete, not however perfectly of the saccharine kind, but seeming to approach more to the nature of manna.

There are sundry other vegetables, raised in our own country, which afford saccharine concretes; as beet-roots, skirrets, parsneps, potatoes, celeri, red-cabbage stalks, the young shoots of Indian wheat. The sugar is most readily obtained from these, by making a tincture of the subject in rectified spirit of wine; which, when saturated by heat, will deposit the sugar upon standing in the cold.

Acid of Sugar. See CHEMISTRY, n° 300.

SUGILLATION, in medicine, an extravasation of blood in the coats of the eye, which at first appears of a reddish colour, and afterwards livid or black. If the disorder is great, bleeding and purging are proper, as are also discutients.

SUICIDE. See SELF-Murder.

SUIDAS, a Greek writer, according to some, flourished in the 11th century, under the reign of the emperor Alexius Comnenus; according to others, before the 10th century. He wrote in Greek an Historical and Geographical Dictionary or Lexicon; a work which, though not always strictly accurate, is nevertheless of great importance, as it contains many things taken from the ancients that are nowhere else to be found. The best edition of Suidas is that of Kuister, in Greek and Latin, with notes, printed in 3 vols fol.

SUIT, is used in different senses; as, 1. Suit of court, or suit-service, which is an attendance the tenant owes to his lord's court. 2. Suit-covenant, where a person has covenanted to do service in the court of the lord. 3. Suit-cultom, which is where one and his ancestors have owed suit time out of mind. 4. It is used for a petition to the king or any person of

Sult.

of dignity, where a lord distrains his tenant for suit, and none is due. In this case, the party may have an attachment against him to appear in the king's court.

SUIT, in law, the same with action. The Romans introduced pretty early set forms for actions and suits in their law, after the example of the Greeks; and made it a rule, that each injury should be redressed by its proper remedy only. *Actiones*, say the Pandects, *compositæ sunt quibus inter se homines disceptarent, quas actiones ne populus prout vellet institueret, certas solenneque esse voluerant.*" The forms of these actions were originally preserved in the books of the pontifical college as choice and inestimable secrets, till one Cneius Flavius, the secretary of Appius Claudius, stole a copy and published them to the people. The concealment was ridiculous: but the establishment of some standard was undoubtedly necessary to fix the true state of a question of right; lest, in a long and arbitrary process, it might be shifted continually, and be at length no longer discernible. Or, as Cicero expresses it, "*sunt iura, sunt formulæ, de omnibus rebus constituta, ne qui aut in genere iniuria, aut in ratione actionis, errare possit. Expressæ enim sunt ex uniuscuiusque damno, dolore, incommodo, calamitate, iniuria, publicæ à prætoris formulæ, ad quas privata li accommodantur.*" And in the same manner our Bracton, speaking of the original writs upon which all our actions are founded, declares them to be fixed and immutable, unless by authority of parliament. And all the modern legislators of Europe have found it expedient, from the same reasons, to fall into the same or a similar method. In England, the several suits, or remedial instruments of justice, are, from the subject of them, distinguished into three kinds; actions *personal*, *real*, and *mixed*.

Personal actions are such whereby a man claims a debt, or personal duty, or damages in lieu thereof; and likewise whereby a man claims a satisfaction in damages for some injury done to his person or property. The former are said to be founded upon contracts, the latter upon torts or wrongs: and they are the same which the civil law calls "*actiones in personam, quæ adversus eum intenduntur qui ex contractu vel delicto obligatus est aliquid dare vel concedere.*" Of the former nature are all actions upon debt or promises; of the latter are all actions for trespasses, nuisances, assaults, defamatory words, and the like.

Real actions, (or, as they are called in the Mirror, *feodal actions*) which concern real property only, are such whereby the plaintiff, here called the *demandant*, claims title to have any lands or tenements, rents, commons, or other hereditaments, in fee-simple, fee-tail, or for term of life. By these actions formerly all disputes concerning real estates were decided; but they are now pretty generally laid aside in practice, upon account of the great nicety required in their management, and the inconvenient length of their process: a much more expeditious method of trying titles being since introduced, by other actions personal and mixed.

Mixed actions are suits partaking of the nature of the other two, wherein some real property is demanded, and also personal damages for a wrong sustained. As for instance, an action of waste: which is brought by him who hath the inheritance, in remainder or reversion, against the tenant for life, who hath committed waste therein, to recover not only the land

wasted, which would make it merely a real action; but also treble damages, in pursuance of the statute of Gloucester, which is a personal recompence; and so both, being joined together, denominate it a *mixed action*.

The orderly parts of a suit are these; 1. The original writ. 2. The process. 3. The pleadings. 4. The issue or demurrer. 5. The trial. 6. The judgment, and its incidents. 7. The proceedings in nature of appeals. 8. The execution. See these articles.

SULLY. See BETHUNE.

SULPHUR, an inflammable substance of a yellow colour, consisting of the vitriolic acid and principle of inflammability united. For its properties, See CHEMISTRY, n° 50, 114, 122, 165, 321, 334, 469.

Sulphur is found naturally formed in vast quantity about volcanoes, and in some kinds of minerals. It is extracted from its ores either by melting or subliming. What we use is all brought from other countries; but it is certain that the metallic ores in this country contain a very considerable quantity of sulphur, which, in the common way of working, is dissipated in the air. Dr Watson has shown, in a paper on lead-ore, in the Philosophical Transactions, that the quantity thus dissipated amounts to not less than 700 tons annually in the various lead-mines in England. Volcanoes, earthquakes, &c. have been thought to take their rise from large beds of sulphur supposed to lie underground; but it is much more probable that sulphur is the effect rather than the cause of these phenomena. See VOLCANO.

Sulphur unites easily with all metallic matters, excepting gold, platinum, and zinc; at least we have not found the means of uniting it with these, directly, and without some intermediate substance. The degrees of affinity with which sulphur combines with those metals to which it may be readily united, are different; for it not only unites more easily and abundantly with some than with others, but it also quits those with which it has a less affinity, to unite with others to which it has a stronger affinity.

The affinities of sulphur, according to Mr Geoffroy's table, are, fixed alkali, iron, copper, lead, silver, regulus of antimony, mercury, and gold; and, according to Mr Gellert's table, they are, iron, copper, tin, lead, silver, bismuth, regulus of antimony, mercury, arsenic, and cobalt: gold and zinc are marked in this table as being incapable of uniting with sulphur.

The compounds formed by sulphur with different metals, are different; but all of them possess a metallic lustre, without any ductility: these combinations of sulphur and of metals are very frequently found in a natural state. Almost all the metals which we dig from the earth are naturally found combined with sulphur, forming most of the ores and metallic minerals.

The properties of the combinations of sulphur with metallic matters have been little examined, because these combinations are not of any use; but, on the contrary, when they are found, they must be decomposed, that the metals may be obtained separately from the sulphur. Nevertheless, we know, not only that metals have different degrees of affinity with sulphur; in consequence of which property, sulphur may be, and actually is, in many metallurgical operations, separated from some metals by means of

Sully,
Sulphur.

others to which it is more disposed to unite; but we also know that sulphur facilitates the fusion of hard and difficultly fusible metals, such as copper and iron; and that, on the contrary, it renders the soft and fusible metals, as tin and lead, less easily fusible. These singular effects seem to proceed from the difference of the affinity of sulphur to the several metals.

Sulphur may be separated from metallic matters by several methods. First, as sulphur is volatile, and as these metallic matters are fixed, or at least less volatile than sulphur, the mere action of fire is sufficient to separate sulphur from most metals. As this method is simple, and not expensive, it is generally employed to separate sulphur from ores; which effect is produced by the torrefaction or roasting of these ores. We must, however, except the ore of mercury, or native cinnabar, and also the combinations of arsenic with sulphur, which cannot be decomposed without an intermediate substance, from the great volatility of mercury and of arsenic: although perhaps it would not be impossible to separate the sulphur from these compounds, without an intermediate substance, by a heat carefully applied, long continued, and with access of air.

Secondly, several combinations of sulphur with metals may be decomposed by means of acids; which dissolve the metallic matter, without attacking the sulphur. But in several of these compounds, the sulphur defends the metal from the action of the acids; and this separation by acids does frequently not succeed, or succeeds only imperfectly. Crude antimony is one of the sulphurated metallic substances from which sulphur may most easily be separated by means of aqua regia. This menstruum seizes readily the regulus of antimony contained in mineral antimony, and separates from it the sulphur, which then appears in form of a white powder.

Lastly, we may, as we have already said, separate several metals from sulphur by means of other metals, to which the sulphur has a greater affinity. This separation is practised in several operations, as in the dry parting, the purification of gold by antimony, the decomposition of cinnabar, of orpiment, and of crude antimony.

The uses of sulphur are considerably extensive in chemistry, in medicine, and in arts. The liver of sulphur is employed in chemistry for several solutions. Sulphur is also useful for several fusions, precipitations, and separations of metals and minerals, as we have already mentioned. Lastly, as sulphur contains a very large quantity of viriolic acid, a method has been found, and is now practised, of extracting from it this acid, by burning sulphur in close vessels, with the addition of some nitre, and by an operation similar to that of the clyffus.

Sulphur is employed in medicine, both internally and externally, for athmatic diseases of the breast, and for several diseases of the skin of the nature of the itch. The internal preparations of sulphur are, flowers of sulphur, washed sulphur, magistery of sulphur, tablets, balsams, livers of sulphur, and others; in some of which this substance is not altered, but only purified and divided; and in others, is combined and associated with other substances; without reckoning the sulphureous combinations of antimony and of mercury.

Some physicians and chemists, considering that sul-

phur is unsoluble in water, and capable of resisting the action of most menstrua, have advanced, that it can produce no effect when taken internally, single and unaltered; but this assertion seems to be without foundation; for we are certain that the sweat and perspiration of those who take sulphur internally, have a smell evidently sulphureous. Besides, sulphur is much more soluble than is generally believed. It is attacked by all oily and saponaceous substances, and consequently by almost all animal liquors.

We cannot easily form a very distinct and clear idea of the manner in which sulphur acts internally upon our bodies; but, from observations made upon its effects, it appears to be dividing, stimulating, and somewhat heating: it principally acts upon the perspirable parts of the body, the chief of which are the skin and lungs; and from this property it is particularly useful in some diseases of these parts.

Sulphur is also a powerful repellent; as appears from its curing several kinds of itch, merely by external application in form of ointments and pomatums.

Several mineral waters, which are drank or used as baths for some diseases, owe their good qualities to sulphur contained in them.

Sulphur is also used in several arts. By means of it fine impressions of engraved stones are taken*. Matches* are formed of it; and its utility as an ingredient in the preparation of gun-powder and fire-works is well known. Lastly, it is used for whitening wool, silk, and many other matters exposed to its vapour during its combustion; the colours and reds of which could not be destroyed by any other substance, but are quickly effaced by this acid vapour.

SULPICIA, an ancient Roman poetess, who lived under the reign of Domitian, and has been so much admired as to be termed the *Roman Sappho*. We have nothing, however, left of her writing, but a satire, or rather the fragment of one, against Domitian, who published a decree for the banishment of philosophers from Rome: which satire is to be found in Scaliger's *Appendix Virgiliana*. She is mentioned by Martial and Sidonius Apollinaris; and is said to have addressed a poem on conjugal love to her husband Calenus, a Roman knight.

SULPICIOUS (Severus), an ecclesiastical writer who flourished about the beginning of the 5th century, and was cotemporary with Rufinus and St Jerom. He was the disciple of St Martin of Tours, whose life he has written; and the friend of Paulinus bishop of Nola, with whom he held an intimate correspondence. The principal of his works is his *Hystoria Sacra*, from the creation of the world to the consulate of Stilicho and Aurelian, about the year 400; in which his style is elegant beyond the age he lived in.

SULTAN, or SOLDAN, a title or appellation given the emperor of the Turks.

Vattier will have the word Turkish, and to signify *king of kings*; adding, that it was first given the Turkish princes Angrolipex and Masgud, about the year 1055; others will have it originally Persian, alleging, in proof hereof, an ancient medal of Cosroe; others derive it from *soldanus*, *quasi solus dominus*; others from the Hebrew שולט, *schalat*, "to rule, reign."

It had its rise under Mahmoud, son of Sebesteghin, the first emperor of the dynasty of the Gaznevites, towards

* See the
article
CASTS.

wards the close of the fourth century of the æra of the Hegira : when that prince going to Segeftan to reduce Kalaf governor of that province, who affected the fovereignty, Kalaf was no fooner advertifed of his coming, than he went out to meet him, delivered the keys of his fortrefs, and owned him his *fultan*, that is, his lord or commander. The title pleafed Mahmoud well, that he affumed it ever afterwards ; and from him it paffed to his defcendents, and to other Mahometan princes.

SUN, fignifies the quantity that arifes from the addition of two or more magnitudes, numbers, or quantities together.

SUMACH, in botany. See RHUS.

SUMATRA, the largeft, excepting Borneo, of the Sunda iflands in the Eaft Indies. It extends itfelf north-weft and fouth-eaft ; having Malacca on the north, Borneo on the eaft, and Java on the fouth-eaft, from which it is parted by the ftraits of Sunda. It is divided by the equinoctial nearly into two equal parts ; extending to 6° of latitude, north and fouth. It is about 250 leagues in length, 60 in breadth, and 500 in circumference. It is very rich and fertile ; yielding not only fulphur, rice, ginger, pepper, camphire, callia, fandal, and other woods and drugs ; but alfo fine tin, iron, copper, filver, gold, and diamonds. It is fo rich in gold, that it is fuppofed to be the Ophir and golden Cherfonefe of the ancients ; but what the Europeans trade with them for chiefly is their pepper. The camphire of Sumatra is looked upon as the very fineft in the Indies, and, as Mr Charles Miller affures us, is worth 200 l. per hundred weight on the fpot. It bears a great price in China, where they make ufe of it as a kind of leaven, mixing it with their own which is a coarfer kind, to which they think it gives odour and fpirit.

Both the Englifh and Dutch have feveral colonies and fettlements here. The chief of the Britifh fettlements are thofe of Bencoolen and Fort Marlborough, on the weft coaft ; from whence the Eaft India company import more pepper than from any country in India. There are alfo great quantities of the beft walking-canes imported from thence.

The natives are of a very dark fwarthy complexion, but not black. According to Mr Miller's account, they are canibals. The coafts are poffeffed by Mohammedan princes, of whom the king of Achen, at the north end of the ifland, is the moft confiderable. The inland country is in poffeffion of feveral Pagan princes, who have little correpondence with foreigners. The animals here are much the fame as thofe on the neighbouring continent of Malacca.

SUMMARY, in matters of literature. See ABRIDGMENT.

SUMMER, one of the feafons of the year, commencing in thefe northern regions on the day the fun enters Cancer, and ending when he quits Virgo : or, more ftrictly and univerfally, the fummer begins on the day when the fun's meridian diftance from the zenith is the leaft, and ends on the day when his diftance is a mean betwixt the greateft and fmalleft. The end of fummer coincides with the beginning of winter. See SEASONS.

SUMMER-Iflands. See BERMUDAS.

SUMMIT, the top or vertex of any body or figure, as of a triangle, cone, pyramid, &c.

SUMMONS, in law, a citing or calling a perfon to any court, to anfwer a complaint, or even to give in his evidence.

Summons
Superfeta-
tion.

SUMPTUARY LAWS, are laws made to reftrein excefs in apparel, and prohibit cofly clothes, of which heretofore we had many in England ; but they are all repealed by 1 Jac. 1. 3 Infl. 199.

SUN, SOL, ☉, in aftronomy, the great luminary which enlightens the world, and by its prefence conftitutes day. See ASTRONOMY, *paſſim*.

Mock-SUN. See PARHELION.

SUN-Fiſh of the Irifh. See SQUALUS.

SUN-Flower, in botany. See HELIANTHUS.

SUNDA ISLANDS, a general name for a cluſter of iflands in the India Ocean, between 93° and 120° of E. Longitude, and between 8° North and 8° South Latitude. The particular names of the iflands are, *Borneo, Sumatra, Java, Bally, Laraboe, and Banca*. See thefe articles.

SUNDAY, or the LORD'S-DAY, a folemn feſtival obſerved by Chriftians on the firſt day of every week, in memory of our Saviour's reſurrection.

This is the principal and moſt noted of the Chriftian feſtivals, and was obſerved with great veneration in the ancient church, from the time of the apoſtles, who themſelves are often ſaid to have met on that day for divine ſervice. It is likewiſe called the *Sabbath-day*, as being ſubſtituted in the room of the Jewiſh ſabbath. See the article SABBATH.

The ancients retained the name *Sunday*, or *dies ſolis*, in compliance with the ordinary forms of ſpeech, the firſt day of the week being ſo called by the Romans, becauſe it was dedicated to the worſhip of the fun.

SUOVETAURILIA, an ancient Roman ſacrifice, ſo called becauſe it conſiſted of a pig (*ſus*), a ſheep, or rather ram (*ovis*), and a bull (*taurus*). They were all males, to denote the mafculine courage of the Roman people. It was likewiſe called *ſolitaurilia*, becauſe the animals offered up were always *ſolida*, whole or uncut.

SUPERCARGO, a perſon employed by merchants to go a voyage, and overſee their cargo or lading, and diſpoſe of it to the beſt advantage.

SUPERCILIUM, in anatomy, the eye-brow See ANATOMY, n° 406.

SUPEREROGATION, in theology, what a man does beyond his duty, or more than he was commanded to do. The Romanifts ſtand uptrenouſly for works of ſupererogation, and maintain that the obſervance of evangelical councils is ſuch. By means hereof, a flock of merit is laid up, which the church has the diſpoſal of, and which ſhe diſtributes in indulgences to ſuch as need. The reformed church do not allow of any work of ſupererogation.

SUPERFETATION, in medicine, a ſecond or after-conception, happening when the mother, already pregnant, conceives of a latter coition ; ſo that ſhe bears at once two foetuses of unequal age and bulk, and is delivered of them at different times. We meet with inſtances of ſuperfetations in Hippocrates, Ariſtotle, Du Laurens, &c. : but they are ſaid to be much more frequent in hares and fows. Naturaliſts hold, that female rats are frequently born with young rats in their wombs ; and we are told of extraordinary inſtances of this kind in the female part of the human

Superficies Species, by Bartholine, Mentzelius, and in the history of the Royal Academy of Arts and Sciences.

Supporters.

SUPERFICIES, or **SURFACE**, in geometry, a magnitude considered as having two dimensions; or extended in length and breadth, but without thickness or depth.

SUPERFINE, in the manufactories, a term used to express the superlative fineness of a stuff: thus a cloth, a camlet, &c. are said to be superfine when made of the finest wool, &c. or when they are the finest that can be made.

SUPERINTENDANT, in the French customs, an officer who has the prime management and direction of the finances or revenues of the king.

SUPERIOR, something raised above another; or some person that has a right to command another.

SUPERIOR, in Scots law. See **LAW**, N° cclxiv. 3. clxv. 2. & clxvi.

SUPERLATIVE, in grammar, one of the three degrees of comparison, being that inflection of nouns adjective that serves to augment and heighten their signification, and shows the quality of the thing denoted to be in the highest degree. See **GRAMMAR**.

SUPERNUMERARY, something over and above a fixed number. In several of the offices are supernumerary clerks, to be ready on extraordinary occasions.

SUPERSTITION, extravagant devotion; or religion wrong directed or conducted.

SUPERVISOR, a surveyor or overseer.

SUPINATION, in anatomy, the action of a supinator muscle, or the motion whereby it turns the hand so as that the palm is lifted up towards heaven.

SUPINE, in Latin grammar, part of the conjugation of a verb, being a verbal substantive of the singular number, and the fourth declension.

There are two kinds of supines. One, called the *first supine*, ending in *um* of the accusative case, is always of an active signification, and marks a motion; as, *abijt deambulatum*. The other, called the *last supine*, and ending in *u* of the ablative case, is of a passive signification, and is governed by substantives or adjectives; as, *facile dictu*, &c.

SUPER, the evening repast.—Suppers that are heavy should be avoided, because the stomach is more oppressed with the same quantity of food in an horizontal posture than in an erect one, and because digestion goes on more slowly when we sleep than when we are awake. They should be eaten long enough before bed-time, that they may be nearly digested before going to sleep; and then a draught of pure water will dilute that which remains in the stomach.

SUPPLEMENT, in matters of literature, an appendage to a book, to supply what is wanting therein.

SUPPORTED, in heraldry, a term applied to the uppermost quarters of a shield when divided into several quarters, these seeming as it were supported or sustained by those below. The chief is said to be supported when it is of two colours, and the upper colour takes up two-thirds of it. In this case it is supported by the colour underneath.

SUPPORTERS, in heraldry, figures in an achievement placed by the side of the shield, and seeming to support or hold up the same. Supporters are chiefly figures of beasts: figures of human creatures for the like purpose are called *tenants*.

SUPPOSITION, in music, according to Rousseau, *supposition* has two senses.

1. When several notes rise or descend diatonically in one part upon the same sound in another, then these diatonick notes cannot all form a harmony, nor enter at once into the same chord: there are some of them, therefore, which must be reckoned as nothing; and it is these notes foreign to the harmony which are called *notes by supposition*.

The general rule is, when the notes are equal, that all those which are struck in the perfect time should carry harmony; those which pass during the imperfect time are notes of supposition, which are only placed there on account of the melody, and to form gradations conjoined. The reader will see what is meant by conjoined or disjoined gradations, by consulting **MUSIC**, art. 50. But, to render the matter perspicuous, let it be understood, that, in gradations conjoined, the highest sound of the inferior degree forms likewise the lowest of the superior; whereas, in such as are disjoined, the series from beginning to end continually rises or descends by some one interval or another; and in this case the highest note of the lowest degree will not begin the succeeding series, which must commence at least a tone or semitone above it. Let it be observed, that by perfect and imperfect times we would be less understood to mean the principal divisions of the bar, than even the aliquot parts of each division. Thus, if there were two equal notes in the same time, or, in other words, two aliquot parts in the same principal division of the bar, it is the first of these notes or parts which carries the harmony; the second is a note of supposition. If the time consists of four equal notes, the first and third carry harmony, the second and fourth are notes of supposition, &c.

Sometimes this order is reversed; the first note is passed over by supposition, and the second carries harmony: but in that case the duration of the second note is generally increased by a point, at the expence of the first.

All this constantly supposes a diatonick procedure by conjoined gradations; for when the degrees are disjoined, there is no such thing as supposition, and all the notes ought to enter into the chord.

2. Those are also called *chords by supposition* in which the continued bass adds or supposes some sounds beneath the fundamental bass; which occasions such chords always to occupy a larger compass than the extent of the octave.

The dissonances of chords by supposition should always be prepared by syncopations, and resolved in descending diatonically upon some sound of a chord under which the supposed bass may be recognized as a fundamental, or at least as a continued bass. For this reason, chords by supposition, if thoroughly examined, may all of them pass for mere suspenses.

There are three kinds of chords by supposition; all of them are chords of the seventh. The first, when the superadded sound is a third below the fundamental; such is the chord of the ninth: if the chord of the ninth is formed by the mediant superadded beneath the chord containing the sensible note in the minor mode, in that case the chord takes the name of the fifth redundant. The second kind is, when the sound supposed is a fifth beneath the fundamental,

Suppository as in the chord of the fourth, otherwise called the *eleventh*; if the chord contains the sensible note, and the tonic be supposed, the chord takes the name of *seventh redundant*. The third kind is that where the supposed found is beneath a chord of the seventh diminished: if it is a third below, that is to say, if the found supposed be the dominant, the chord is called a *chord of the second minor and third major*; it is very little in practice: if the found superadded be a fifth below, or if that found be the mediant, the chord is called a *chord of the fourth and fifth redundant*; and if it is a seventh below, that is to say the tonic itself, the chord takes the name of the *sixth minor*, and *seventh redundant*. With respect to the inversion of these different chords, where the supposed found is transferred to the higher parts, as it is only admitted by a licence, it should not be practised without choice and circumspection. At the word **ACCORD**, in *Roussseau's Musical Dictionary*, will be found all those which are tolerable.

SUPPOSITORY, a kind of medicated cone or ball, which is introduced into the anus for opening of the belly. Suppositories are usually made of soap, sugar, alum, or a piece of tallow-candle about the length of a man's thumb and the breadth of a finger; though they may be made smaller for children, and sometimes a little thicker for adults.

SUPPRESSION, in medicine, is generally used to signify a retention of urine or of the menses.

SUPPURATION, the second way wherein an inflammation terminates; being a conversion of the inspissated blood and the first adjacent parts, as the vessels and fat, into pus or matter; which disorder, when it has not yet found an opening, is generally called an *abscess*.

SUPRASPINATUS, in anatomy. See there, *Table of the Muscles*.

SUPREMACY, the superiority or sovereignty of the king. See **SOVEREIGNTY**.

SUR, or **SHUR**, (anc. geog.) a desert of Arabia Petrea, extending between Palestine and the Arabian Gulph; into which the Israelites, on their landing out of the Red Sea, first came, Exod. xv. 22. Again, Numb. xxxiii. 8. it is said, that from the sea they went three days journey into the Wilderness of Etham; whence some conclude that Etham and Shur are the same wilderness; or only differ as a part from the whole, Shur being the general name, and Etham that part of it lying nearest to Etham; thus contending, that the passage through the sea was straight forwards. Others, on the contrary, from the intent of the passage through the sea, namely, the drowning of the Egyptians, maintain, that they only took a circuit or compass in the sea, which as they entered into they also came out of, in the Wilderness of Etham. Now called *Corandel*, (Thevenot.)

SURAT, a sea-port town of Asia, in the province of Gozarat, and in the peninsula on this side the Ganges. It was built in the year 1660, on the banks of the river Tapa, the then mart-town being in another place: and when the English removed from it to this, others followed their example; and in a few years it became a large place, and is now said to have 200,000 inhabitants. Its trade is very considerable; for from 1690 to 1705, the revenues arising from the custom-

house and other things amounted to 162,500 pounds. In this city there are as many different religions as in Amsterdam; for there are Mahometans of several sects, and many sorts of Gentoos, of which the Banyans are the most numerous. These are either merchants, bankers, brokers, accountants, collectors, or surveyors; but there are very few handicraftsmen, except tailors and barbers. It is said that there are 85 different sects among them, who never eat with each other. There are also Talapins, who are great enemies to the Papists, and preach up morality to be the best guide of human life. They live upon alms, seldom speak in the streets, and extend their charity even to birds and beasts. Of Perfecs there are a great number about Surat and the adjacent countries. They were banished from Persia in the 7th century, because they would not change their religion. They never marry into any other religion, which keeps their complexion almost as fair as that of the Europeans. Besides these, there are Jews and Armenian Christians, who are all great merchants. The fields about Surat are all plain; and the soil is fertile, except towards the sea, which is sandy and barren. All sorts of provisions are very cheap, and they have as good wheat as in Europe. They have various sorts of fowls; and plenty of antelopes in their forests, though but few deer. There are no fine buildings, but many of the houses are large; and there are caravansaries and mosques. The French have a little church near the old English factory, where they keep a few capuchins, who practise surgery without a reward. The English and Dutch agents make a good figure here, and they always maintain a good understanding with the officers of state and justice. The affairs of the East India company are managed by a president and council; and the former lives in great splendor. The Mahometan women are always veiled when they appear abroad, and their dress is much the same as the men. The Gentoos women are bare-faced, and their legs are bare up to the knee. They have several gold and silver rings on their noses, ears, legs, and toes. Surat, together with the citadel, was taken by the English in April 1759, and afterwards ceded to them by the Great Mogul. It is 160 miles north of Bombay, and 375 south-west of Agra. E. Long. 72. 25. N. Lat. 21. 10.

SURD, in arithmetic and Algebra, denotes any number or quantity that is incommensurable to unity: otherwise called an *irrational number* or *quantity*. See **ALGEBRA**, n^o 10, 11.

SURETY, in law, generally signifies the same with **BAIL**.

SURFACE. See **SUPERFICIES**.

SURFEIT, in medicine, a sickness with a sensation of a load at the stomach, usually proceeding from some error in diet, either with regard to the quantity or quality of the food taken. Sometimes, however, a surfeit is only a plethora from indolence and full but improper feeding; in which case perspiration is defective, and eruptions form themselves on the skin.

A surfeit from animal-food, as muscles, putrid flesh, &c. is best remedied by the use of vegetable acids, which may be taken diluted with water, a vomit being prefixed, and this even though a vomiting and purging both attend.

When an excess of feeding is the cause, the primæ

Surat
Surfeir.

Surfeit viz being evacuated, and the nature of the plethora attended to, that the load may be properly evacuated, the indication of cure will be, to recover the perspiratory discharge, consistent with which diuretics may be used in preference to medicines which produce any other evacuation.

SURFEIT, in farriery. See there, § xix.

SURGE, in the sea-language, the same with a wave. See WAVE.

SURGEON, or CHIRURGEON, one that professes the art of SURGERY.

In England there are two distinct companies of surgeons now occupying the science or faculty of surgery; the one company called *barbers*, the other *surgeons*, which latter are not incorporated.—The two are united to sue, and be sued, by the name of *masters or governors* and commonality of the mystery of *barbers and surgeons of London*. 32 H. VIII. c. 42.

No person using any *barbery* or *shaving* in London, shall occupy any *surgery*, letting of blood, or other matter; drawing of teeth only excepted.—And no person using the mystery or craft of surgery shall occupy or exercise the feat or craft of *barbery*, or

shaving; neither by himself, nor any other for his use. 32 VIII. 8. c. 42. Surgeon.

By the same statute, surgeons are obliged to have signs at their doors.

The French *chirurgiens* being refused to be admitted into the universities, (notwithstanding that their art makes a branch of medicine,) on pretence of its bordering a little on *butchery* or *crudely*, associated themselves into a brotherhood, under the protection of S. Cosmus and S. Damian: on which account, according to the laws of their institution, they are obliged to dress and look to wounds *gratis* the first Monday of each month.

They distinguish between a *chirurgien* of the long robe, and a *barber-chirurgien*. The first has studied *physic*, and is allowed to wear a gown. The skill of the other, besides what relates to the management of the beard, is supposed to be confined to the more simple and easy operations in *chirurgery*; as bleeding, tooth-drawing, &c.

They were formerly distinguished by badges: those of the long gown bore a case of instruments; the barber, a basin.

S U R G E R Y .

SURGERY, a branch of medicine, including the knowledge of all those diseases wherein the application of the hand is necessary, whether such diseases are occasioned by external injuries, or take their rise

from internal causes, with the method of performing all manual operations which may be necessary in such cases.

PART I. HISTORY OF SURGERY.

History.
2
Origin of
the art.

THAT surgery was coeval with the other branches of medicine, or perhaps antecedent to any of them, will not admit of doubt. The wars and contentions which have taken place among mankind almost ever since their creation, necessarily imply that there would be occasion for surgeons at a very early period; and probably these external injuries would for some time be the only diseases for which a cure would be attempted, or perhaps thought practicable.—In the sacred writings we find much mention of balsams, particularly the balm of Gilead, as excellent in the cure of wounds: though at the same time we are informed that there were some wounds which this balsam could not heal; as indeed we know, at this day, there are many wounds which, though curable by internal medicines, will resist the most powerful external applications.

2
Of the sur-
gery of the
ancient
Greeks.

Concerning the surgery practised among the Egyptians, Jews, and Asiatic nations, we know little or nothing. The Greeks were those from whom the art descended to us, though they confessedly received it from the eastern nations. The first Greek surgeons on record are *Æsculapius*, and his sons *Podalirius* and *Machaon*. *Æsculapius* flourished about 50 years before the Trojan war; and his two sons distinguished themselves in that war both by their valour and skill in curing wounds. This indeed is the whole of the medical skill attributed to them by Homer; for in the plague which broke out in the Grecian camp, he does not mention their being at all consulted. Nay, what is still more strange, though he sometimes mentions his heroes having their bones broke, he never takes

notice of their being reduced or cured by any other than supernatural means; as in the case of *Æneas*, whose thigh-bone was broken by a stone cast at him by *Diomed*. The methods which these two famous surgeons used in curing the wounds of their fellow-soldiers seems to have been the extracting or cutting out the dart which inflicted it, and applying emollient fomentations or styptics, when necessary, to the wound: and to these they undoubtedly attributed much more virtue than they could possibly possess; as appears from the following lines, where Homer describes *Eurypylos* as wounded and under the hands of *Patroclus*, who would certainly practise according to the directions of the surgeons.

Patroclus cut the forky steel away;
Then in his hands a bitter root he bruist'd,
The wound he wash'd, the styptic juice infus'd.
The closing flesh that instant ceas'd to glow;
The wound to torture, and the blood to flow.

Till the days of *Hippocrates* we know very little of what was the practice of the Greek surgeons. From 3 State of the art in the him, however, we learn, that the practice of blood-time of Hip- letting, cupping, and scarification, was known to them; pocrates.— also the use of warm and emollient fomentations, issues made with hot irons, pessaries, injections, fumigations, &c. *Hippocrates* also gives directions with regard to fractures, luxations, ulcers, fistulas, He directs the extension, reduction, bandages, and splints, proper to be used in fractures and luxations of different bones, with several machines to increase the extension when necessary. He directs the laxity and

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and tightness of the bandages; the intervals for unloosing and binding them on again; the position and repose of the fractured member, the regimen and diet; and he mentions the time when a callus is usually formed. He treats also of fractures of the skull, and the method of applying the trepan. In his treatment of ulcers, he speaks of reducing fungous flesh by means of escharotics, some of which are alum, nitre, verdigrise, quicklime, &c.

4
Surgery becomes a distinct branch.

In the time of Ptolemy Philopater of Egypt, medicine, all the branches of which had hitherto been practised by the same person, was now divided into three, viz. the dietetic, pharmaceutical, and surgical; from which time to the present, surgery has continued to be reckoned a distinct profession from medicine, though very improperly, in the opinion of the best authors.

5
Archagathus the first Roman surgeon expelled the city.

Surgery appears not to have existed in Rome, notwithstanding the warlike genius of the people, for more than 500 years. Archagathus, a Greek, was the first professor of that art in the city; and so frequently employed the knife, hot irons, and other cruel methods of cure, that he was branded with the opprobrious title of *hangman*, and expelled the city, where no physician or surgeon of eminence again made his appearance for 180 years. At this time Asclepiads undertook the profession of medicine; but seems to have dealt little in surgery. Neither have we any thing of importance on that subject till the time of Celsus, who flourished during the reigns of Augustus and Tiberius.—In his surgery, all the improvements from Hippocrates to his own days are collected; the most minute and trifling diseases are not omitted.

6
State of surgery in the time of Celsus.

An eminent surgeon, of the moderns, emphatically exhorts every person in that profession "to keep Celsus in his hands by day and by night." He describes the signs of a fractured skull, the method of examining for the fracture, of laying the skull bare by an incision in the form of the latter X, and afterwards of cutting away the angles, and of applying the trepan, with the signs of danger and of recovery. He observed, that sometimes, though very rarely, a fatal concussion of the brain might happen, the blood-vessels within the skull being burst, yet the bone remaining entire. After the operation of the trepan, sponges and cloths wet in vinegar, and several other applications, were made to the head; and, throughout, severe abstinence was enjoined. In violent fractures of the ribs, he ordered venesection; low diet; to avoid passions of mind, loud speaking, motion, and every thing that might excite coughing or sneezing; cloths wet in wine, roses and oil, and other applications, were laid over the fracture. The cure of fractures, in the upper and lower extremities, he said were nearly alike; that fractures differ in degree of violence and danger, in being simple or compound, that is, with or without a wound of the flesh, and in being near to the joint. He directs the extension of the member by assistants; the reduction, by the surgeon's hands, of the fractured bones into their natural situation; and to bind the fractured part with bandages of different lengths, previously dipped in wine and oil: on the third day fresh bandages are to be applied, and the fractured member fomented with warm vapour, especially during the inflammation. Splints,

if necessary, are to be applied, to retain the bones in a fixed position. The fractured arm is to be suspended in a broad sling hung round the neck: the fractured leg is to be inclosed in a kind of case, reaching above the ham, and accommodated likewise with a support to the foot, and with straps at the side, to keep the leg steady: in the fractured thigh-bone, the case is to extend from the top of the hip to the foot. He describes the method of treating compound fractures, and of removing small fragments of splinters of bones; and the manner of extracting darts. In luxations of the shoulder, he mentions several methods of giving force to the extension, and of replacing the dislocated bone. One method similar to Hippocrates was, to suspend the patient by the arm; the fore-part of the shoulder, at the same time, resting upon the top of a door, or any other such firm fulcrum. Another method was to lay the patient supine, some assistants retaining the body in a fixed position, and others extending the arm in the contrary direction; the surgeon, in the mean time, attempting, by his hands, forcibly to reduce the bone into its former place.

If a large inflammation was expected to ensue after a wound, it was suffered to bleed for some time, and blood was drawn from the arm. To wounds accompanied with considerable hæmorrhage, he applied a sponge wet in vinegar, and constant pressure: if necessary, for the violence of the hæmorrhage, ligatures were made round the vessels, and sometimes the bleeding orifice was seared up with the point of a hot iron. On the third day fresh dressings were applied. In considerable contusions, with a small wound of the flesh, if neither nerves nor blood-vessel prevented, the wound was to be enlarged. Abstinence and low diet, in all such accidents, was prescribed; cloths wet with vinegar, and several other applications, were directed to the inflamed part. He observes, that fresh wounds may be healed without compound applications: Hippocrates used a piece of dry sponge, and condemned greasy ingredients. In external gangrene, Celsus cut into the sound flesh; and when the disease, in spite of every effort, spread, he advised extirpation of the member. After cutting to the bone, the flesh was then separated from it, and drawn back, in order to save as much flesh as possible to cover the extremity of the bone. Celsus, though extremely diffuse in the description of surgical diseases, and of various remedies and external applications, yet is nearly silent on the method and process of extirpating members; from which, comparing his treatise with the modern system, we might infer, that the operation was then seldom practised than at present. He describes the symptoms of that dangerous inflammation the carbuncle, and directed immediately to burn or to corrode the gangrened part. To promote the suppuration of abscesses, he ordered poultices of barley-meal, or of marsh-mallows, or the seeds of linseed and fennel. He also mentions the compositions of several repellent cataplasms. In that superficial inflammation called the *erysipelas*, he applied cerus, mixed with the juice of solanum or nightshade. Sal ammoniac was sometimes mixed with his plasters.

He is very minute in describing diseases of the eyes, ears, and teeth, and in prescribing a multitude of remedies and applications. In inflammation of the eyes, he.

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the enjoined abstinence and low diet, rest, and a dark room: if the inflammation was violent, with great pain, he ordered venesection and a purgative; a small poultice of fine flower, saffron, and the white of an egg, to be laid to the forehead to suppress the flow of pituita; the soft inside of warm white bread dipped in wine, to be laid to the eye; poppy and roses were also added to his collariums, and various ingredients too tedious to enumerate. In chronic watery distensions of the eyes, he applied astringents, cupped the temples, and burnt the veins over the temple and forehead. He couched cataracts by depressing the crystalline lens to the bottom of the orbit. Teeth, loosened by any accident, he directed, after the example of Hippocrates, to be fastened with a gold thread to those adjoining on each side. Previous to drawing a tooth, he ordered the gum to be cut round its neck; and if the tooth was hollow, it was to be filled with lead before extraction, to prevent its breaking by the forceps. He describes not only the inflammation, but likewise the elongation, of the uvula: he also describes the polypus, and some other diseases affecting the nose.

He describes several species of hernia or ruptures, and also the hydrocele or dropsy of the scrotum, and the manual assistance required in those complaints. After the return of the intestines into the abdomen, a firm compress was applied to that part of the groin through which they protruded, and was secured by a bandage round the loins. In some cases, after the return of intestinal ruptures, he diminished the quantity of loose skin, and formed a cicatrix, so as to contract over the part, to render it more rigid and capable of resisting. He describes various diseases of the genital parts, a difficulty of urine, and the manner of drawing off the water by a catheter; the signs of stone in the bladder, and the method of sounding or feeling for that stone. Lithotomy was at that time performed by introducing two fingers into the anus; the stone was then pressed forward to the perineum, and a cut made into the bladder; and by a crooked instrument, made in a particular form, the stone was extracted. He describes the manner of performing this operation on both the sexes, of treating the patient, and the signs of recovery and of danger. Hippocrates had even ventured to cut into the kidney, either to give a discharge to abscesses or to extract stones.

Celsus directed various corrosive applications and injections to fistulas; and, in the last extremity, opened them to the bottom with a knife, cutting upon a grooved instrument or conductor. In old callous ulcers, he made a new wound, by either cutting away the hard edges, or corroding them with verdigrise, quick-lime, alum, nitre, and with some vegetable escharotics. He mentions the symptoms of caries in the bone; directs the bone to be laid bare, and to be pierced with several holes, or with the trepan, or to be burnt or rasped, in order to promote an exfoliation of the corrupted part; afterwards to apply nitre and several other ingredients. One of his applications to a cancer was auripigmentum or arsenic. He directs the manner of tapping the abdomen in the ascites, and of drawing blood by the lancet and cupping-glasses. His cupping-glasses seem not to have been so convenient as the modern: they were made either of brass or horn, and were unpurged with a pump. He cured vari-

cofe veins by usion or by incision. He gives directions for extracting the dead foetus from the womb, in whatever position it should present; and, after delivery, applied to the private parts soft cloths wet in an infusion of vinegar and roses. In Celsus's works there is a great redundancy and superfluity of plasters, ointments, escharotics, collariums, of suppurating and discutient cataplasms, and external applications of every kind, both simple and compound: perhaps, amongst the multitude, there are a few useful remedies now laid aside and neglected.

The last writer of consequence who flourished at Rome was Galen, physician to the emperor Marcus Aurelius. His works are for the most part purely medicinal; however, he wrote also on surgery, and made Commentaries on the Surgery of Hippocrates. He opened the jugular veins, and performed arteriotomy at the temples; directed leeches, scarification, and cupping-glasses, to draw blood. He also described with accuracy the different species of hernia or ruptures.

In the year 500 flourished Aëtius, in whose works we meet with many observations omitted by Celsus and Galen, particularly on the surgical operations, and diseases of women, the causes of difficult labours, and modes of delivery. He also takes notice of the dracunculus, or worm under the skin, a disease at present common in Africa. Aëtius, however, is greatly excelled by Paulus Egineta, who flourished in 640; and whose treatise on surgery is superior to that of Celsus or all the other ancients. He directs how to extract darts; to perform the operation sometimes required in dangerous ruptures or hernia, where the intestines cannot by any other means be returned back; he directs also to tie up punctured arteries in the operation for the aneurism. Galen, Paulus, and all the ancients, speak only of one species of aneurism, and define it to be "a tumour arising from arterial blood, extravasated from a ruptured artery." The aneurism from a dilatation of the artery is a discovery of the moderns. In violent inflammations of the throat, where immediate danger of suffocation was threatened, Paulus performed the operation of bronchotomy. In obstinate distensions upon the eyes, he opened the jugular veins. He describes the manner of opening the arteries behind the ears in chronic pains of the head. He wrote also upon obstetrics, on difficult labours, and other female diseases. Fabricius ab Aquapendente, a celebrated surgeon of the 16th century, has followed Celsus and Paulus as text-books.

From the time of Paulus Egineta to the year 900, no writer of any consequence, either on medicine or surgery, appeared. At this time the Arabian physicians Rhazes and Avicenna revived in the East the medical art, which as well as others was almost all entirely extinguished in the West. Avicenna's *Canon Medicinæ*, or General System of Medicine and Surgery, was for many ages celebrated through all the schools of physics. It was principally compiled from the writings of Galen and Rhazes. The latter had correctly described the spina ventosa, accompanied with an enlargement of the bone, caries, and acute pain. In difficult labours he recommends the fillet to assist in the extraction of the foetus; and for the same purpose Avicenna recommends the forceps. He describes the composi-

Surgery of Galen.

Of Aëtius and Paulus Egineta.

The art revives among the Arabians.

tion

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Albucasis brings surgery in repute among the Arabians.

tion of several cosmetics to polish the skin and make the hair grow or fall off.

Notwithstanding this, however, it was not till the time of Albucasis, who flourished in the year 1000, that surgery came into repute among the Arabians. Rhazes complains of their gross ignorance, and that the manual operations were performed by the physicians servants. Albucasis enumerates a tremendous list of operations, sufficient to fill us with horror. The hot iron and cauteries were favourite remedies of the Arabians; and, in inveterate pains, they resorted, like the Egyptians and eastern Asiatics, great confidence in burning the part. He describes accurately the manner of tapping in the scitites; mentions several kinds of instruments for drawing blood; and has left a more ample and correct delineation of surgical instruments than any of the ancients. He gives various obstetrical directions for extracting the fœtus in cases of difficult labours. He mentions the bronchocele, or prominent tumour on the neck, which, he tells us, was most frequent among the female sex. We are also informed by this writer, that the delicacy of the Arabian women did not permit male surgeons to perform lithotomy on females; but, when necessary, it was executed by one of their own sex.

Leprosy introduced into Europe.

From the 11th century to the middle of the 14th, the history of surgery affords nothing remarkable except the importation of that noxious disease the leprosy into Europe. St Lewis king of France had caught the leprosy in the Crusades; and in order to a cure, was prescribed the blood of young children, as a potion, by the Jewish physicians. It does not appear that either external or internal remedies were of any avail in curing it, or indeed thought to be so; but, by taking proper precautions to separate the infected from the sound, it gradually disappeared. The discovery of America introduced a new and more terrible disease than the leprosy, namely, the venereal; which at its origin appeared in loathsome ulcers affecting the genitals, and by degrees the palate and uvula. Swellings and buboes arose in the groin: in its more advanced stages, excruciating pains were felt in the bones, especially at night; scabs and small running sores covered the skin; nodes or protuberances appeared in the forehead; the bones became at length carious, enlarged, and rotten: many, after lingering for months under such wretched calamities, others, for a year or more, lost their palate, nose, eyes, lips, teeth, genitals; and, before death, presented a cadaverous spectacle of deformity and corruption. Even at this day, when the disease has become much milder, venereal ulcers will sometimes appear with such inveteracy as to give no small trouble to the surgeon who attempts to remove them.

State of the leprosy.

Soon after this the scurvy, with all its train of direful, and for a long time incurable, ulcers, rigid muscles, and rotten gums, made its appearance. The state of medical knowledge did not, in those ages, admit of a certain and easy cure either for the venereal disease or scurvy, nor was the true cure of the latter known till within these few years.

State of surgery in Britain in the 16th century.

At the beginning of the 16th century surgery was held in contempt in this island, and was practised indiscriminately by barbers, farriers, and low-gelders: the barbers and surgeons company continued for 200 years after to be incorporated, both in London and

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Paris. In Holland and some parts of Germany, even at this day, barbers exercise the razor and lancet alternately. The surgeons company in London, however, have now disengaged themselves from that dishonourable connection: they are now likewise authorized to examine and to grant certificates to young surgeons, which qualify them to purchase or to be appointed to a medical commission in the army or navy. Even yet, however, the distinction between physicians and surgeons is by far too great, and their reciprocal ignorance of these different branches of the same science frequently embarrasses both physician and surgeon, often to the great danger of the patient, as will appear in the sequel of this article.

Too great distinction between physicians and surgeons.

Surgery, in the strict limitation of the word *, is principally confined to wounds, fractures, luxations, tumours, ulcers, and to the different manual operations, instruments, and bandages. These are the themes of general systems of surgery. On this science and art, amongst the ancient surviving writers, Hippocrates, Celsus, Galen, P. Ægineta, and Albucasis, alone possess any intrinsic excellence.

Black's Historical Sketch.

It is within the last three centuries that we have any original improvement in surgery, from the era of the Arabians; nor do we know of any eminent British surgical writers until within the last 130 years. "In Germany," says Heister, "all the different surgical operations, at the beginning even of the 18th century, were left to empirics; the rest were contented to cure a wound, open a vein or an abscess, return a fractured or luxated bone; but they seldom or never ventured to perform any of the difficult operations: he also speaks of their gross ignorance of the Latin language."

The first surgical work of the 16th century, entitled to any pre-eminence or criticism, is that of J. Carpus; but in the effulgence of later writers his light is scarce perceptible. F. ab Aquapendente, an Italian, published a system of Surgery, containing a description of the various diseases, accidents, and operations. Boerhaave pays this author the following compliment: *Ille superavit omnes, et nemo illi hanc disputat gloriam omnibus potius quam hocce carere possumus.* About the same period, A. Parey, a Frenchman, made several important additions to surgery, particularly in his collection of cases of wounds, fractures, and other accidents which occur during war. The ancients, who were ignorant of powder and fire-arms, are defective in this part of military surgery. Parey pretends to have first invented the method of tying, with a needle and strong silk-thread waxed, the extremities of large arteries, after the amputation of a member. The ligation of the blood vessels is, however, merely a revival of the ancient practice, which had fallen into disuse: throughout the dark ages, the hot iron, cauteries, and strong astringents, were substituted in its place. B. Maggus and L. Botallus wrote on the cure of gunshot wounds. J. A. Cruce wrote a system of surgery:

Writers on surgery in the 16th century.

In the 17th century, surgery was enriched with several systems, and with detached or miscellaneous observations. The principal authors are, M. A. Severi, V. Vidius, R. Wiseman, Le Clerc, J. Scultetus, J. Mangetus, C. Magatus, Spigelius, F. Hildanus, T. Bartholin, P. de Marchetti.

The 18th century opens with several eminent surgical

41 S

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17
Improvements
in lithotomy.

cal writers and improvements. In the operation of lithotomy, as described by Celsus, the rectum or lower gut, and often the seminal ducts, were wounded, fistulas ensued, or the power of generation was annihilated. The moderns therefore invented three methods different from that of Celsus. One method, and the earliest, was to introduce a catheter into the urethra and bladder, and upon that to make a direct incision through the urethra into the bladder. J. de Romanis, an Italian, in the 16th century, was the original inventor of this operation, a description of which was published by his pupil Marianus. Another method, much later invented, was to distend the bladder as large as possible with urine, and when thus enlarged and elevated, to open into it through the abdominal muscles, immediately above the os pubis. These were called the *high and low operations*; Celsus's, the *apparatus minor*. A French priest called *Frere Jacques* introduced another improvement, somewhat different from the modern low operation, or *apparatus major*. Jacques's incision was directed obliquely and to one side of the urethra, avoiding as much as possible to open any considerable extent of the urinary canal. Inconveniences still attended these various experiments in lithotomy. Jacques was a bold rash man, and ignorant of anatomy; of 60, cut by him for the stone, 25 died soon after; others survived, but under an incontinence of urine and fistulas, and only 13 were perfectly cured. The priest's operation and success is described by J. Merrey. A grooved catheter was afterwards invented to conduct the incision-knife; other surgeons added the cutting-gerget; and, with these improvements, Jacques's lateral operation is now considered as one of the most safe and successful. Douglas, Cheselden, and afterwards Le Dran, took uncommon pains to explain and to improve this operation. J. Denys also wrote well on the stone and lithotomy.

18
Inventions
of M. Petit.

J. Petit of Paris wrote on diseases of the bones, fractures, dislocations, and caries. Boerhaave says, *Tractatus hic nunquam sibi parem habuit*. Petit invented the screwed tourniquet, which can be braced or relaxed at pleasure, and, in the hurry of battles, is extremely useful to compress the large arteries, and to stop the hæmorrhage. Tourniquets were not used until towards the end of the 17th century. The ancients, previous to amputation, only made a tight ligature round the member, or attempted to grasp and compress the arteries with the band and fingers: from these defects, amongst them, the amputation of any large member was thought tremendous, and was too frequently fatal. Of late years, the agaric, growing upon old oak-trees, has been extolled as a powerful styptic in hæmorrhages from large vessels.

19
Different
systems of
surgery.

A complete description of the different surgical accidents and diseases, and of the principal surgical operations, as executed from the beginning of the 18th century to the present time, with descriptions and plates of the instruments and bandages, will be seen in those celebrated writers, French, German, and English, P. Dionis and De la Faye, J. Garengeot, H. F. le Dran, L. Heister, and S. Sharp. Heister's System consists of two quarto volumes, and is prefaced with a large catalogue of writers. To Sharp's Compendium of the surgical operations is added a volume called *A*

Critical Inquiry into the Modern Practice of Surgery. To these may be added, Saviard's Surgical Observations, J. Z. Platner's Surgical Institutions. On gunshot wounds, and on fractures, Ranby and Bromfield merit perusal. Splints of a new construction, to retain fractured bones in a steady position until a callus is formed, were invented by Sharp, and improved by Pott. Gough, with meritorious ingenuity, has invented and published a description of several machines, to secure fractured bones in a fixed situation. As such accidents occur so frequently in life, and above all during war, every invention of this sort, and the author, is entitled to public thanks. There is infinitely more skill and address required to save a fractured member, than to cut it off. Knives and saws are dreadful alternatives; and we have already an exuberant stock of treatises on extirpation.

Numbers had dragged through a great part of life, and many had died in execrating agony, from obstructions of the urethra and fistulas, the consequence of venereal gleet, and other causes. To remedy such complaints, we find bougies of different constructions and materials recommended by the moderns, and described with more or less accuracy in most of the surgical systems. In the present century, Daran and Goulard have written dissertations expressly upon this subject. Goulard's Treatise on the Preparations of Lead, and its utility in external inflammations, sprains, contusions, and a variety of complaints, is also well entitled to perusal.

In preventing the protrusion of inguinal ruptures, the modern steel-bandages called *trusses* are more effectual than the ancient. The nature of the hernia congenita, or inguinal rupture of infants, was obscure before the publications of Haller, Hunter, and Pott. The last author has written excellent treatises on ruptures, and on the hydrocyle.

On diseases of the eyes, and surgical operations on those organs, the most celebrated treatises are written by Maitre Jean, C. St Yves, D. Mauchard, and Taylor. David, a modern French surgeon, rejected the operation of depressing the crystalline lens with a needle to the bottom of the orbit, in couching of cataracts; he made an incision through the external coat of the eye, and extracted this humour entire. In the former mode, the lens frequently ascended, and again interrupted the rays of light.

On the teeth, their diseases, the dentist operations, and the dentition of infants, we have two excellent treatises, one in French, the other in English, written by P. Fauchard and by J. Hunter. We do not meet amongst the ancients with any mention of artificial teeth. Hippocrates and Celsus only direct the immediate reinserting into their sockets found teeth suddenly loosened from the jaw. With us, artificial teeth are commonly made from the hard tusk of a sea-horse. Another modern invention, in which, unfortunately, the advantages and disadvantages are balanced, is that of transplanting found teeth of similar shape and size from one head, and fixing them instantaneously into the fresh sockets of another person's jaws; there they are tied to the neighbouring teeth by a waxed silk thread, and in a few weeks are firmly grasped and secured by the gums.

Through the writings of almost all the eminent anatomists,

History.

30
Of diseases
of the ure-
thra and fi-
stulas.

31
Of ruptures.

32
Of diseases of
the eye.

33
Of the teeth.

History. tomids, there are a variety of miscellaneous surgical observations. To recapitulate their names in detail would be superfluous.

The great superiority of the moderns above the an-

cients in the knowledge of anatomy, and the superiority likewise in the construction and workmanship of their instruments, necessarily render all their operations much more safe and prosperous.

History.

PART II. THEORY OF SURGERY.

²⁴ Theories of surgery and medicine connected. **I**N the extensive signification in which we have taken the word *surgery*, it is plain that the theory must include the greatest part, if not the whole, of the theory of medicine. Fevers, for instance, may terminate by a critical swelling; and the surgeon who should ignorantly attempt to discuss a tumor of this kind, might do much mischief. Ulcers may arise from various internal causes; and the person who should attempt to cure them by external applications alone would certainly fail. In like manner, the treatment of a simple wound becomes exceedingly different, according to the constitution and habit of body in the person who is wounded: from all which it is plain, that there is no theory which will in all cases answer; but that the surgeon must be well acquainted with the other branches of medicine, or he cannot practise with any kind of certainty or success.—We shall begin, however, with those cases where the cure is most easy.

SECT. I. Of Simple Wounds.

²⁵ Of mortal wounds. The first thing to be considered in the inspection of a wound is, whether it is likely to prove mortal or not. This knowledge can only be had from anatomy, by which the surgeon will be able to determine what parts are injured; and, from the offices which these parts are calculated to perform, whether the human frame can subsist under such injuries. It is not, however, easy for the most expert anatomist always to prognosticate the event with certainty; only this rule he ought always to lay down to himself, to draw the most favourable prognosis the case will bear, or even more than the rules of his art will allow. This is particularly incumbent on him in sea-engagements, where the sentence of death is executed as soon as pronounced, and the miserable patient is thrown alive into the sea upon the surgeon's declaring his wound to be mortal. There are, besides, instances on record where wounds have healed which the most skilful surgeons have deemed mortal. In the war before last, an officer was shot quite through the body by a musket-ball, which penetrated the substance of the lungs; yet he recovered, though not without great difficulty. Mr Forster informs us that Tupia, a native of the island of O-Tahitee, had been run through the body by one of the spears headed with the bone of the sting-ray; and yet this wound was healed. He informs us also, that in others of that country he had observed the marks of such desperate wounds, that he could not imagine how life could have subsisted under them. In general, however, those wounds are justly deemed mortal.

²⁶ The most favourable prognosis ought always to be drawn.

²⁷ Instances of desperate wounds being healed. 1. That penetrate the cavities of the heart, and all those wounds of the viscera where the large blood-vessels are opened; such are large wounds of the lungs, liver, spleen, kidneys, stomach, intestines, mesentery, pancreas, uterus, aorta; of the iliac, celiac, renal, mesenteric, and carotid arteries, (especially if they are wounded near their origin), of the subclavian

²⁸ Different kinds of wounds which are necessarily mortal.

also or vertebral, of the vena cava, the iliac vein, internal jugular, vertebral, renal, or mesenteric veins; of the vena porta, and of other large veins that lie deep in the body; because their situation will not admit of proper applications to restrain the flux of blood.

2. Those wounds are no less mortal than the former which obstruct or entirely cut off the passage of the animal-spirits through the body. Such are wounds of the cerebellum, medulla oblongata, and some violent strokes of the brain itself; though the cortical substance of the brain may be much injured, and yet the patient recover. There is reason to apprehend very great danger when the small veins or arteries which are contained in the cranium are injured: for the blood flowing from them into the internal sinuses of the brain, either produces too great a pressure upon those very tender parts of the brain, and so obstructs the course of the blood and spirits; or, being corrupted, putrifies the brain itself, if it cannot be evacuated by the assistance of the trepan; which is the case when this accident happens at the lower part of the cranium, or in the sinuses of the brain. Nor is there less danger where the nerves which tend to the heart are wounded, or entirely divided; for, after this, it is impossible for the heart to continue its motion.

3. To this class also are to be referred all wounds that entirely deprive the animal of the faculty of breathing. Therefore there is great danger where the *apera arteria* is completely divided; for, where it is only divided in part, it may be healed again by the assistance of an expert surgeon. To this place also belong violent shocks of the bronchia, mediastinum, and diaphragm, especially the tendinous parts of it.

4. Those wounds also which interrupt the course of the chyle to the heart are no less incurable than the former; such are wounds of the stomach, intestines, receptacle of the chyle, thoracic duct, and larger lacteals; to which we may add wounds of the oesophagus, if they are large; though death is not so sudden an attendant upon these wounds, but for want of nourishment they are greatly weakened by degrees, and die consumptive.

5. Wounds which are inflicted upon membranous parts that are situated in the abdomen, and contain some secreted fluid on the bladders, either for the bile or urine, the stomach, intestines, receptacle of the chyle, and lacteal vessels. The fluids contained in these parts, when once they are let loose into the cavity of the abdomen, cannot be properly discharged, and therefore easily corrode the internal parts of the body; and the membranes that contained them are generally so fine, that they will not admit of agglutination, especially since no medicine from without can be applied; though some few, indeed, have recovered after slight wounds in these parts.

6. We shall next proceed to describe those wounds, which prove fatal if neglected and left to nature. By these are meant those wounds that produce instant themselves.

²⁹ Of such as become mortal when left to death

death unless relieved by present assistance, but are curable by a good surgeon called in time; such are wounds of the larger external blood-vessels, which might be remedied by ligature. Of this kind are wounds of the brachial or crural artery, unless they are too near the trunk of the body. Wounds in the large arteries of the cubit or tibia, of the branches of the external carotid and temporal artery, are of this kind; to these may be added wounds of the jugular and other veins situated upon the external parts of the body.

³⁰
Of those
that become
mortal by
accident.

7. Wounds are properly said to become mortal by accident, where the patient's death is occasioned either by the ill conduct of the patient himself, or by the ignorance or neglect of his surgeon, the wound itself being deemed curable. Under this head are to be reckoned, 1. Those wounds which the surgeon has neglected to cleanse sufficiently, though he had it in his power to do it; as when some foreign body, which might easily have been extracted, is left in the wound by the carelessness of the surgeon, and produces inflammations, hæmorrhages, convulsions, and at last death itself. So in wounds of the thorax and abdomen, if the surgeon does not use his utmost diligence to evacuate the grumous blood, it will corrupt there, and, by drawing the neighbouring parts into consent, will expose the patient to instant death. Therefore great care must be taken that the lips of the wound do not close till the blood which is collected in the cavity of the body be all evacuated, if possible; which may be easily perceived by the difficulty of breathing, and other bad symptoms, being removed: but if any of the larger internal vessels are wounded, then all attempts to discharge the blood are vain; for the violence of the hæmorrhage takes off the patient. 2. Wounds also are reckoned mortal by accident which are treated or searched in too rough a manner by the surgeon; for if wounds be handled roughly that are full of nervous parts or large blood-vessels, there is great danger of bringing on hæmorrhages, convulsion, inflammation, gangrene, and death itself. The case also is the same, 3. In external wounds which are slight of themselves, but the patient is lost by the violence of the inflammation which is brought on and increased by the surgeon's injudicious treatment. Or, 4. When any one is taken off by the violence of the hæmorrhage from a wound of the head or foot; for in this case a surgeon might easily have stopped the blood by the application of proper remedies, or by ligature. Or, 5. Where the patient is guilty of any intemperance in eating or drinking, of excess of any passion, of exposing himself to the cold air, or of using any violent exercise; for by this means wounds, more especially those of the head, by being liable to fresh hæmorrhages and other dangerous accidents, frequently become mortal, notwithstanding the surgeon uses his utmost care and skill. Under this head also are to be reckoned, 6. Those wounds of the head where the patient is lost by the vast quantity of blood which is extravasated in the cavity of the cranium, and confined there; but where he might have been relieved, if the trepan had been used in time; for though wounds of this kind generally prove incurable, yet, as there is a possibility of saving a person in these circumstances by the use of the trepan, this

may properly be reckoned amongst the doubtful cases, and not deemed absolutely mortal.

In examining wounds, the next consideration is, whether the parts injured are such as may be supposed to induce dangerous symptoms, either immediately or in some time during the course of the cure. In order to proceed here with any degree of certainty, it is necessary to be well acquainted with those symptoms which attend injuries of the different parts of the body. If the skin only and part of the cellular substance is divided, the first consequence is an effusion of blood; the lips of the wound retract, become tumefied, and red and inflamed; leaving a gap of considerable wideness, according to the length and deepness of the wound. Along with this inflammation, if a very considerable portion of skin and cellular substance is divided, a slight fever seizes the patient; the effusion of blood in the mean time stops, and the wound is partly filled up with a cake of coagulated blood. Underneath this cake, the small vessels pour forth a clear liquor, which in a short time becomes converted into pus*. Below this pus granulations of the new flesh arise, the cake of coagulated blood loosens, a new skin covers the place where the wound was, and the whole is healed up; only there remains a mark, called a *cicatrix* or *scar*, showing where the injury had been received.

³¹
Of such as
are attended
with dan-
gerous
symptoms.

³²
Appearances
of a fine
ple wound
left to heal
naturally.

* See the
new flesh
arise, the
cake of coagulated
blood loosens,
articles Pus
and Mucus.

All wounds are accompanied with a considerable degree of pain, especially when the inflammation comes on; and this though the division reaches no farther than the skin and cellular substance. But if the muscular fibres are also divided, the pain is much greater, because the sound part of the muscle is stretched by the contraction of the divided part and the action of the antagonist muscle, which it is now less fitted to bear. The wound now also gaps much more than where the cellular substance only is divided, inasmuch that if left to itself the skin will cover the muscular fibres without any intervention of cellular substance, and not only a very unsightly cicatrix remains, but the use of the muscle is in some measure lost.—If the muscle happens to be totally divided, its parts retract to a very considerable distance; and unless proper methods be taken, the use of it is certainly lost ever afterwards.

³³
Of wounds
of the mus-
cles, of the mus-

If by a wound any considerable artery happens to be divided, the blood flows out with great velocity, and by starts distinguishing the pulse of the artery; the patient soon becomes faint with loss of blood; nor does the hæmorrhage stop until he faints away altogether, when the ends of the divided vessel close by their natural contractility; and if as much *vis vite* still remains as is sufficient to renew the operations of life, he recovers after some time, and the wound heals up as usual. The part of the artery which is below the wound in the mean time becomes useless, and its sides collapse, so that all the inferior part of the limb would be deprived of the vital fluid, were it not that the small branches sent off from the artery above the wounded place become enlarged and capable of carrying on the circulation. Nature also, after a wonderful manner, often produces new vessels from the superior extremity of the divided artery, by which the circulation is carried on as formerly. However, the consequences of such a profuse hæmorrhage may be very dangerous to the patient, by inducing

³⁴
Of wound-
ed arteries.

³⁵
Dangers
consequences
of these
wounds,
ex-

extreme debility, polypous concretions in the heart and large vessels, or an universal dropy in case the patient recovers. This happens especially where the artery is partially divided; because then the vessel cannot contract in such a manner as to close the orifice; however, if the wound is but small, the blood gets into the cellular substance and intestines of the muscles, swelling up the member to an extreme degree, forming what is called a *spurious aneurism*. Thus the hemorrhage soon stops externally; but great mischiefs are apt to flow from the confinement of the extravasated blood. This is now found to have the power of dissolving not only the fleshy parts, but also the bones themselves; and thus not only the use of the limb is entirely lost, but the patient is brought into great danger of his life, if proper assistance be not obtained in a short time.—It not frequently happens, that when a large artery has been wounded or totally divided, so that the parts which were wont to be supplied with blood by that vessel become totally or in great measure deprived of it, a mortification then ensues which cannot be prevented or cured: in some cases the limb remains paralytic or insensible through life.

Wounds of the membranes, nerves, or tendons, are attended with the most direful symptoms. The peculiar symptom indeed which attends a wounded membrane is an erysipelas. This is to a membrane what a simple inflammation is to a fleshy part: and hence the danger of an erysipelas of the face more than of any other part of the body; for there is such a connection between the external and internal membranes all over the body, that an affection of the one seldom fails to bring on an affection of the other. When a nerve or tendon is entirely divided, the pain is but trifling, though the consequences are often dangerous. If the nerve is large, all the parts to which it is distributed below the wound immediately lose the power of motion and sensation; nor is it uncommon, in such cases, for them to be seized with a gangrene. This, however, does not hold universally. According to Dr Kirkland, it takes place only when all or the greatest part of the nerves belonging to a particular part are divided or tied. "If the spinal marrow" says he, "is divided near to the head, we know the parts below soon lose their action irrecoverably; or if the bundle of nerves passing out of the æilla were divided or tied, sensation in the greatest part of the arm below would probably be lost. But we all know, that in performing the operation for an aneurism in the arm, if the nerves which accompany the brachial artery are tied, a temporary numbness is only felt, and sensation in any degree below the ligature is not lost.—I have seen the superior cubital nerve torn asunder above the elbow, in a gun-shot wound, with considerable loss of substance; and a temporary palsy only was the consequence."

When the tendon belonging to any muscle is totally divided, that muscle immediately exerts its contractile power; the divided ends of the tendon are removed to a considerable distance; and, unless proper assistance is obtained, the action of the muscle is ever lost. But when either nerve or tendon happens to be partially divided, the case is much worse. The distraction of the parts which remain whole, occasion-

ed by the divided parts contracting themselves, occasions the most excruciating pain, which frequently terminates in convulsions of the worst kind, particularly those most fatal spasms termed *tetanus* and *opisthotonus*, which often attend wounds in nervous or tendinous parts.

Wounds which penetrate the cavities of the thorax or abdomen are always exceedingly dangerous, because there is scarce a possibility of all the viscera escaping unhurt. A wound is known to have penetrated the cavity of the thorax principally by the discharge of air from it at each inspiration of the patient, by an extreme difficulty of breathing, coughing up blood, &c. Such wounds, however, are not always mortal, though very frequently so. The lungs, may even the heart itself, may be wounded, and yet the patient recover. Van Swieten relates, that a stag was found to have a cicatrix of a wound formerly inflicted on the cone of its heart. The same author also is of opinion, that wounds even of the right ventricle are not absolutely mortal, as the force of contraction in this ventricle is not very great; however, it is otherwise when the left ventricle is wounded, the great force with which it contracts, continually dilating the wound, and extravasating the blood in such quantities, that life cannot possibly subsist.—Wounds of the diaphragm are almost always mortal, either by inducing fatal convulsions immediately, or by the ascent of the stomach, which the pressure of the abdominal muscles forces up through the wound into the cavity of the thorax; and of this Van Swieten gives several instances.—Even though the wound does not penetrate into the cavity of the thorax, the very worst symptoms may follow. For if the wound defends deeply among the muscles, and its orifice lies higher, the extravasated humours will be therein collected, stagnate, and corrupt in such a manner as to form various sinuses; and after having eroded the pleura, it may at length pass into the cavity of the thorax. The matter having once found a vent into this cavity, will be continually augmenting from the discharge of the sinuous ulcer, and the lungs at last consumed by soaking in corrupted matter. This is most to be dreaded from those sinuous ulcers which run behind the ribs; for there is then no opportunity either of compressing the parts, or dilating the wound in order to procure a discharge of the matter. If, in cases of wounds in the thorax, the ribs or sternum happen to become carious, the cure will be extremely tedious and difficult. Galen relates the case of a lad who received a blow upon his sternum in the field of exercise: it was first neglected, and afterwards badly healed; but, four months afterwards, matter appeared in the part which had received the blow. A physician made an incision into the part, and it was soon after cicatrized: but in a short time a new collection of matter made its appearance, and upon a second incision the wound refused to heal. Galen found the sternum carious; and having cut off the diseased part, the pericardium itself was observed to be corroded, so that the heart could be seen quite naked; notwithstanding which, the wound was cured in no very long time.

Great caution is necessary in determining whether the wound has really penetrated into the thorax or the abdomen: for the former defends much farther in

Wounds of the thorax.

Wounds of the lungs and heart, not always mortal.

Of the diaphragm exceedingly dangerous.

Danger of wounds which do not penetrate the cavity of the thorax.

Extraordinary case of a carious sternum, and mortified pericardium.

Of distinguishing wounds of the thorax from those of the abdomen.

the

36 Power of extravasated blood in dissolving bones.

37 Wounds of the membranes, nerves, or tendons.

38 Dr Kirkland's opinion.

39 Fatal symptoms attending the partial division of a nerve or tendon.

Theory.

Theory.

the back than in the fore part; and there are instances of surgeons penetrating the abdomen instead of the thorax, when attempting to perform the operation for an empyema. However, as the lungs are almost always wounded when the cavity of the thorax is penetrated, the symptoms arising from thence can scarcely be mistaken.—Another symptom which frequently, though not always, attends wounds of the thorax, is an emphysema. This is occasioned by the air escaping from the wounded lungs, and insinuating itself into the cellular membrane; which being pervious to it over the whole body, the tumour passes from one part to another, till at last every part is inflated to a surprising degree. An instance is given, in the Memoirs of the Royal Academy, of a tumour of this kind, which on the thorax was eleven inches thick, on the abdomen nine, on the neck six, and on the rest of the body four; the eyes were in a great measure thrust out of their orbits by the inflation of the cellular membrane; and the patient died the fifth day. This was occasioned by a stab with a sword.

46
Of an emphysema.

47
Wounds of the abdomen.

48
An hernia or fistulous ulcer sometimes the consequence of wounds of the integuments.

49
Signs of a wound penetrating the cavity of the abdomen.

50
Wounds of the intestines will sometimes heal spontaneously.

indeed the wound most commonly proves generally mortal where any considerable portion of the intestine has been protruded, even though itself should not be wounded.

When the mesentery is injured, the danger is extreme, both on account of the blood-vessels which are every where dispersed through it, and the membranous nature of the mesentery itself, which is as subject to the erysipelatous inflammation as the other membranes of the body. Wounds of the liver are also exceedingly dangerous, on account of the nature of that viscus; for as the circulation of the blood is there very slow, and the substance of the liver itself is exceedingly soft and tender, the smallest acrimony in the matter is sufficient to destroy the whole, by producing incurable abscesses. Wounds of the spleen and pancreas are said not to be dangerous; and there are even some instances of these parts being cut out of living animals without any considerable injury; but those of the kidneys, urinary bladder, and gall-bladder, are almost always mortal.

51
Wounds of the mesentery and liver are very dangerous.

52
But not those of the spleen and pancreas.

Wounds of the head, even though they penetrate only through the external integuments, are not without danger, chiefly on account of the danger arising from the membranes of the brain, the pericranium, and the concussion of the brain by the stroke of the wounding instrument. Even contusions on the head, without any external wound, have sometimes brought on the most violent symptoms, and this when every thing seemed for a while to be in a fair way. Mr Pott, in his excellent Treatise upon Injuries of the Head from external Violence, divides wounds of the head into two kinds, viz. lacerated wounds, and those made by puncture. The former he subdivides into other two kinds, viz. those in which the scalp, though torn or unequally divided, still keeps its natural situation, and is not separated from the cranium to any considerable distance beyond the breadth of the wound; and those in which it is considerably detached from the parts it ought to cover. The latter are the most dangerous; as in such cases the pericranium is most commonly inflamed, and communicates the injury to the membranes of the brain, whence follow the most fatal symptoms. Small wounds, or such as are made by instruments that pierce rather than cut, are in general more apt to be troublesome than those which are larger, and, in the head particularly, are sometimes attended with very alarming symptoms. The parts capable of being hurt by such wounds are the skin, tela cellulosa, the expanded tendons of the muscles of the scalp, and the pericranium. If the wound affects the cellular membrane only, and has not reached the aponeurosis or pericranium, the inflammation and tumour affect the whole head and face, the skin of which wears a yellowish cast, and is sometimes thick set with small blisters containing a serum of the same colour. It receives the impression of the fingers, and becomes pale for a moment, but returns immediately to its inflamed colour: it is not very painful to the touch, and the eyelids and ears are always comprehended in the tumefaction: the former are sometimes distended in such a manner as to be closed; a feverish heat and thirst generally accompany it; the patient is restless, has a quick pulse, and most commonly a nausea and inclination to vomit. This generally happens to persons of a bilious

53
Of wounds of the head.

54
Mr Pott's division of them into two classes.

55
Of those in which the scalp is separated from the cranium.

Wounds of the abdomen are not much less dangerous than those of the thorax, by reason of the importance of the viscera which are lodged there. When the wound does not penetrate the cavity, there is some danger of an hernia being formed by the dilatation of the peritonæum through the weakened integuments, and the danger is greater the larger the wound is. Those wounds which run obliquely betwixt the interstices of the muscles often produce sinuous ulcers of a bad kind. For as there is always a large quantity of fat interposed every where betwixt the muscles of the abdomen, if a wound happens to run between them, the extravasated humours, or matter there collected, not meeting with free egress through the mouth of the wound, often makes its way in a surprising manner through the panniculus adiposus, and forms deep sinuities between the muscles; in which case the cure is always difficult, and sometimes impossible.

If a large wound penetrates the cavity of the abdomen, some of the viscera will certainly be protruded through it; or if the wound is but small, and closed up with fat so that none of the intestines can protrude themselves, we may yet know that the cavity of the abdomen is pierced, and probably some of the viscera wounded, by the acute pain and fever, paleness, anxiety, faintings, hiccup, cold sweats, and weakened pulse, all of which accompany injuries of the internal parts. The mischiefs which attend wounds of this kind proceed not only from the injury done to the viscera themselves, but from the extravasation of blood and the discharge of the contents of the intestines into the cavity of the abdomen; which, being of a very putrescent nature, soon bring on the most violent disorders. Hence wounds of the abdominal viscera are very often mortal, though not always so. It appears, that the small intestines have been totally divided, and yet the patient has recovered. Wounds both of the small and large intestines have healed spontaneously, even when they were of considerable magnitude; so that both the contents of the intestine have been freely discharged thro' the wound in it, and part of the intestine itself has been protruded through the wound of the integuments. When this last is the case, however, there is great danger from the mere contact of the external air; and

bilious habit, and is indeed an inflammation of the erysipelatous kind; but though its appearance is alarming, it is not often attended with danger. The wound does indeed neither look well, nor yield a kindly discharge while the fever continues; but till the scalp continues to adhere firmly to the skull, and the patient does not complain of that tense pain, nor is afflicted with that fatiguing restlessness, which generally attends mischief underneath the cranium.

56
Of such as
affect the
brain and its
membranes.

Wounds and contusions of the head which affect the brain and its membranes are also subject to an erysipelatous kind of swelling and inflammation, but very different both in its character and consequences from the preceding. In this the febrile symptoms are much higher; the pulse harder and more frequent; the anxiety and restlessness extremely fatiguing; the pain in the head intense, and generally attended with irregular shiverings, which are not followed by a critical sweat, nor afford any relief to the patient. These shiverings are most frequently a sign of matter forming between the dura mater and the skull; and indeed shivering generally accompanies the formation of matter in any part of the body, as shall be explained when we come to treat of abscesses. In the former case, the erysipelas generally appears within the first three or four days; whereas in the latter it seldom comes on till several days after the accident, when the symptomatic fever is got to some height. In the simple erysipelas, although the wound be undigested, yet it has no other mark of mischief; the pericranium adheres firmly to the skull, and upon the cessation of the fever all appearances become immediately favourable. In that which accompanies injury done to the parts underneath, the wound not only has a spongy, glassy, unhealthy aspect; but the pericranium in its neighbourhood separates of its own accord from the bone, and quits all cohesion with it. These appearances indicate great danger, and commonly end in death.

57
Of wounds
which pass
through all
the integu-
ments to the
pericra-
nium.

If the wound be a small one, and has passed thro' the tela cellulosa to the aponeurosis and pericranium, it is sometimes attended with very alarming symptoms. The inflamed scalp does not arise to such a degree of tumefaction as in the erysipelas, neither does it pit or retain the impression of the fingers. It is of a deep red colour, unmixed with the yellow tint of the erysipelas; it appears tense, and is extremely painful to the touch. As it is not an affection of the tela cellulosa, and as the ears and the eye-lids are not covered by the parts in which the wound is inflicted, they are seldom, if ever, included in the tumour, though they may partake of the general inflammation of the skin: it is generally attended with acute pain in the head, and such a degree of fever as prevents sleep, and sometimes brings on a delirium.

58
Of those
where the
skull is cleft,
or part of it
cut off.

In violent wounds of the head, it not unfrequently happens that the skull is cleft, or even a part of it entirely taken off, sometimes with and sometimes without injuring the brain. These wounds, though very dangerous, are not always mortal, unless the medullary substance of the brain be injured; for this never fails to bring on death in a short time. There have been instances of people who by wounds of this kind had a considerable portion of the dura mater exposed for the remainder of their life, and yet felt no remarkable inconvenience, farther than that the brain was exceed-

ingly tender; and they felt great pain, giddiness, dimness of sight, &c. even on a slight pressure of that part.

In wounds of the joints there is always a considerable difficulty of cure, by reason of the efflux of the synovia, which serves for lubricating the parts; and there is also great danger on account of the number of tendons, ligaments, and synovial glands, which are situated about the articulations. In this case, small wounds are more dangerous than large ones, especially when the former cannot be enlarged. The danger is least when the wound is situated in the upper part of the joint, and has not penetrated through the capsular ligament. The symptoms attending a wounded joint are, violent pain, inflammation, &c. with an efflux of thick whitish matter almost of the consistence of honey, called *melicera*, and is indeed no other than the synovia which lubricates the joint. This flux it is very difficult to restrain, and by it the wound is prevented from healing: at last the wound degenerates into an ulcer with callous lips, which ends in an incurable fistula; and even if the wound should at last be healed up, the joint for the most part remains stiff and contracted, so that the limb cannot be stretched out.

From the preceding account of the symptoms attending wounds in the different parts of the body, the surgeon may be enabled to judge in some measure of the event; though it must always be remembered, that wounds, even those which seemed to be of the slightest nature, have, contrary to all expectation, proved mortal, chiefly by inducing convulsions or a locked jaw; so that no certain prognostic can be drawn on sight of recent wounds. We shall now, however, proceed to consider their treatment.

For the cure of wounds, it has been already observed, that the ancients imagined balsams, the juice of herbs, &c. to be a kind of specifics. In after-ages, and in countries where balsams are not easily to be procured, salves have been substituted in their place; and even at this day there are many who reckon a salve or ointment essentially necessary for healing the slightest cut. It is certain, however, that the cure of wounds cannot be effected, nay, not even forwarded in the least, by ointments, unless in particular cases or by accident. That power which the human frame has of repairing the injuries done to itself, which by physicians is called *vis medicatrix nature*, is the sole agent in curing external injuries, and without this the most celebrated balsams would prove ineffectual. There are three stages to be observed in the cure of a wound: the first, called *digestion*, takes place when the ends of the wounded vessels contract themselves, and pour out the liquor which is converted into pus. As soon as this appears, the second stage, in which the flesh begins to *grow up*, takes place; and as this proceeds, the edges of the wound acquire a fine bluish or pearl colour, which is that of the new skin beginning to cover the wound as far as the flesh has filled it up. This process continues, and the skin advances from all sides towards the centre, which is called the *cicatrizing* of the wound. For the promoting of each of these processes, there were ointments formerly much in vogue. A composition of turpentine and the yolk of an egg was named *digestive ointment*, from the power it was supposed to have of promoting the formation of pus; balsicum and other ointments were supposed to pro-

60
A prognosis
cannot be
drawn with
certainty.

61
Virtues of
balsams and
salves in c-
uring wounds
imaginary.

62
Three stages
to be ob-
served in the
curing of
wounds.

Theory.

Theory.

63
None of
these can be
promoted by
any
ointment.

mote the growth of flesh, and there were ointments also for cicatrizing. But it is now found, that no ointment whatever is capable of promoting these operations; and it is only necessary to keep the wound clean, and to prevent the air from having access to it. This, indeed, nature takes care to do by covering the wounded part with a cake of coagulated blood; but if a wound of any considerable magnitude should be left entirely to nature, the pus would form below the crust of coagulated blood in such quantity, that it would most probably corrupt, and the wound degenerate into a corroding ulcer. It is necessary, therefore, to cleanse the wound once a-day; and for this purpose it will be proper to apply a little ointment spread on soft scraped lint. For the first dressing, dry lint is usually applied, and ought to be allowed to remain for two or three days, till the pus is perfectly formed; after which the ointment may be applied as just now directed; and, in a healthy body, the wound will heal without further trouble. As to the ointment employed, it is almost indifferent what it be, provided it has no acrid or stimulating ingredients in its composition; and hence the digestive ointment above-mentioned is rather hurtful than otherwise, on account of the stimulating nature of the turpentine which makes part of its composition.

65
Where fu-
ture is ne-
cessary.

But though, in general, wounds thus easily admit of a cure, there are several circumstances which require a different treatment, even in simple divisions of the fleshy parts, when neither the membranous nor tendinous parts are injured. These are, 1. Where the wound is large, and gapes very much, so that, if allowed to heal in the natural way, the patient might be greatly disfigured by the scar. In this case, it is proper to bring the lips of the wound near to each other, and to join them by future, either of the dry or bloody kind, as the wound is more superficial or lies deeper.

66
Of extract-
ing foreign
bodies.

2. When foreign bodies are lodged in the wound, as when a cut is given by glass, &c. it is necessary by all means to extract them before the wound is dressed; for it will never heal until they are discharged. Sometimes it happens that these bodies are situated in such a manner as not to be capable of being extracted without lacerating the adjacent parts, which would occasion violent pain and other bad symptoms. In this case it is necessary to enlarge the wound so that these offending bodies may be easily removed. This treatment, however, is chiefly necessary in gunshot wounds, of which we shall treat in the next section.

67
Of using
compresses,
&c.

3. When the wound is made in such a manner that it runs for some length below the skin, and the bottom is much lower than the orifice. In this case, the matter collected from all parts of the wound will be lodged in the bottom of it, where, corrupting by the heat, it will degenerate into a fistulous ulcer. To prevent this, we must use compresses, applied so that the bottom of the wound may suffer a more considerable pressure than the upper part of it. Thus the matter formed at the bottom will be gradually forced upwards, and that formed at the upper part will be incapable of descending by its weight; the divided parts in the mean time easily uniting when brought close together. Indeed, the power which nature has of uniting divided parts of the human body is very surprising; for, according to authors of credit, even if a piece of flesh

is totally cut out, and applied in a short time afterwards to the place from whence it was cut, the two will unite. On this principle Taliacotius, professor at Bologna, pretended to restore lost parts, as noses, ears, lips, &c. by cutting out a piece of the arm and adapting it to the part. But though these are justly looked upon to be ridiculous pretensions, we are certain that a part cut out of a living body does not entirely lose its vital power for some time, as is evident from the modern practice of transplanting teeth; and from an experiment of Dr Hunter's at London, where he put the testicle of a cock into the belly of a living hen, which adhered to the liver, and became connected to it by means of blood-vessels *. We have therefore the greatest reason to hope, that the divided parts of the human body, when closely applied to each other, will cohere without leaving any sinus or cavity between them. However, if this method should fail, and matter still be collected in the depending part of the wound, it will be necessary to make an opening in that part in order to let it out; after which, the wound may be cured in the common way.

* See Blood,
no 19.

68
Of taking
away fun-
gous flesh.

4. During the course of the cure it sometimes happens, that the wound, instead of filling up with fleshy granulations of a florid colour, shoots up into a glassy-like substance which rises above the level of the surrounding skin, at the same time that, instead of laudable pus, a thin ill-coloured and fetid ichor is discharged. In this case the lips of the wound lose their beautiful pearl colour, and become callous and white, nor does the cicatrizing of the wound at all advance. When this happens in a healthy patient, it generally proceeds from some improper management, especially the making use of too many emollient and relaxing medicines, an immoderate use of balsams and ointments. Frequently nothing more is requisite for taking down this fungus than dressing with dry lint; at other times desiccative powders, such as calamine, tutty, calcined alum, &c. will be necessary; and sometimes red precipitate mercury must be used. This last, however, is apt to give great pain, if sprinkled in its dry state upon the wound; it is therefore most proper to grind it with some yellow balsamic ointment, which makes a much more gentle, though at the same time efficacious, escharotic. Touching the overgrown parts with blue vitriol is also found very effectual.

Hitherto we have considered the wounded patient as otherwise in a state of perfect health; but it must be observed, that a large wound is capable of disordering the system to a great degree, and inducing dangerous diseases which did not before exist.—If the patient is strong and vigorous, the pain and inflammation of the wound great, a considerable degree of fever may arise, which it will be necessary to check by bleeding, low diet, and other antiphlogistic regimen, at the same time that the inflamed lips of the wound and parts adjacent are to be treated with emollient fomentations or cataplasms till the pain and swelling abate. On the other hand, it may happen, when the patient is of a weak and lax habit, that the vis vitæ may not be sufficient to excite such an inflammation in the wound as is absolutely necessary for its cure. In this case, the edges of the wound look pale and soft; the wound itself ichorous and bloody, without any signs of fleshy granulations; or if any new flesh shoots

69
Of the regi-
men of the
patient in
wounds.

Theory.

Theory.

up, it is of the fungous glassy kind above-mentioned. To such wounds all external applications are vain; it is necessary to strengthen the patient by proper internal remedies, among which the bark has a principal place, until the wound begins to alter its appearance. In such persons, too, there is some danger of a hectic fever by the absorption of matter into the body when the wound is large; and this will even take place during the course of the cure, even when the appearances have been at first as favourable as could be wished. This happens generally when the wound is large, and a great quantity of matter formed: for by this discharge the patient is weakened, so that the pus is no sooner formed, than it is by the absorbent vessels re-conveyed into the body, and feverish heats immediately affect the patient. For this the best remedy is to exhibit the bark copiously, at the same time supporting the patient by proper cordials and nourishing diet. Indeed, in general, it will be found, that, in the case of wounds of any considerable magnitude, a more full and nourishing regimen is required than the patient, even in health, has been accustomed to; for the discharge of pus alone, where the quantity is considerable, proves very debilitating, if the patient is not strengthened by proper diet. And it is constantly found, that the cure of such fores goes on much more easily when the patient is kept in his usual habit of body, than when his system is much emaciated by a very low allowance; and, for the same reason, purgatives, and whatever else tends to weaken the constitution, are improper in the cure of wounds.

70
Of hæmorrhages.

Hæmorrhages very frequently happen in wounds, either from a division of one large artery, or of a number of small ones. In this case, the first step to be taken by the surgeon is to effect a temporary stoppage of the blood by means of strong compression. In the head, as well as in the trunk of the body, the easiest method of applying pressure of this kind is by means of dossils of linen or charpie, held firmly upon the mouths of the bleeding vessels, either by the hands of an assistant or the use of a proper bandage: but it is better when pressure can be applied to the superior part of the artery, as it not only secures the vessel equally well, but admits of the necessary ligature being applied with greater freedom. Where accidents of this kind, therefore, happen to any of the limbs, and pressure can be made on the superior part of the artery, the tourniquet is immediately to be applied.

71
Ancient surgeons were not so defective in the knowledge of stopping hæmorrhages.

The patient being in this manner secured from immediate danger, the surgeon must take the proper means for preventing any return. In this the ancients were extremely defective. Being ignorant of the use of the tourniquet, and equally so of the method of tying up blood-vessels, they could only apply dossils of linen covered with astringent powders for the small arteries, and for the larger ones they had no other resource but searing with red-hot irons. This cruel remedy they applied even in cases of amputation; and we find that some ancient chirurgical writers ordered the flesh to be divided down to the bone by a red-hot knife: but the effects even of this are by no means to be depended upon farther than as a temporary relief; for, in general, the pulsation of the larger arteries soon overcomes all resistance from the eschar occasioned by

the cautery. Styptic powders are still less efficacious; and though sponge, agaric, and fungous substances of various kinds, have been recommended even by the more skilful modern surgeons, yet the application of the ligature, and that alone, can be depended upon where the larger arteries are divided. In performing this operation there are two different methods; one in which the nerve which runs along with the artery, depending and part of the circumjacent muscles, are taken in with the artery in the ligature; the other, in which the divided artery is taken hold of by a pair of forceps, or by an hooked instrument called the *tenaculum*, and tied up by itself. The former method is liable to great objection, on account of the violent symptoms it occasions; particularly extreme pain, spasms, and convulsions, not only of the part affected, but even of the whole system.

Spasmodic twitches are frequently found to occur after the amputation of limbs, and are often the source of much distress. In some instances they are no doubt to be considered as the effect of other causes; but in various cases it has happened, that demonstrative proof has been obtained of their arising from the ligatures of arteries having been applied in an improper manner. When such convulsive affections occur after amputations, and the usual means of preventing them have failed, effectual relief may be frequently obtained by destroying the ligatures altogether, so as to remove the compression upon the nerves; care being taken at the same time to renew the ligatures upon the arteries immediately, without comprehending any of the contiguous parts.

Practitioners have commonly been afraid of tying up blood-vessels by themselves without the intervention of some of the surrounding parts, on the supposition of the coats of arteries not being of a sufficient firmness for bearing that degree of compression necessary for the prevention of hæmorrhagy. This, however, originates from an idea of the coats of arteries not being so strong as they really are, and of a great degree of force being necessary for compressing the sides of arteries into close contact with one another. But it is now well known, that even very small arteries are possessed of much firmness; and it is also certain, that, even in the largest arteries of the arm or thigh, a very slight degree of compression is fully sufficient, not only for restraining hæmorrhagy, but for securing the ligature on the very spot to which it is first applied; and in small vessels the force necessary for this purpose is trifling indeed, being far less than is commonly practised. It has also been objected to this mode of securing blood-vessels by themselves, that the ligatures, although they should not cut the arteries through, yet are more apt to slip than when some of the surrounding parts are comprehended along with them; and, in some instances, it is said that arteries retract so far, that they cannot in any other way be laid hold of than by means of the crooked needle in the ordinary method. Long and repeated experience, however, of a few individuals, of this mode of taking up arteries by themselves, has put the fact beyond a doubt, that it is equally secure as any other yet invented (A).—Fatal hæmorrhages after capital operations, either from inattention or some

72
Ligature of the vessels can alone be depended on.

74
Arteries may be safely tied up by themselves.

Theory.

Theory.

other cause, do now and then indeed happen in the hands of the most able practitioners; but occurrences of this nature have as frequently happened when the curved needle was employed, as when the blood-vessels were secured by themselves without any of the contiguous parts being included.

In a few instances it may happen, that a bleeding vessel, from lying at the bottom of a deep wound, cannot be laid hold of in any other manner than by the curved needle being made to pass round it. Such occurrences, however, are exceedingly rare. Among other advantages which the tying of arteries by means of the tenaculum has over the old mode of operating, there is still one we have not yet taken notice of. It often happens, after amputations and other operations where the larger arteries have been tied, that the ligatures do not come easily away, from being made to run so deep as with the curved needle is commonly necessary. In some instances much pain and trouble has occurred from this circumstance, the ligature remaining quite immovable for a great many weeks: and after all, we have seen it necessary for the surgeon to put the patient to a great deal of pain, by being obliged to cut out the threads with a scalpel. But when the tenaculum is used, every risk of this kind is effectually avoided, from the ligatures generally falling off of their own accord, in the course of the third or fourth dressing of the fore.

From what has been said, therefore, we shall consider it as a practice that ought to be established, that, in forming the ligature of arteries, the nerves and other contiguous parts should be carefully avoided.

The principal artery being in this manner secured, all the vessels or the part must one after another be taken up in the same manner, by first loosening the tourniquet in order to discover them, and afterwards applying the ligature to each in the manner directed. It often happens, however, that the loss of blood the patient has sustained, a tendency to delirium which may take place for the time, the fear he labours under, and the degree of cold to which the fore is exposed, have all together such an effect upon the smaller arteries, as to prevent them for the time from discharging their contents; and as arteries left in such a state without being secured, generally burst out on the removal of these causes, a circumstance which always occasions much trouble to the practitioner, as well as a great deal of pain to the patient, every surgeon therefore ought to pay the nicest attention to this point. The tourniquet should be made perfectly loose; any coagulated blood on the surface of the fore ought to be carefully washed off with a sponge and warm water; and the patient, if faintish, ought to get a glass of wine or some other cordial; and after all, the surgeon ought to examine, with the most minute attention, the usual course which the vessels of the part are known to take. This being done, every artery of the part, even the smallest that can be distinguished, ought to be secured with a ligature: for such vessels as appear exceedingly trifling while the part is yet exposed to the air, after the patient becomes warm in bed, when of course the solids become relaxed and the fluids expand, even the smallest branches of arteries that happen to be neglected, will now be capable of producing much mischief, by discharging very considerable quantities

of blood; and, as little or no injury can ever occur by the proper application of ligatures to all the arteries that present themselves, the greatest attention ought at all times to be paid to this circumstance.

When the principal arteries of a lump or other large wound have been taken up, and a little blood continues to be discharged, but appears to come from sundry small vessels only, the surgeon, unless he is much accustomed to this kind of business, is induced to think, that as they are very trifling to appearance, so he need not be at the trouble of tying them, as the necessary compression of the bandages proper for the wound will in all probability effect a total stoppage of the hæmorrhage. In a general oozing of a small quantity of blood from the whole surface of a fore, and when no particular vessel can be distinguished, there is a necessity for trusting to this remedy; but whenever an artery can be discovered, of whatever size it may be, it ought unquestionably to be secured by a ligature. It very rarely happens that any inconvenience occurs from ligatures when properly applied; but many lives have been lost from a remissness in this article. But when, from the deepness of a wound, or from any other cause, some particular artery cannot be properly secured by the tenaculum, in this case we are under the necessity of employing the crooked needle. But it frequently happens, that considerable quantities of blood are discharged, not from any particular vessel, but from all the small arteries over the surface of the fore. In wounds of great extent, particularly after the extirpation of cancerous breasts, and in other operations where extensive fores are left, this species of hæmorrhage often proves very troublesome by being exceedingly difficult to suppress.

Bleedings of this kind seem evidently to proceed from two very different and opposite causes. First, Either from too great a quantity of blood contained in the vessels, or from an over-degree of tone in the vessels themselves; or, perhaps, from a combination of both these causes. But, secondly, Such evacuations undoubtedly happen most frequently in such constitutions as are very relaxed and debilitated; either from a putrid dissolved state of the blood, or from a want of tone in the containing vessels, or, in some instances, from a concurrence of both.

In constitutions perfectly healthy, when the fluids are not tainted with any degree of putrescency, and the solids are possessed of their natural tonic powers, on the occurrence of wounds even of the most extensive nature, as soon as the larger arteries are secured, all the small vessels that have been divided, in consequence of that contractile power with which in a state of health they are endowed, and from the stimulus of the external air to which they are now exposed, are diminished not only in their diameters, but also in their length; in consequence of which, they recede considerably within the surface of the surrounding parts. This cause of itself would probably in the greatest number of instances prove sufficient for restraining all loss of blood from the smaller arteries; but, in the found state of constitution of which we have now been speaking, another very powerful agent is provided by nature for producing the same effect. From the extremities of the divided vessels which at first discharged red blood only, there now, in their contracted state, oozes out a

75
Advantages
of the in-
strument
called the
tenaculum.

76
How the
smaller
vessels are
to be se-
cured.

77
When the
crooked
needle is
to be made
use of,

78
Of the dif-
ferent causes
in of hæmor-
rhages.

79
Coagulated
blood
powerfully
restrains an
hæmorrhage
more

Theory.

Theory.

more thin, though viscid fluid, containing a great proportion of the coagulable parts of the blood; and this being equally distributed over the surface of the wound, by its balsamic agglutinating powers has undoubtedly a very considerable influence in restraining all such hæmorrhages.

In constitutions altogether healthy, where neither of the states of disease we have alluded to preponderates over the other, we find, that as soon as the larger arteries of wounds are secured, nature, in the manner already described, generally puts a stop to all farther discharge. So that, whenever the contrary happens, by a tedious oozing continuing from the surface of the sore, we ought then to pay particular attention to the habit of body with which it is connected.

80
When phlebotomy is
useful.

When such an occurrence happens in a patient young and vigorous, and where the tone of the muscular fibres is evidently great, the most effectual means of putting a stop to the discharge is to relax the vascular system, either by opening a vein in some other part, or, what gives still more immediate relief, by untying the ligature on one of the principal arteries of the part, so as to allow it to bleed freely: those violent spasmodic twitchings too, so frequent after operations on any of the extremities, when they do not depend on a nerve being included in the ligature with the artery, are in this manner more effectually relieved than by any other means.

By the same means the patient, from being in a febrile heat and much confused, soon becomes very tranquil: the violent pulsation of the heart and larger arteries abates, and the blood not being propelled with such impetuosity into the smaller vessels of the part, they are thereby left at more liberty to retract; and as in this state they do not pour forth red blood so freely, they are the more readily covered with that viscid glutinous fluid which we have already shown to be one of the most important means intended by nature for the prevention of such hæmorrhages. At the same time that, by the means recommended, we endeavour to allay the commotion produced in the system, the patient ought to be kept exceedingly cool; wine and other cordials should be rigidly avoided; cold water, acidulated either with the mineral or vegetable acids, ought to be the only drink; motion of every kind, particularly of the part affected, should be guarded against; and the wound being gently covered with soft charpie, ought to be tied up with a bandage so applied as to produce a moderate degree of pressure on the extremities of the divided parts.

81
Opiales.

In every extensive wound attended with hæmorrhages of this kind, and particularly when violent spasmodic affections of the muscles supervene, together with the means already recommended large doses of opiates are found highly beneficial; for whatever hurtful effects may have been apprehended from opiates in some inflammatory affections, every practitioner who has ventured on a free use of them must admit, that in all occurrences of this nature their influence far surpasses that of any other remedy.

As soon therefore as a sufficient quantity of blood has been discharged, and the wound being dressed and the patient laid to rest, a dose of opium proportioned to the violence of the symptoms ought to be immediately exhibited. It ought to be remarked, however,

that in all such circumstances, much larger doses of the remedy are necessary than in ordinary cases requiring the use of opiates. Small doses, instead of answering any good purpose, seem frequently rather to aggravate the various symptoms; so that whenever they are here had recourse to, they ought always to be given in quantities sufficient for the intended effect.

82
Hæmorrhages
most frequent
in lax habits

Although hæmorrhages of this nature do now and then occur in firm vigorous constitutions, yet they undoubtedly happen much more frequently in relaxed enfeebled habits, where the solids have lost part of their natural firmness, and the fluids have acquired some degree of putrescency. As the vessels in this situation of matters are supposed to have been deprived of that degree of tone of which we wish them to be possessed, instead of restraining the patient from the use of cordials, as is done usually in every case of hæmorrhagy, a moderate use of generous wine ought to be immediately prescribed; for nothing, it may be observed, tends so much, in such circumstances, to restrain hæmorrhages, as a well-directed use of proper cordials. By tending to invigorate and brace the solids, they thereby enable the arterial system to give a due resistance to the contained fluids; and the same cause, it may be observed, has a considerable influence in restoring to the fluids that viscosity of texture, of which in all such instances we suppose them to be deprived.

83
Use of wine
and cordials
in such
cases.

Whenever, therefore, such tedious hæmorrhages occur in relaxed debilitated habits, a free use of Port, Madeira, or any other wine whose strength and goodness can be depended on, ought to be immediately allowed; a nourishing diet also becomes proper; the patient ought to be kept cool; and the mineral acids, from their known utility in every species of hæmorrhagy, ought also to be prescribed. Rest of body is here proper too; and opiates, when indicated either by pain or spasmodic affections of the muscles, ought never to be omitted.

84
External
applications.

Together with these remedies adapted to the general system, particular dressings, appropriated to the state of the parts to which they are to be applied, have been found very beneficial. We have already remarked, that in firm healthy constitutions, as soon as the discharge of blood which naturally occurs in every large wound is over, the parts come soon to be covered with a viscid coagulable effusion from the mouths of the now retracted arteries; but in constitutions of an opposite nature, where the solids are much relaxed, the blood in general is found in such a dissolved state as to afford no secretion of this nature.

In order therefore to supply as much as possible the deficiency of this natural balsam, different artificial applications have been invented. Dusting the part with starch or wheat-flour, has sometimes been found of use; and gum arabic in fine powder has been known to answer when these failed.

85
Alcohol

Applications of this kind, indeed, have been used with success in all such hæmorrhages, with whatever habit of body they happen to be connected; but they have always proved more particularly serviceable in relaxed constitutions, attended with a dissolved state of the blood and an enfeebled muscular system. We may here use with freedom, too, a remedy which in such circumstances generally proves serviceable, but which, when used in constitutions of an opposite nature, ought never to fail.

Theory. be employed. The remedy alluded to is alcohol, or any other ardent spirits, impregnated with as great a quantity as they can dissolve of myrrh or any other of the heating viscid gums. The balsamum traumaticum of the shops, a remedy of this nature, has long been famous for its influence in such cases; but that indiscriminate use of this and similar applications which has long prevailed with some practitioners, has undoubtedly done much harm; for as they are all possessed of very stimulating powers, they of course tend to aggravate every symptom in wounds connected with a tense state of fibres, when much pain, and especially when spasmodic muscular affections prevail. But in constitutions where the blood appears to be in a dissolved state, and where the arterial system seems evidently to require a stimulus, remedies of this class come to be very useful; inasmuch that, in every constitution of this kind where hæmorrhages prove troublesome, no application whatever is found to answer better than charpie immersed in an agglutinating spirituous balsam of this nature.

86
Pressure to be used when every other method fails,

By a due perseverance in one or other of the plans here pointed out, it will seldom happen that hæmorrhages of this nature are not at last put a stop to: but when the contrary does occur, when, notwithstanding the use of the remedies recommended, a discharge of blood still continues, together with the means already advised, an equal moderate pressure ought to be applied over the whole surface of the fore, to be continued so long as the necessity of the case seems to indicate.

In finishing the dressings of such wounds, after the charpie and compresses have been applied, a bandage properly adapted to the part ought to conclude the whole, and in such a manner as to produce as equal a degree of pressure over the surface of the fore as possible. But it now and then happens that no bandage whatever can be so applied as to produce the desired effect; and in such cases the hand of an assistant is the only resource. In these instances, a person's hand being firmly applied over the dressings so as to produce a very equal degree of pressure, will commonly succeed when no other remedy is found to have much influence.

87
Of wounds of the nerves, &c.

88
Sometimes happen in blood-letting.

89
Symptoms of a punctured nerve or tendon.

Wounds of the nerves, tendons, and membranes, as they are attended with much more violent symptoms than those where even considerable arteries are divided, so they frequently resist every method of cure proposed by the most skilful practitioners. In the simple process of blood-letting, it frequently happens that the tendinous expansion called the *aponeurosis* of the biceps muscle is wounded, or even the tendon of that muscle itself is punctured, by the point of the lancet; or sometimes a nerve which happens to lie in the neighbourhood is partially divided. Any one of these wounds, though they are the smallest we can well suppose to be given, are frequently very dangerous and difficult of cure. It sometimes immediately happens on the introduction of the lancet, that the patient complains of a most exquisite degree of pain; and when this occurs, we may rest assured that either a nerve or tendon has been wounded. On some occasions, by proper management, such as evacuating a considerable quantity of blood at the orifice newly made, by keeping the part at perfect rest, and preserving the patient in as cool a state as possible, the pain at first complain-

ed of will gradually abate, and at last go off entirely, without any bad consequence whatever. At other times, however, this pain which occurs instantaneously on the introduction of the lancet, instead of abating, begins soon to increase; a fullness, or small degree of swelling, takes place in the parts contiguous to the wound; the lips of the fore become somewhat hard and inflamed; and, in the course of 24 hours or so from the operation, a thin watery serum begins to be discharged at the orifice.

If by the means employed relief is not soon obtained, these symptoms generally continue in nearly the same state for two or perhaps three days longer. At this time the violent pain which at first took place becomes still more distressing; but instead of being sharp and acute as before, it is now attended with the sensation of a burning heat, which still goes on to increase, and proves, during the whole course of the ailment, a source of constant distress to the patient. The fullness and hardness in the lips of the wound begin to increase, and the swelling in the neighbouring parts gradually extends over the whole member; from the foot upwards over the thigh, when the operation has been done in the lower extremity; and from the elbow down the fore-arm, and along the humerus over to the pectoral muscle and other contiguous parts, when the accident has occurred at the usual place of blood-letting in the arm. The parts at last become exceedingly tense and hard; an erysipelatous inflammatory colour frequently appears over the whole member; the pulse by this time has generally become very hard and quick; the pain is now intense, the patient exceedingly restless; twichings of the tendons occur to a greater or lesser degree; on some occasions, a locked jaw and other convulsive affections supervene; and all these symptoms continuing to increase, it most frequently happens, that the torture under which the patient has been groaning is at last terminated by death.

Different opinions have prevailed respecting the cause of these symptoms. By some they have been imputed to wounds of the tendons. By others the tendons are supposed to be so entirely destitute of sensibility, as to be quite incapable of producing so much distress; so that wounds of the nerves they consider on all such occasions as the true cause of the various symptoms we have mentioned.

One or other of these ideas continued to be the only source for explaining the various phenomena found to occur in this malady, till a different opinion was at last suggested by the ingenious Mr John Hunter of London. Mr Hunter supposes, that all the dreadful symptoms found now and then to be induced by the operation of blood-letting, may be more readily accounted for from an inflamed state of the internal surface of the vein, than from any other cause. Such a state of the vein he has often traced in horses that have died of such symptoms from venesection, where the internal coat of the vein was always found much inflamed, not only in the neighbourhood of the part where the orifice was made, but on some occasions the inflammation extended along the whole course of the vein, and seemed at last to reach the heart itself. Some instances, too, have occurred, of the same appearances in the human body, where the veins after death were found in a state of high inflammation. And on other occasions,

Theory.

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Mr Hunter's explanation of these symptoms.

inflammation having in this manner been once excited, has been known to terminate in suppuration; and the matter thus produced being in the course of circulation carried to the heart, Mr Hunter supposes that in such cases death may have been induced by that cause alone.

91
Bel's Surgery, p. 113
Objections to his hypothesis.
There can be no reason to doubt the fact held forth by Mr Hunter, that in such instances the vein in which the orifice has been made has frequently after death been found greatly inflamed: but however ingenious his arguments may be for concluding that this state of the vein is the original cause of all the bad symptoms enumerated, and although we must allow that such an inflammatory affection of a vein must have a considerable influence in aggravating the various symptoms previously induced by other causes; yet we may very fairly conclude, that it could not probably in any one instance be able to account with satisfaction for their first production.

In many instances the patient, at the very instant of the operation, feels a very unusual degree of pain. In some cases, the violence of the pain is almost unupportable: now this we can never suppose to have been produced by the mere puncture of a vein; for although the coats of veins are not perhaps entirely destitute of feeling, yet we know well that they are not endowed with such a degree of sensibility as to render it probable such intense pain could ever be induced by their being punctured in any way whatever. This inflamed state of the veins therefore, as detected by Mr Hunter after death, must be considered rather as being produced by, than as being productive of, such affections; and that such ailments should frequently produce an inflammation of the contiguous veins, is a very probable conjecture. In the course of 48 hours or so from the operation, when the febrile symptoms are just commencing, such a degree of hardness and evident inflammation is induced over all the parts contiguous to the orifice, that it would be surprising indeed if the vein, which is thus perhaps entirely surrounded with parts highly inflamed, should escape altogether. We shall therefore proceed upon the supposition of this inflamed state of the veins being a consequence rather than the cause of such ailments; and of course we now revert to one or other of the opinions long ago adopted on this subject, that all the train of bad symptoms found on some occasions to succeed to venesection, proceeds either from the wound of a nerve or of a tendon.

92
Tendons when punctured produce as bad symptoms as wounded nerves.
That a partial wound of a nerve will now and then produce very distressing symptoms, no practitioner will deny; but it has been attempted to be shown, that tendons are almost totally destitute of sensibility; and it has therefore been supposed, that their being wounded can never account for the various symptoms known to occur in such cases. There is great reason however to think, that in different instances the same train of symptoms have been induced by different causes; that in one instance a wounded nerve, and in others pricks of the tendons, have given rise to them, as we have already supposed.

93
Method of cure.
However, in order to prevent as much as possible the consequent inflammation and other symptoms which usually ensue, a considerable quantity of blood should be immediately discharged at the orifice just made: the limb, for several days at least, ought to

be kept in a state of perfect rest, care being at the same time taken that the muscles of the part be all preserved in as relaxed a state as possible: the patient should be kept cool; on a low diet; and, if necessary, gentle laxatives ought to be administered.

By such management alone, the fatal symptoms we have enumerated may frequently be prevented; and when they do occur in cases where the above precautions have not been taken, they may be considered to be as much the consequence of negligence in the after-treatment, as of any thing peculiarly bad in the nature of the original accident.

When, however, notwithstanding the means recommended, the symptoms, instead of diminishing, rather become more violent; if the lips of the orifice turn hard and more inflamed, if the pain becomes more considerable, and especially if the swelling begins to spread, other remedies come then to be indicated. In this state of the complaint, topical blood-letting, by means of leeches applied as near as possible to the lips of the wound, frequently affords much relief; and when the pulse is full and quick, it even becomes necessary to evacuate large quantities of blood by opening a vein in some other part.

The external applications usually employed in this state of the complaint, are, warm emollient fomentations and poultices. In similar affections of other parts no remedies with which we are acquainted would probably be found more successful; for as warm fomentations and cataplasms prove in general very powerful agents in the formation of pus, and as nothing would so certainly relieve the symptoms which usually occur here as a free suppuration, applications of this nature were made therefore with some apparent propriety; but it is now almost certain, that little or no advantage is ever to be expected from remedies of this class. And in fact we find, in the complaint now under consideration, that all such applications, instead of being productive of any advantage, rather do harm. The heat of the part is here one of the most distressing symptoms; so that, instead of affording relief, warm emollient applications rather tend to augment this source of uneasiness. The lips of the wound, from not being capable of producing a good suppuration, are by the additional heat applied to them through the medium of such applications, rendered still more hard, swelled, and of course more painful; and the swelling of the contiguous parts also becomes more diffuse over the rest of the member.

By Ambrose Paré, Dionis, Heister, and others, instead of emollient remedies, oil of turpentine, tincture of myrrh, and other heating applications, are recommended. "That these would not prove effectual," says Mr Bell, I cannot from experience pretend to say; for suspecting their powerful stimulating effects might in cases of this nature prove too irritating for parts already by disease rendered exquisitely sensible, I have never, I must own, ventured to use them: but I can from repeated experience assert, that cooling astringent applications afford much more ease, and, upon the whole, in all such ailments, prove more effectual, than warm emollients; and of this class the most effectual I have ever used, are the saturnine applications. The parts chiefly affected being alternately covered with cloths wet with a solution of saccharum saturni, and

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Cooling astringents of great use.

pledgits

Theory.

Theory.

plodgits spread with Goulard's cerate, are kept more cool and easy than by any other remedy I have ever happened to use.⁹⁶

In all such cases therefore, so soon as the number of leeches proportioned to the violence of the symptoms have been applied to the parts chiefly affected, and have discharged a sufficient quantity of blood, the swelling ought to be covered with pieces of soft linen wet in the saturnine solution; and these being kept constantly moist for the space of a few hours, should be succeeded by Goulard's cerate; and thus every part, in any degree affected, ought to be alternately covered with one or other of these applications so long as any degree of swelling remains.

⁹⁶ Low diet, phlebotomy time be attended to, by keeping the patient cool, on a low diet, preserving a lax state of the bowels; and, if necessary, farther quantities of blood ought to be evacuated.

For the violence of the pain, which is sometimes so excessive as to destroy entirely the patient's rest, opiates ought to be freely exhibited; and when twitchings of the tendons and other convulsive symptoms supervene, medicines of this kind become still more particularly necessary. In order, however, to have a proper influence in this state of the complaint, opiates ought to be given in very full doses; otherwise, instead of answering any good purpose, they constantly tend to aggravate the different symptoms, not only by increasing the heat and restlessness, but by having an evident influence in rendering the system more susceptible than it was before of the pain and other distressing effects produced upon it by the wound: whenever opiates, therefore, are in such circumstances employed, the doses ought always to be considerable.

It often happens, however, in this very alarming disorder, either from neglecting the matter altogether on the accident first happening, as is too frequently the case, or from an improper subsequent treatment by warm emollient applications, that opiates and all the other remedies enumerated are afterwards had recourse to without any advantage whatever: the fever, pain, and swelling of the parts continuing, convulsive affections of the muscles at last occur, all tending to indicate the most imminent danger. In this situation of matters, if we have not immediate recourse to some effectual means, the patient will soon fall a victim to the disorder; and the only remedy from which in these circumstances much real advantage is to be expected, is a free and extensive division of the parts in which the orifice producing all the mischief was at first made. We know well, from the repeated experience of ages, that much more pain and distress of every kind is commonly produced by the partial division either of a nerve or of a tendon, than from any of these parts being at once cut entirely across. Now the intention of the operation here recommended, is to produce a complete division of the nerve or tendon we suppose to have been wounded by the point of the lancet, and which we consider as the sole cause of all the subsequent distresses.

⁹⁸ The operation now recommended being attended with a good deal of pain, and being put in practice for the removal of symptoms from which it is perhaps difficult to persuade the patient that much danger can

occur, all the remedies we have mentioned should be first made trial of before it is proposed: but at the same time, care ought to be taken that the disorder is not allowed to proceed too far before we have recourse to it; for if the patient should be previously much weakened by the severest symptoms having continued violent for any length of time, neither the remedy now proposed, nor any other with which we are acquainted, would probably have much influence. So soon therefore as the course already prescribed has been fairly tried, and is found to be inadequate to the effects expected from it, we ought immediately to have recourse to a free division of the parts chiefly affected; the manner of doing which will be described in its proper place.

These are the general methods of treating simple wounds of the nerves, tendons, or membranes; but where the wounds are very large, and attended with great distraction, laceration, and loss of substance, some farther directions will be necessary; but of these we shall treat in the next section. The total division of a tendon is not attended with much danger where the action of the muscle belonging to it is not necessary to life: for the divided ends of tendons will very readily unite if they are kept close together; and may either be conjoined by suture, or retained in that posture by a proper bandage.

¹⁰⁰ In wounds of the thorax, even tho' none of the viscera should be wounded, we may yet reasonably expect that a considerable quantity of blood will be extravasated; and this, if very large, must be evacuated if possible. However, it ought to be particularly observed, that this extravasated blood should not be discharged before we are assured that the wounded vessels have done bleeding. When the pulse appears sufficiently strong and equal, the extremities are warm, no hiccup or convulsion appears, and the patient's strength continues, we may then know that the internal hemorrhage has ceased, and that the means for discharging the blood may now be safely used. It may, however, be doubted whether the extravasated blood ought always to be discharged by art; since it is apparent from the most faithful observations, that matter, water, blood, &c. have vanished from the cavities of the thorax, and been afterwards discharged by sweat, urine, &c. Yet this but seldom happens; and if we were to trust to nature only in these cases, it is certain that many would perish from a destruction of the vital viscera by the extravasated and putrid blood, who by an artificial extraction of the same blood might have been saved. The extraction therefore is to be attempted, by putting the body in such a posture that the blood may flow out through the orifice of the wound; by sucking through a flexible tube, obdurate at the end, and having holes in its sides; by injections of diluent, attenuating, and deterring liquors; by dilating the wound, or perforating the thorax a little above the diaphragm, as in the operation for an empyema. By one or other of these methods, wounds of the thorax may generally be cured, provided the viscera are not injured in such a manner as to render them incapable of performing the offices of life.

¹⁰¹ In wounds of the abdomen, where the intestines are injured, they must, if possible, be joined by what is called the *Glover's suture*; though, when the wound

Theory.

Theory.

is small, they may be left to themselves. In all wounds of the abdomen, however, there is great danger from the entrance of the air between the integuments and the viscera. This, if confined, will be rarefied to an extreme degree, and occasion the most violent pains, with incredible distention of the abdomen. It is necessary therefore, that the air which has entered should be expelled, by sucking and the effort of respiration; after which the integuments are to be sewed together, and the wound is to be cured in the same manner as directed for simple wounds: only it will require to be dressed as seldom as possible; and a spare diet, with other antiphlogistic regimen, is here absolutely necessary.

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Of the in-
tellects pro-
lapsed through a
wound
without be-
ing injured.

It sometimes happens, that, through a large wound of the abdominal integuments, the intestine comes out without being injured; yet, if it remains for any time exposed to the air, the case is commonly very dangerous. If assistance can be had at the moment the wound is given, the intestines are immediately to be replaced, and the patient laid in such a posture that they cannot by their own gravity fall out again. However, if assistance is not procured in time, and thus the intestine becomes dry and cold, it ought to be well fomented before it is replaced. Celsus advises also, that those parts of the intestine which prolapsed last should be first replaced, after which the patient should be gently shaken, that each of the intestines may reduce itself to its proper place, and there remain.—This advice is very necessary to be observed; otherwise violent gripes and other bad consequences may follow. Garengot also gives us another advice of no small consequence, namely, that if the wound is in the middle of the abdomen under the navel, penetrating through the rectus muscle on either side, then the prolapsed part of the intestine or omentum is frequently liable to be returned under that muscle, between its body and the tendinous capsule, which very loosely encompasses this muscle below the navel; since it might thus be falsely imagined that the intestine was returned into the abdomen, whence the most violent disorders might ensue. If the intestines are already cold and dry, before any attempts are made to replace them, we ought first to be certain that life remains in these parts: otherwise we might expect an absolute mortification; and though the mortified parts should cast off, the contents of the intestines would escape into the cavity of the abdomen; whence the death of the patient would follow, after the most miserable disorders.

When the wound of the abdomen is large, the intestines easily prolapse, but are as easily returned. But when part of an intestine has been forced through a narrow wound, the disorder is much more dangerous. For the prolapsed intestine being distended by flatus, or the ingested aliments driven thither by the peristaltic motion, it will be inflamed, tumefied, and incapable of being returned through the stricture of the wound; whence a stoppage of the circulation and gangrene will soon follow. In this case the utmost care is to be taken to reduce the intestine to its natural size; and warm fomentations are among the principal means for this purpose. If these should fail, some practitioners of great eminence have advised the puncturing of the intestine in different places in order to discharge the flatus. This practice has also

been recommended in an incarcerated hernia; but is exceedingly disapproved of by Mr Pott; and even in the present case it seems to be very dubious whether any good can possibly arise from it. To puncture any part that is already inflamed, must undoubtedly add to the inflammation; and it is very improbable that the discharge of flatus procured by the punctures would at all be a recompence for the bad consequences produced by the increased inflammation. The method recommended by Celsus seems in this case to be much more eligible; namely, to dilate the wound in such a manner as to reduce the intestine with ease. Sometimes these methods may succeed, and the intestine be preserved whole; though at other times necessary it unavoidably happens that part of it is lost either by suppuration or gangrene. In these cases we must use our utmost endeavours to make the two ends of the intestine unite; and if they do so, the loss of the gangrened or suppurated part will not be much felt: but if this should be found impracticable, the upper part of the intestine should be joined to the edge of the wound; where it will ever afterwards perform the office of an anus, and the fæces will continue to be discharged that way through life. It is to be remarked, however, that even in the most favourable case, viz. where the divided ends of the intestine unite, there will always remain a stricture on the part; for which reason it is requisite that the patient should be very temperate in his diet, eat soft food, and by small quantities at a time; otherwise there will be danger of an obstruction in the place of union, and a rupture may ensue.

103
Treatment
when part
of the in-
testine is
gangrened.

When the omentum appears prolapsed, the same general treatment is to be observed; only that, when it is dry and mortified, the dead part may safely be extirpated.—We shall conclude the article of abdominal wounds with a case from the memoirs of the academy of sciences for the year 1705, which shows that we ought not to despair, even though the most desperate symptoms should take place, as long as any vis vitæ remains. A madman wounded himself in 18 different places of the abdomen. Eight of these penetrated the cavity, and injured the contained viscera; he had a diarrhoea, nausea, and vomiting, tension of the abdomen, with difficult respiration and violent fever, so that his life was despaired of. During the first four days, he was bled seven times; and during the greatest part of the cure his diet consisted almost entirely of flesh-broths, with the addition of some mild vegetables. By these means he was not only cured of his wounds, but restored to his right senses. Seventeen months after, he went mad again, and threw himself over a precipice, by which he was instantly killed: on opening the body, the wounds were found to have penetrated the middle lobe of the liver, the intestinum jejunum, and the colon.

104
Remarkable
case of
wounds in
the abdo-
men.

In wounds of the head, where the cellular mem-
brane only is affected, and the aponeurosis and peri-
cranium untouched, phlebotomy, lenient purges, and
the use of the common febrifuge medicines, particu-
larly those of the neutral kind, generally remove all the
threatening symptoms mentioned, n° 105. When the
inflammation is gone off, it leaves on the skin a
yellowish tint and a dry scurf, which continue until
perspiration takes them away; and upon the removal
of

105
Wounds of
the head.

Theory.

of the disease, the wound immediately recovers an healthy aspect, and soon heals without further trouble. But in the worst kind of these wounds, that is, where a small wound passes through the tela cellulosa and aponeurosis to the pericranium, the patient will admit of more free evacuations by phlebotomy than in the former. In both, the use of warm fomentations is required; but an emollient cataplasm, which is generally forbid in the erysipelatous swellings, may in this latter case be used to great advantage. Where the symptoms are not very pressing, nor the habit very inflammable, this method will prove sufficient; but it sometimes happens that the scalp is so tense, the pain so great, and the symptomatic fever so high, that by waiting for the slow effect of such means, the patient runs a risk from the continuance of the fever; or else the injured aponeurosis and pericranium, becoming sloughy, produce an abscess, and render the case both tedious and troublesome. A division of the wounded part, by a simple incision down to the bone, about half an inch or an inch in length, will most commonly remove all the bad symptoms; and if it be done in time, will render every thing else unnecessary.

106
Of the
joints.

In wounds of the joints, if any thing can be done to save the limb, it must be by dilating the wound in order to discharge the humour, which collects in great quantity. At the same time the most cooling and discent remedies are to be applied to the neighbouring parts, while the wound itself is to be treated with drying gums and balsamics. Relaxing and emollient applications are bad, as causing a great efflux of humour, which at any rate is too copious. The air and cold are likewise to be avoided, and all applications to the wound ought to be of the warm and stimulating kind.

SECT. II. *Of contused and lacerated Wounds, without or with Fractures of the Bones.*

WHEN the small vessels are broken by a blow with any hard instrument without penetrating the skin, at the same time that the solid fibres of the part are crushed, the injury is termed a *contusion*; and when at the same time the skin is broken, it is termed a *contused and lacerated wound*; because in this case the parts are not fairly divided as with a knife, but torn asunder or violently stretched.

107
Simple con-
tusion de-
scribed.

Every contusion therefore, whether the skin is broken or not, may properly be reckoned a wound; for where the injury is so slight that none of the contents of the small vessels are extravasated, it scarce deserves to be mentioned. The immediate consequence of a contusion, therefore, is a swelling, by reason of the extravasation just mentioned; and the skin becomes discoloured by the blood stagnating under it: but as this fluid, even though covered by the skin, cannot long remain in its natural state, it thence happens, that the contused part soon loses its florid red colour, and becomes blue or black; the thinner parts being in the mean time gradually taken up by the absorbent vessels, which at last happens to the blood itself; the blue disappears, and is succeeded by a yellowish colour, showing that the blood is now dissolved; after which the part recovers its former appearance, and the ruptured vessels appear to have united as though nothing had happened.

Theory.

These are the symptoms which attend the slightest kind of contusions; but it is evident, that where the blow is so violent as to rupture or crush some of the large nerves, blood-vessels, tendons, or membranes, all the bad consequences already mentioned which attend simple wounds of those parts will ensue, and they will not at all be alleviated by the circumstance of the skin being whole. Hence it is easy to see how a contusion may produce ulcers of the worst kind, gangrene, sphacelus, carious bones, &c.; and if it happens to be on a glandular part, a scirrhus or cancer is very frequently found to ensue. Even the viscera themselves, especially of the abdomen, may be injured by contusions to such a degree as to produce an inflammation, gangrene, or scirrhus, nay instant death, without rupturing the skin; and such a blow as a man may strike with his fist will often be sufficient for this purpose, as has been observed in the case of some celebrated boxers.

108
Mischiefs
attending
violent
contusions.

That the bones may be fractured along with a contusion, is known by every day's experience; however, without being broken, it is certain that they may be so crushed and injured, that the medullary substance contained in them may be vitiated, and thus the most grievous disorders may ensue. But in no part whatever are contusions more dangerous than in the head, as has been confirmed by the most fatal experience, very dangerous. Mr Pott divides into two classes those injuries to which the head is liable from contusion, viz. those in which the mischief is confined to the scalp, and those where the other parts are concerned. The former is of little consequence; the tumour attending it being easily removed, or the extravasated blood with which it is filled may be discharged by a small opening. One circumstance, however, he says, attending this tumour, requires considerable attention; for the tumour here sometimes produces to the fingers a sensation as if the cranium was broken and depressed; whence an inexperienced surgeon might be apt to remove the scalp as in the real fracture, and thus give his patient a great deal of unnecessary pain. The touch therefore being in this case fallacious, it is necessary to wait for the appearance of other symptoms before we proceed to a division of the integuments.

109
Contusions
of the head
very danger-
ous.

The most dangerous contusions of the head are those where the dura mater and parts within the skull are affected; and in order to have a clear idea of this kind of injury, it is necessary to recollect, that the vessels of the pericranium, those of the diploe, or medullary substance between the two tables of some parts of the cranium, and those of the dura mater within it, do all constantly and freely communicate with each other; and that this communication is carried on by means of innumerable foramina, found in all parts of both surfaces of the skull, as well as at the sutures; that upon the freedom of this communication depends the healthy and sound state of all the parts concerned in it; and that from the interruption or destruction of this proceed most of the symptoms attending violent contusions of the head, extravasations of fluid between the cranium and dura mater, inflammations of the said membrane, and simple undepressed fracture of the skull.

110
Reason of
extreme
danger at-
tending
them.

The pericranium is so firmly attached to the outer surface of the skull, as not to be separable from it with-

Theory.

Theory.

without considerable violence; and when such violent separation is made in a living subject (especially if young), the cranium is always seen to bleed freely from an infinite number of small foramina. The dura mater, which is a firm strong membrane, is almost as intimately attached to the inside of the skull, as the pericranium is to the outside, and by the same means, viz. by vessels; and by these means a constant circulation and communication are preserved and maintained between the two membranes, and the bones dividing them. This all the appearances which attend the scalping a living person, or the separation of the skull from the dura mater of a dead one, (especially if such person died apoplectic or was hanged), prove beyond all doubt. In the former, the blood will (as we have already observed) be seen issuing from every point of the surface of the cranium: in the latter, not only a considerable degree of force will be found necessary to detach the saved bone from the subjacent membrane, but, when it is removed, a great number of bloody points will be seen all over the surface of the latter; which points, if wiped clean, do immediately become bloody again, being only the extremities of broken vessels. These vessels are largest at and about the sutures; at which places the adhesion is the strongest, and the hæmorrhage upon separation the greatest.

III
Communication
between the
outside and
inside of the
cranium.

III
Mistakes
concerning
the attach-
ment of
the dura
mater.

It has been thought by many, that the dura mater was attached to the skull only at the sutures; that in all other parts it was loose and unconnected with it; and that it constantly enjoyed or performed an oscillatory kind of motion, or was alternately elevated and depressed. This idea and opinion were borrowed from the appearance which the dura mater makes in a living subject, after a portion of the skull has been removed: but although it has been inculcated by writers of great eminence, yet it has no foundation in truth or nature; and has misled many practitioners in their opinions, not only of the structure and disposition of this membrane, but in their ideas of its diseases.

The dura mater does, on the internal surface of the bones of the cranium, the office of periosteum, in the same manner as the pericranium does on the external, (at least they have no other): to this it is so firmly and so generally attached, as to be incapable of any even the smallest degree of motion. The alternate elevation and subsidence of it, which are observable when any portion of it is laid bare, are owing to a very different cause from any power in itself; neither are nor can they ever be performed, until a piece of the cranium has been forcibly taken away, and consequently are not natural or necessary.

By blows, falls, and other shocks, some of the larger of those vessels which carry on this communication between the dura mater and the skull are broken, and a quantity of blood is shed upon the surface of that membrane. This is one species of bloody extravasation, and indeed the only one which can be formed between the skull and dura mater. If the broken vessels be few, and the quantity of blood which is shed be small, the symptoms are generally slight, and by

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41 U

none

(a) This must be supposed to be spoken in a general sense; because it is well known, that sometimes a very small quantity of extravasated fluid will produce the most alarming and most pressing symptoms; and that at other times a large quantity will occasion none at all.

proper treatment disappear (a). If they are large or numerous, or the quantity of extravasated fluid considerable, the symptoms are generally urgent in proportion: but whether they be slight or considerable, whether immediately alarming or not, they are always and uniformly such as indicate pressure made on the brain and nerves, viz. stupidity, drowsiness, diminution or loss of sense, speech, and voluntary motion.

But it also often happens, from the same kind of violence, that some of the small vessels which carry on the circulation between the pericranium, skull, and dura mater, are so damaged as not to be able properly to execute that office, although there are none so broken as to cause an actual effusion of blood.

Smart and severe strokes on the middle part of theWhat injuries are most frequently followed by this kind of mischief; the coats of the small vessels which sustain the injury inflame, and become sloughy; and in consequence of such alteration in them, the pericranium separates from the dura mater. the outside of that part of the bone which received the blow, and the dura mater from the inside: the latter of which membranes, soon after such inflammation, becomes sloughy also, and furnishes matter; which matter being collected between the said membrane and the cranium, and having no natural outlet whereby to escape or be discharged, brings on a train of very terrible symptoms, and is a very frequent cause of destruction. The effect of this kind of violence is frequently confined to the vessels connecting the dura mater to the cranium; in which case the matter is external to the said membrane: but it sometimes happens, that by the force either of the stroke or of the concussion, the vessels which pass between and connect the two meninges, are injured in the same manner; in which case, the matter formed in consequence of such violence is found on the surface of the brain, or between the pia and dura mater, as well as on the surface of the latter, or perhaps in all these three situations at the same time.

The difference of this kind of disease from eitherDifference an extravasation of blood or a commotion of the medullary parts of the brain, is great and obvious. All the complaints produced by extravasation are (as we have already said) such as proceed from pressure made on the brain and nerves, and obstruction to the circulation of the blood through the former; stupidity, loss of sense and voluntary motion, laborious and obstructed pulse and respiration, &c. and (which is of importance to remark) if the effusion be all considerable, these symptoms appear immediately or very soon after the accident.

The symptoms attending an inflamed or sloughySymptoms state of the membranes, in consequence of external attending an inflamed state of the membranes, violence, are very different; they are all of the febrile kind, and never, at first, imply any unnatural pressure; such are, Pain in the head, restlessness, want of sleep, frequent and hard pulse, hot and dry skin, flushed countenance, inflamed eyes, nausea, vomiting, rigor; and toward the end, convulsion, and delirium. And

III

III

III

none of these appear at first, that is, immediately after the accident; seldom until some days are past.

One set or class of symptoms are produced by an extravasated fluid making such pressure on the brain and origin of the nerves as to impair or abolish voluntary motion and the senses: the other is caused by the inflamed or putrid state of the membranes covering the brain, and seldom affects the organs of sense until the latter end of the disease; that is, until a considerable quantity of matter is formed, which matter must press like any other fluid.

117
Blood cannot be converted into pus.

It is a generally received opinion, that blood shed from its vessels, and remaining confined in one place, will become pus; and that the matter found on the surface of the dura mater toward the end of these cases was originally extravasated blood. But that pure blood shed from its vessels by means of external violence, and kept from the air, will not turn to or become matter, is proved incontestably by every day's experience in many instances; in aneurisms by puncture, in retained menses by imperforate vaginae, and in all ecchymoses. True pus cannot be made from blood merely; as may be known from the manner in which all abscesses are formed, and from every circumstance attending suppuration: and that the matter found on the surface of the dura mater, after great contusions of the head, never was mere blood, we are as certain as observation and experience can make us.

118
Division of the symptoms by some French writers.

Some of the French writers have indeed divided the symptoms of what they call a *contusion of the head*, into two kinds; and have named them *primitive* or *original* symptoms, and *secondary* or *consequential* ones: among the former, they rank immediate loss of sense, hæmorrhagy, involuntary discharge of urine and feces, great propensity to sleep, &c.; among the latter they reckon fever, delirium, rigor, convulsion, &c. One kind they impute to the mere extravasation of blood, the other to its putrefaction.

119
Objections to it.

This account, though ingenious and specious, is not founded on fact. It is true, that the two kinds of symptoms are very distinct from each other, as well in their nature as in their time and manner of access; and so far the remark is true: but from the best observation and examination, both on the living and on the dead, they appear to proceed from very different causes. That both these kind of symptoms do now and then concur in the same patient, is beyond all doubt; and that the case is thereby rendered complex, and more difficult to be judged of: but this does not constantly happen; and even when it does, there are generally such distinguishing characteristic marks of each, as may prove the truth of what is here asserted.

120
Particular account of the progress of the disease.

If there be neither fissure nor fracture of the skull, nor extravasation, nor commotion underneath it, and the scalp be neither considerably bruised nor wounded, the mischief is seldom discovered or attended to for some few days. The first attack is generally by pain in the part which received the blow. This pain, though beginning in that point, is soon extended all over the head, and is attended with a languor or dejection of strength and spirits, which are soon followed by a nausea and inclination to vomit, a vertigo or giddiness, a quick and hard pulse, and an incapacity of sleeping, at least quietly. A day or two after this attack, if no means to prevent inflammation are used, the part ge-

nerally swells, and becomes puffy and tender, but not painful; neither does the tumour rise to any considerable height, or spread to any great extent. If this tumid part of the scalp be now divided, the pericranium will be found of a darkish hue, and either quite detached or very easily separable from the skull; between which and it will be found a small quantity of a dark-coloured ichor.

If the disorder has made such progress that the pericranium is quite separated and detached from the skull, the latter will even now be found to be somewhat altered in colour from a sound healthy bone. Of this alteration it is not very easy to convey an idea by words; but it is a very visible one, and what some very able writers have noticed. Among these Fallopius particularly: *Inspiciatis diligenter os distictum: quod or, quando est in natura sua, est coloris subrubri, non candidi prorsus, nec rubri prorsus, sed est veluti color mistus ex albo declinans ad rubicandam, ut si multo lacte, aut alio colore candido, poneris parum sanguinis vel alterius rei rubrae. Sed si videritis inaequalitatem coloris in ipso esse detecto, ita ut assint veluti puncta coloris albi, et aridi ossis, que aride aliquando majores sunt, aliquando minores, &c. sciatis quod os sit contusum.*

From this time the symptoms generally advance more hastily and more apparently; the fever increases, the skin becomes hotter, the pulse quicker and harder, the sleep more disturbed, the anxiety and restlessness more fatiguing; and to these are generally added irregular rigors, which are not followed by any critical sweat, and which, instead of relieving the patient, add considerably to his sufferings. If the scalp has not been divided or removed until the symptoms are thus far advanced, the alteration of the colour of the bone will be found to be more remarkable: it will be found to be whiter and more dry than a healthy one; or, as Fallopius has very justly observed, it will be found to be more like a dead bone: the sanies or fluid between it and the pericranium will also, in this state, be found to be more in quantity, and the said membrane will have a more livid diseased aspect.

In this state of matters, if the dura mater be denuded, it will be found to be detached from the inside of the cranium, to have lost its bright silver hue, and to be as it were smeared over with a kind of mucus, or with matter, but not with blood. Every hour after this period, all the symptoms are exasperated, and advance with hasty strides: the headach and thirst become more intense, the strength decreases, the rigors are more frequent, and at last convulsive motions, attended in some with delirium, in others with paralysis or comatose stupidity, finish the tragedy.

If the scalp has not been divided or removed till this point of time, and it be done now, a very offensive discoloured kind of fluid will be found lying on the bare cranium, whose appearance will be still more unlike to the healthy natural one; if the bone be now perforated, matter will be found between it and the dura mater, generally in considerable quantity, but different in different cases and circumstances. Sometimes it will be in great abundance, and diffused over a very large part of the membrane; and sometimes the quantity will be less, and consequently the space which it occupies smaller. Sometimes it lies only on the exterior surface of the dura mater; and sometimes it is between

121
Appearance of the skull and pericranium.

122
Of the dura mater.

123
Of the scalp and integuments.

Theory.

Theory.

it and the pia mater, or also even on the surface of the brain, or within the substance of it.

134
Cause of
these symp-
toms.

The primary and original cause of all this is the stroke upon the skull: by this the vessels which should carry on the circulation between the scalp, pericranium, skull, and meninges, are injured; and no means being used to prevent the impending mischief, or such as have been made use of proving ineffectual, the necessary and mutual communication between all these parts ceases; the pericranium is detached from the skull, by means of a sanies discharged from the ruptured vessels; the bone, being deprived of its due nourishment and circulation, loses its healthy appearance; and the dura mater (its attaching vessels being destroyed, or rendered unfit for their office) separates from the inside of the cranium, inflames, and suppurates.

Whoever will attend to the appearances which the parts concerned make in every stage of the disease, to the nature of the symptoms, the time of their access, their progress, and most frequent event, will find them all easily and fairly deducible from the one cause which has just been assigned, *viz.* the contusion. As the inflammation and separation of the dura mater is not an immediate consequence of the violence, so neither are the symptoms immediate, seldom until some days have passed: the fever at first is slight, but increases gradually; as the membrane becomes more and more diseased, all the febrile symptoms are heightened; the formation of matter occasions rigors, frequent and irregular, until such a quantity is collected as brings on delirium, spasms, and death.

135
Appear-
ances when
the scalp is
wounded.

Hitherto we have considered this disease as unaccompanied by any other, not even by an external mark of injury, except perhaps a trifling bruise of the scalp: let us now suppose the scalp to be wounded at the time of the accident, by whatever gave the contusion; or let us suppose, that, the immediate symptoms having been alarming, a part of the scalp had been removed in order to examine skull.

In this case the wound will for some little time have the same appearance as a mere simple wound of this part, unattended with other mischief, would have; it will, like that, at first discharge a thin sanies or gleet, and then begin to suppurate; it will digest, begin to incarnate, and look perfectly well. But after a few days all these favourable appearances will vanish; the sore will lose its florid complexion and granulated surface, will become pale, glassy, and flabby; instead of good matter, it will discharge only a thin discoloured sanies; the lint with which it is dressed, instead of coming off easily (as in a kindly suppurating sore), will stick to all parts of it; and the pericranium, instead of adhering firmly to the bone, will separate from it all round, to some distance from the edges.

This alteration in the face and circumstances of the sore, is produced merely by the diseased state of the parts underneath the skull; which is a circumstance of great importance in support of the doctrine advanced; and is demonstrably proved, by observing that this diseased aspect of the sore, and this spontaneous separation of the pericranium, are always confined to that part which covers the altered or injured portion of the dura mater, and do not at all affect the rest of the scalp; nay, if it has by accident been wounded in any

other part, or a portion has been removed from any part where no injury has been done to the dura mater, no such separation will happen; the detachment above will always correspond to that below, and be found nowhere else.

The first appearance of alteration in the wound immediately succeeds the febrile attack; and as the febrile symptoms increase, the sore becomes worse and worse, that is, degenerates more and more from a healthy, kindly aspect.

Through the whole time, from the first attack of the fever to the last and fatal period, an attentive observer will remark the gradual alteration of the colour of the bone if it be bare: at first it will be found to be whiter and more dry than the natural one; and as the symptoms increase, and either matter is collected or the dura mater becomes sloughy, the bone inclines more and more to a kind of purulent hue or whitish yellow: and it may also be worth while in this place to remark, that if the blow was on or very near to a future, and the subject young, the said suture will often separate in such a manner as to let through it a loose, painful, ill-conditioned fungus; at which time also it is no uncommon thing for the patient's head and face to be attacked with an erysipelas.

We have said, that in those cases in which the scalp is very little injured by the bruise, and in which there is no wound, nor any immediately alarming symptoms or appearances, that the patient feels little or no inconvenience, and seldom makes any complaint until some few days are past. That at the end of this uncertain time, he is generally attacked by the symptoms already recited. That these are not pressing at first, but that they soon increase to such a degree as to baffle all our art; from whence it will appear, that when this is the case, the patient frequently suffers from what seems at first to indicate his safety, and prevents such attempts being made, and such care from being taken of them, as might prove preventative of mischief.

But if the integuments are so injured as to excite or ¹³⁶claim our early regard, very useful information may be gained from thence be collected. For whether the scalp be considerably bruised or not, if in the place of such bruise the pericranium be found spontaneously detached from the skull, having a quantity of discoloured sanies be-
tween them, under the tumid part, in the manner already mentioned, it may be regarded as a pretty certain indication, either that the dura mater is beginning to separate in the same manner, or that, if some preventative means be not immediately used, it will soon suffer; that is, it will inflame, separate from the skull, and give room for a collection of matter between them. And with regard to the wound itself, whether it was made at the time of the accident, or afterward artificially, it is the same thing; if the alteration of its appearance be as above related, if the edges of it spontaneously quit their adhesion to the bone, and the febrile symptoms are at the same time making their attack, these circumstances will serve to convey the same information, and to prove the same thing.

This particular effect of contusion is frequently found to attend on fissures and undepressed fractures of the cranium, as well as on extravasation of fluids in cases where the bone is entire; and on the other hand,

Theory. all these do often happen without the concurrence of this individual mischief. All this is matter of accident: but let the other circumstances be what they may, the spontaneous separation of the altered pericranium in consequence of a severe blow, is almost always followed by a suppuration between the cranium and dura mater; a circumstance extremely well worth attending to in fissures and undepressed fractures of the skull, because it is from this circumstance principally that the bad symptoms and the hazard in such cases arise.

127
Separation of the pericranium followed by a suppuration of the dura mater.

It is no very uncommon thing for a smart blow on the head to produce some immediate bad symptoms; which after a short space of time disappear, and leave the patient perfectly well. A slight pain in the head, a little acceleration of pulse, a vertigo, and sickness, sometimes immediately follow such accident, but do not continue many hours, especially if any evacuation has been used. These are not improbably owing to a slight commotion of the brain; which having suffered no material injury thereby, they soon cease. But if after an interval of some time the same symptoms are renewed; if the patient, having been well, becomes again feverish and restless; and that without any new cause; if he complains of being languid and uneasy, sleeps disturbedly, loses his appetite, has a hot skin, a hard quick pulse, and a flushed heated countenance, and neither irregularity of diet nor accidental cold have been productive of these, mischief is most certainly impending, and that most probably under the skull.

128
Signs of an effusion of fluid under the cranium.

If the symptoms of pressure, such as stupidity, loss of sense, voluntary motion, &c. appear some few days after the head has suffered injury from external mischief, they do most probably imply an effusion of a fluid somewhere. This effusion may be in the substance of the brain; in its ventricles, between its membranes, or on the surface of the dura mater: and which of these is the real situation of such extravasation, is a matter of great uncertainty; none of them being attended with any peculiar mark or sign that can be depended upon, as pointing it out precisely: but the inflammation of the dura mater, and the formation of matter between it and the skull, in consequence of contusion, is generally indicated and preceded by a puffy, circumscribed, indolent tumour of the scalp, and a spontaneous separation of the pericranium from the skull under such tumour.

These appearances therefore following a smart blow on the head, and attended with languor, pain, restlessness, watching, quick pulse, headache, and slight irregular shiverings, do almost infallibly indicate an inflamed dura mater, and pus either forming or formed between it and the cranium.

By detachment of the pericranium is not meant every separation of it from the bone which it should cover. It may be and often is cut, torn, or scraped off, without any such consequence: but these separations are violent; whereas this is spontaneous, and is produced by the destruction of those vessels by which it was connected with the skull, and by which the communication between it and the internal parts was carried on: and therefore it is to be observed, that it is not the mere removal of that membrane which causes the bad symptoms, but it is the inflammation of the dura mater; of which inflammation this spontaneous

secession of the pericranium is an almost certain indication.

129
Separation of both tables of the cranium sometimes takes place.

Besides the mischiefs already mentioned, Mr Pott observes, that sometimes an exfoliation or separation of both tables of the cranium takes place from external violence, such as happen spontaneously in old or neglected venereal disorders. This disease, which has its seat in the diploe, often spoils the whole substance of the bone, and produces a separation of a part of it. This kind of venereal caries is most frequently of a small extent, and affects different parts of the skull; though sometimes it may be of large extent in one piece. The separated part is generally quite carious, and appears as if it had been worm-eaten. The surface of the bone so diseased is seldom much elevated, though generally somewhat: neither has it often the circumscribed form and appearance of a true node, as it is called; though now and then it has.

The scalp which covers a bone in this state is most frequently diseased also; sometimes with one large ill-conditioned sore; but more often with a number of crude, foul, painful, serpiginous ulcers; through most of which a probe will discover a rough bare bone, from which is constantly discharged a greasy stinking sanies. This complaint is generally accompanied by a nocturnal headache, pocky spots, and pains about the breast and shoulders; and is almost always preceded by the former, though very frequently that symptom ceases, either during the mercurial courses instituted for that purpose, or when the pericranium covering the diseased part becomes foul and sloughy.

The proportion of extent of surface which one table of these diseased parts of the cranium bears to the diseased part of the other table, is very uncertain, and often very unequal. Sometimes the alteration of the outer table is much more extensive than that of the inner; in which case, when the separation is made, the detached piece comes away very easily, and the uncovered part of the dura mater is small compared to the size of the external fore: but sometimes, on the contrary, the disease occupies a more considerable extent of the inner table than of the outer, and thereby renders the case more difficult and the cure more tedious.

Where the skull is broken, the most violent symptoms frequently, though not always, take place at the very beginning. Mr Pott divides this kind of injury into two general classes, *viz.* those in which the broken parts keep their proper level, and those in which they do not; or, in other words, fractures without and fractures with depression. The symptoms of a fractured cranium have been universally reckoned, Loss of sense, giddiness, vomiting, bleeding at the ears, nose, mouth, &c. But though these do frequently accompany a broken skull, they are by no means produced by the breach made in the bone, nor do they indicate any such breach to have been made. They proceed entirely from some violence offered to the contents of the cranium, and either do or do not accompany fractures as they happen to be joined with such injuries or not. These symptoms are frequently produced by extravasations of blood or serum upon the membranes of the brain, or between them. They may also be the consequence of shocks or concussions of the brain itself, where the skull is perfectly entire. On the other

130
Of fractures of the cranium.

Theory.

other hand, the bones of the cranium are sometimes cracked, broken, nay, even depressed, and the patient suffers none of these symptoms. Hence it is difficult to know when the skull is fractured and when it is not; and hence arises one source of danger in contusions and wounds of the head; for as it is impossible to know whether the cranium is fractured or not, the surgeon is often not warranted to divide the scalp until some urgent symptoms appear, after which it too frequently happens that all assistance comes too late. But if by any means the surgeon is assured that the skull is broken, it will then be incumbent on him at all events to proceed in the manner to be afterwards directed for curing these kinds of injuries.

Sometimes, though rarely, it happens that one of tables of the skull only is injured; but in this the symptoms are so much alike with the foregoing, that it is needless to take further notice of them: we shall therefore only consider one symptom more, and which attends injuries done to the substance of the brain itself. This is a fungous excrecence of the brain, somewhat resembling the fungous or proud flesh already mentioned, which grows up in ill-conditioned wounds in any part of the body. These fungi of the brain arise very suddenly and unexpectedly, and expand to a considerable bulk; and grow the largest when the patient is seized with a violent fever. However, they are seldom formed when the dura mater continues entire; for this membrane, being very strong, sufficiently confines the brain: but when it is divided, together with the pia mater, the fungi increase most of all. These substances seem entirely to be produced from the cortical substance of the brain, and never have any portion of the medulla; whence they are sometimes extirpated with safety, though their appearance is at any rate to be accounted a very bad symptom.

In violent contusions and lacerations of the membranes and tendons, all the symptoms which we have before mentioned will arise with aggravation; and death very frequently ensues, after the most terrible convulsions. These are very frequent in gunshot wounds; but the different ways in which people may be affected in consequence of these wounds, it is impossible to recount. One thing to be observed in gunshot wounds is, that the entrance of them is always narrower than the place where the ball comes out, provided it goes quite through the limb; because the violent impetus of the ball drives in and contuses the flesh before it as it goes in, while it lacerates and tears it out in going through the other side. By reason of this extreme contusion and laceration, there is frequently very little hæmorrhage from gunshot wounds, even when considerable vessels are injured; and hence probably proceeds the notion of an eschar in gunshot

wounds, as if they were burnt by the heat of the bullet. But it is impossible that a true eschar can in this case be formed; because it is demonstrated that bullets acquire no heat while flying in the air, nor unless they strike upon an hard obstacle*. That a violent distension of the vessels will prevent hæmorrhage, is plain from the case of those who have unhappily got their arms torn off by entangling about mills or other machinery; for in none of these do the axillary artery bleed, notwithstanding its magnitude. The reason of this seems to be, that the vessels entirely lose their elasticity, and collapse by the pressure of the surrounding parts in such a manner that the blood cannot pass through them.

With regard to the cure of simple contusions of the fleshy parts, they are in general easily removed by the common discutient applications, of which none is better than vinegar and crude sal ammoniac. If the blow has been very violent, the part will perhaps suppurate; in which case it is to be treated as afterwards directed when we come to speak of tumours. The danger of contused wounds in the head, however, is greater than in any other part of the body. Here it sometimes happens, that the scalp is so wounded at the time of the accident, or so torn away, as to leave the bone perfectly bare, and yet the violence has not been such as to produce the evil abovementioned. In this case, if the pericranium be only turned back along with the detached portion of scalp, there may be probability of its reunion; and it should therefore be immediately made clean and replaced, for the purpose of such experiment, which, if it succeeds, will save much time, and prevent considerable deformity. If this attempt does not succeed, the detached piece may be removed, and the case then becomes as if the scalp and the pericranium had been forced away at the time that the wound was first inflicted; and the worst that can happen, is an exfoliation from the bare skull (c).

It does also sometimes happen, that the force which detaches or removes the scalp does also occasion the mischief in question; but the integument being wounded or removed, we cannot have the criterion of the tumour of the scalp for the direction of our judgment. In these circumstances our whole attention must be directed to the wound and general symptoms. The edges of the former will digest as well, and look as kindly for a few days, as if no mischief was done underneath; but after some little space of time, when the patient begins to be restless and hot, and to complain of pain in the head, these edges will lose their vermilion hue, and become pale and flabby; instead of matter, they will discharge a thin gleet; and the pericranium will loosen from the skull, to some distance from the said edges. Immediately after this, all the general

Theory.

* See Phil. Transf. Vol. lxxi. part I.

136
Cure of simple contusions.

137
Of contused wounds of the head, where the pericranium and scalp are detached from the bone.

139
Appearance of the wound when the internal parts are injured.

(c) Not that exfoliation is the necessary consequence of the skull being laid bare; this depends upon other circumstances besides the mere removal of the scalp and pericranium. The solidity of the surface of the bones, the size of the vessels, and the impulse of the blood through them, are what principally determine that. If the cortex of the bone be not very hard, and the impulse of the blood be capable of counterbalancing the effects of the external air, a granulation of flesh will be generated on the surface of the bone, which will cover and firmly adhere to it, without throwing off the smallest exfoliation, especially in young subjects. On the contrary, if the bone be much hardened, and the vessels thereby constricted; or if such applications be made use of as will produce an artificial constriction of them; the surface will necessarily become dry, and, the juices ceasing to circulate through it, it must part with a scale to a certain depth; that is, that part through which the circulation ceases to be carried on will be separated from and cast off by the vessels which nourish the rest of the bone.

131
Difficulty of knowing whether the skull is fractured or not.

132
Fungi of the brain.

133
Of contusions and lacerations of the membranes.

134
Of gunshot wounds.

135
Why there is little hæmorrhage in these wounds.

Theory.

Symptoms are increased and exasperated, and as the inflammation of the membrane is heightened or extended, they become daily worse and worse, until a quantity of matter is formed, and collected, and brings on that fatal period which, though uncertain as to date, very seldom fails to arrive.

139
General indications of cure.

The method of attempting the relief of this kind of injury consists in two points; *viz.* to endeavour to prevent the inflammation of the dura mater; or, that being neglected, or found impracticable, to give discharge to the fluid collected within the cranium in consequence of such inflammation.

140
Exceeding usefulness of bleeding.

Of all the remedies in the power of art for inflammations of membranous parts, there is none equal to phlebotomy. To this truth many diseases bear testimony; pleurifies, ophthalmies, strangulated hernias, &c. and if any thing can particularly contribute to the prevention of the ills likely to follow severe contusions of the head, it is this kind of evacuation: but then it must be made use of in such a manner as to become truly a preventative; that is, it must be made use of immediately, and freely.

141
It ought never to be omitted.

It will in general indeed be found very difficult to persuade a person, who has had what may be called only a *knock on the pate*, to submit to such discipline, especially if he finds himself tolerably well. He will be inclined to think, that the surgeon is either unnecessarily apprehensive, or guilty of a much worse fault; and yet, in many instances, the timely use or the neglect of this single remedy makes all the difference between safety and fatality.

It may be said, that as the force of the blow, the height of the fall, the weight of the instrument, &c. can never precisely or certainly determine the effect, nor inform us whether mischief is done under the bone or not, a large quantity of blood may be drawn off unnecessarily in order to prevent an imaginary evil. This is in some degree true; and if the advice just given were universally followed, many people would be largely bled without necessity; but then, on the other hand, many a very valuable life would be preserved, which for want of this kind of assistance is lost. And if it be allowed to use such means as may be in themselves hazardous, surely it cannot be wrong to employ one which is not so; at least if it be considered in a general sense, whatever it may accidentally prove to some few particular individuals.

Acceleration or hardness of pulse, restlessness, anxiety, and any other degree of fever, after a smart blow on the head, are always to be suspected and attended to. Immediate, plentiful, and repeated evacuation by bleeding, have in many instances removed these, in persons to whom, in all probability, very terrible mischief would have happened had not such precaution been used. In this, as well as some other parts of practice, we neither have nor can have any other method of judging, than by comparing together cases apparently similar. It is by no means, however, to be inferred from hence, that early bleeding will always prove a certain preservative; and that they only die to whom it has not been applied: this, like all other human means, is fallible; and perhaps there are more cases out of its reach than within it: but where preventative means can take place, this is certainly the best, and the most frequently successful.

The second intention, *viz.* the discharge of matter

collected under the cranium, can be answered only by Theory.

When, from the symptoms and appearances already described, there is just reason for supposing matter to be formed under the skull, the operation of perforation cannot be performed too soon; it seldom happens that it is done soon enough.

The propriety or impropriety of applying the trephine in cases where there is neither fissure, fracture, nor symptom of extravasation, is a point which has been much litigated, and remains still unsettled either by writers or practitioners.

When there is no reason for suspecting either of those injuries, either from the symptoms or from the appearances, and the pericranium, whether the scalp be wounded or not, remains firmly attached in all parts to the skull, there certainly is not (let the general symptoms be what they may) any indication where to apply the instrument; and consequently no sufficient authority for using it at all. But whenever that membrane, after the head has received an external violence, separates, or is detached spontaneously from the bones underneath it, and such separation is attended with the collection of a small quantity of thin brown ichor, an alteration of colour in the separated pericranium, and an unnatural discoloured of the bone, we cannot help thinking that there is as good reason for trepanning as in the case of fracture: we believe experience would vindicate us, if we said *better* reason; since it is by no means unfrequent for the former kind of case to do well without such operation, whereas the latter (we mean supuration under the skull) never can.

All the best practitioners have always agreed in acknowledging the necessity of perforating the skull in the case of a severe stroke made on it by gunshot, upon the appearance of any threatening symptoms, even though the bone should not be broken: and very good practice it is. A wound by gunshot (as far as it relates to the skull) is to be regarded only as one attended with a very high degree of contusion, and therefore most likely to produce symptoms accordingly; among which, inflammation of the dura mater stands principal. Experience confirms both: most of the symptoms attending wounds of the head made by gunshot, are symptoms of contusion; and the formation of matter between the cranium and dura mater is a very frequent and very fatal consequence of such contusion.

In short, the spontaneous separation of the pericranium, if attended with general disorder of the patient, with a chilliness, horripilation, languor, and some degree of fever, appears to us, from all the observation we have been capable of making, to be so sure and certain an indication of mischief underneath, either present or impending, that we should never hesitate about perforating the bone in such circumstances.

When the skull has been once perforated, and the dura mater thereby laid bare, the state of the latter cases it is must principally determine the surgeon's future conduct. In some cases one opening will prove sufficient for all necessary purposes, in others several may be necessary. This variation will depend on the space of detached dura mater and the quantity of collected matter. The repetition of the operation is warranted both by the nature of the case, and by the best authorities, there being no comparison to be made between the

143
Dispute concerning the perforation forming this operation.

144
Ought always to be performed where the pericranium separates from the skull.

145
In what cases it is to be repeated.

146
Of perforating the cranium.

the possible inconvenience arising from largely denuding the dura mater, and the certain as well as terrible evils which must follow the formation and confinement of matter between it and the skull.

146
The antiphlogistic regimen necessary after the operation.

It can hardly be necessary to observe, that notwithstanding the operation of perforation be absolutely and unavoidably necessary, yet the repetition of blood-letting, of cooling laxative medicines, the use of antiphlogistic remedies, and a most strict observance of a low diet and regimen, are as indispensably requisite after such operation as before: the perforation lets the membrane free from pressure, and gives vent to collected matter, but nothing more: the inflamed state of the parts under the skull, and all the necessary consequences of such inflammation, call for all our attention full as much afterwards as before; and although the patient must have perished without the use of the trephine, yet the merely having used it will not preserve him without every other caution and care.

147
Of cases where the cranium is fractured.

In those cases where the bone is evidently fractured, if the solution of continuity be either produced by such a degree of violence as hath caused a considerable disturbance in the medullary parts of the brain, or has disturbed any of the functions of the nerves going off from it, or has occasioned a breach of any vessel or vessels, whether sanguine or lymphatic, and that hath been followed by an extravasation or lodgement of fluid, the symptoms necessarily consequent upon such derangement, or such pressure, will follow; but they do not follow because the bone is broken: their causes are superadded to the fracture; and although produced by the same external violence, are yet perfectly and absolutely independent of it; so much so, that, as we have already observed, they are frequently found where no fracture is.

The operation of the trepan is frequently performed in the case of simple fractures, and that very judiciously and properly. But it is not performed because the bone is broken or cracked: a mere fracture or fissure of the skull can never require perforation, or that the dura mater under it be laid bare. The reason for doing this springs from other causes than the fracture, and those really independent on it. They spring from the nature of the mischief which the parts within the cranium have sustained, and not from the accidental division of the bone. From these arise the threatening symptoms, from these all the hazard, and from these the necessity and vindication of performing the operation of the trepan.

If a simple fracture of the cranium was unattended in present with any of the before-mentioned symptoms, and there was no reason for apprehending any other evil in future, that is, if the solution of continuity in the bone was the whole disease, it could not possibly indicate any other curative intention but the general one in all fractures, viz. union of the divided parts. But how can such union be promoted or assisted by perforation? It most certainly cannot; and yet perforation is absolutely necessary in seven cases out of ten of simple undepressed fractures of the skull.

148
Reasons for trepanning in the case of fractures.

The reasons for trepanning in these cases are, first, the immediate relief of present symptoms arising from pressure of extravasated fluid; or, second, the discharge of matter formed between the skull and dura mater in consequence of inflammation; or, third, the

prevention of such mischief as experience has shown may most probably be expected from such kind of violence offered to the last-mentioned membrane.

In the first case (that of an extravasated fluid within the cranium), the relief from perforation is not only sometimes immediate, but frequently is not attainable by any other means. This is a sufficient proof, not only of its utility, but of its necessity.

In the second (of formation of matter between the skull and dura mater), there is no natural outlet by which such matter can escape; and the only chance of life is from the operation.

In the third, that of mere fracture, without depression of bone, or the appearance of such symptoms as indicate commotion, extravasation, or inflammation, it is used as a preventative; and therefore is a matter of choice more than immediate necessity.

Many practitioners, both ancient and modern, have therefore disused and condemned it; and have, in cases where there have been no immediate bad symptoms, advised to leave the fracture to nature, and not to perform the operation as a preventative, but to wait until its necessity may be indicated by such symptoms as may both require and vindicate it. This is a point of the utmost consequence in practice, and ought to be very maturely considered.

They who object to the early use of the trephine, speak of it as being frequently unnecessary, and as rendering the patient liable to several inconveniences which may arise from uncovering the dura mater before there is any good or at least any apparent reason for so doing. And in support of this their opinion, they allege many instances of simple fracture, which have been long undiscovered, without being attended with any bad symptoms; and of others which, though known and attended to from the first, have done very well without such operation.

They who advise the immediate use of the instrument, do it upon a presumption that, in considerable violence received by the head, such mischief is done to the dura mater, and the vessels by which it is connected to the cranium, that inflammation of the said membrane must follow; which inflammation generally produces a collection of matter and a symptomatic fever, which most frequently baffles all our art, and ends in the destruction of the patient.

What the former assert is undoubtedly sometimes true. There have been several instances of undepressed fractures of the skull, which either from having been undiscovered at first, or neglected, or having been under the care of a practitioner who has disliked the operation, have done very well without it. This is certainly true, but is not sufficient to found a general rule of practice upon: in matters of this sort, a few instances are by no means sufficient to establish a precedent: that which is found to be most frequently useful, is what we ought to abide by; referring to ourselves a liberty of deviating from such general rule in particular cases.

This is one of those perplexing circumstances which all writers lament, and all practitioners feel; but which, instead of merely complaining of, we should endeavour, as much as in us lies, to correct.

In order to obtain what information we can on this subject, we should consider, first, what the mischiefs are

149
Objections to the early use of the trephine.

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Answered.

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are, which may most probably be expected to follow, or which most frequently do follow, when perforation has been too long deferred or totally neglected; secondly, what prejudice or inconvenience does really arise from, or is thought to be caused by, the operation itself, considered abstractedly; and, thirdly, what proportion the number of those who have done well without it bears to that of those who may truly be said to have been lost for want of it, or of those to whom it might have afforded some chance of relief.

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Dangers
arising from
a delay of
the operation.

With regard to the first, we have already observed in the case of simple undressed fractures, whenever the trephine is applied, it must be with design either to relieve or to prevent ills arising from other mischief than the mere breach in the bone; which breach, considered simply and abstractedly, can neither cause such ills, nor be relieved by such operation. One, and that the most frequent, of these mischiefs, is the inflammation, detachment, and suppuration of the dura mater, and consequently the collection of matter between it and the skull; a case of all others attending wounds of the head, the most pressing, the most hazardous, and the least within our power to relieve. Indeed, the only probable method of preventing this evil seems to be the removal of such a part of the skull as, by being broken, appears plainly to have been the part where the violence was inflicted; and which, if the dura mater becomes inflamed, and quitting its connexion suppurates, will, in all probability, cover and confine a collection of matter for which nature has provided no outlet.

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Those
which follow
the operation
itself.

The second consideration proposed was, What mischief or inconvenience may most reasonably be supposed to follow or to proceed from the mere operation considered abstractedly. They who are averse to the use of it as a preventative, allege that it occasions a great loss of time; that it is frequently quite unnecessary; and that the admission of air to the dura mater, as well as the laying of it bare, is necessarily prejudicial.

The former of these is undoubtedly true: a person whose skull has been perforated cannot possibly be well (that is, cured) in so short a space of time as one who has not undergone such operation, supposing such person to have sustained no other injury than the mere fracture; and if the majority of the people whose skulls are broken, were so lucky as to sustain no other injury, that is, if no other mischief was in these cases in general done to the parts contained within the skull, the objection to perforation would be real and great, and the operation a matter of more serious consideration. But this is seldom the case; by much the larger number of those who suffer a fracture of the skull, are injured with regard to other parts, and labour under mischief of another kind additional to the fracture; that is, the parts within the cranium are injured as well as the cranium itself. This being the case, the loss or waste of a little time ceases to be an object of so great importance. The hazard which it is supposed may be incurred from laying bare the dura mater is indeed a matter of some weight: so that it certainly ought not to be done but for very good reasons: and yet, let the supposed hazard be what it may, it cannot, in the nature of things, be by any means equal to that which must be incurred by not doing it

when such operation becomes necessary. In short, if we would form a right judgment of this point, the question concerning it ought to stand thus: Is the chance of ill which may proceed from merely denuding the dura mater, equal to that of its not being so hurt by the blow as to inflame and suppurate? Or is the mischief which may be incurred by mere perforation of the skull, equal to the good which it may produce? These questions, let those who have seen most business of this kind, and who are therefore the best judges, consider and determine.

The third consideration, *viz.* What proportion the number of those who have escaped without the operation bears to that of those who have perished for want of it, is in great measure included in the two preceding; at least the determination of them must also determine this.

"The number of cases of this kind (says Mr Pott) which are necessarily brought into a large hospital so situated as Bartholomew's is, in the middle of a populous city, where all kinds of hazardous labour are carried on, has enabled me to make many observations on them; and although I have now and then seen some few of them do well without the use of the trephine, yet the much greater number whom I have seen perish with collections of matter within the cranium, who have not been perforated, and for whom there is no other relief in art or nature, has, I must acknowledge, rendered me so very cautious and diffident, that although I will not say that I would always and invariably perform the operation in every case of simple fracture, yet the case must be particularly circumstanced, the prospect much fairer than it most frequently is, and my prognostic delivered in the most guarded apprehensive manner, when I omit it. I should be sorry to be so misunderstood as to have it supposed that I mean to say, that I think the denudation of the dura mater a matter of absolute indifference, or that no ill can proceed from it. This I know is a point concerning which the best practitioners have differed, and concerning which we will stand in need of information; but I think I may venture to say, what is fully to my present purpose, *viz.* that enlarging the opening of a fracture by means of a trephine will not produce or occasion much risk or hazard additional to what must be occasioned by the fracture itself: that has already let in the air upon the membrane; and therefore that consideration is, at least in some degree, at an end, and the principal point to be determined still remains the same, *viz.* Whether, upon a supposition that the dura mater may possibly not have been so injured as to inflame and suppurate in future, the operation ought not to be practised as a preventative, but, on the contrary, ought rather to be deferred until worse symptoms indicate the necessity of it? or, Whether it ought in general to be performed early, in order, if possible, to prevent and guard against a very probable as well as very terrible mischief?

"I know that it may be said, that a fracture, if of any considerable size, or whose edges are fairly distant and unconnected, will of itself make some way for discharge from within: and so it certainly may and does, in the case of an effusion of fluid blood; but even in this it very seldom proves sufficient for the purpose. But

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Mr Pott's
opinion
concerning
the numbers
of those who
have perished
for want of it.

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Much less
than those
which attend
its delay.

does

does not the distant separation of the edges imply greater separation of the attaching vessels of the dura mater? and does not experience too often prove this to be the case? In truth, the great advantage which is sometimes derived from considerable fractures, is most frequent in those cases where portions of bone are so loose as to be removable; which removal of bone stands in place of perforation, and makes much more for the necessity of the operation in other cases than against it, if properly considered.

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Cases of
contusions
of the head
without any
wound,
mentioned
by Mr Pott.

In confirmation of the above doctrine Mr Pott adduces a great many cases. Of contusions of the head without any wound he mentions five. The first, a man that was knocked down in a mob; he soon recovered his senses, and, after being plentifully bled, was to appearance well in three days. Six days after, he was taken ill with the symptoms of a beginning inflammation of the dura mater; which having continued three days, he was again taken under Mr Pott's care.—It was now twelve days from the accident; and after this the symptoms continually increased until the seventeenth day, when he died. Two days before his death, a tumour, which had arisen on the spot where the injury had been received, was laid open, and a thin brown sanies discharged. The cranium was altered from its healthy appearance, but without fracture or fissure. On opening the head, a considerable quantity of matter was found betwixt the dura mater and the skull under the diseased part, but nowhere else.

The second case was a boy of nine years of age, who had been stunned for a minute or two by a fall from a cart. In two days he seemed to be quite well: but in five days after, that is, in seven from the accident, he complained of the symptoms already mentioned; which having continued for six days longer, Mr Pott was called, and found about a third part of the parietal bone covered with a flatish tumour, containing a fluid. The scalp was now divided, and the cranium found in a diseased state; but a physician who also attended him over-ruled Mr Pott when he intended to perforate it. The child grew worse, and died in three days. On opening the body, a collection of matter was found below the diseased part of the bone; and about the middle of it the dura mater was discoloured and sloughy, containing about a spoonful of matter betwixt it and the pia mater.

In the third case, a labourer fell from a scaffold two stories high, by which he was stunned, but seemed well next day. Five days after, he began to complain of the usual symptoms of an oppressed brain, to which was added a sensation as if a cord was drawn tight round the encephalon; and on the right side of his forehead was a small tumour, which being opened, was found to contain a brown fluid. The bone was diseased, and a circular piece of the scalp cut out. However, as only internal remedies, such as bleeding, neutral salts, &c. were made use of, all the symptoms were aggravated. On the tenth day, the fore was pale, spongy, and glassy, and the scalp separated from the skull to some distance. This day a piece of the bone was removed, and the dura mater under it found smeared with matter. Next day he was worse in every respect; upon which a larger piece of the bone was removed, and a considerable quantity of matter

discharged. The next day, finding his pulse still high and full, ten ounces of blood were drawn off, and a glyster injected. The loss of blood produced a swooning, which lasted some minutes, after which he said he thought his head was easier. As the evening approached, the symptoms returned, and therefore some leeches were applied to his temples. That night, for the first time, he got a little quiet sleep, and in the morning of the 12th day he said that his head was perfectly easy: a very large discharge had been made through the perforation in the cranium, and the wound in the scalp had rather a better aspect. He was kept strictly to a low regimen; took at first the sal absinthii mixture freely: when his pain had left him, his physician ordered him the bark; and in a very few days every bad symptom left him.

The fourth case was a lad of about twelve years of age, who was struck senseless by the blow of a bat on his forehead, as he stood beside a man playing at cricket. A considerable swelling arose on the part: he was treated with bleeding, purging, and the antiphlogistic regimen; and at the end of nine days was discharged as well. In five days after, 14 from the accident, he returned with complaints of an oppressed brain. The symptoms continued to increase, notwithstanding all that could be done, till the 20th, when the forehead which had formerly been swelled and subsided, beginning again to look tumid and puffy, the integuments were divided; the pericranium was found to have quitted its adhesion for more than the breadth of a crown piece, and between it and the bone was a small quantity of thin discoloured fluid. The trephine being applied, a large discharge of matter continued for a week; and the boy again got well.

The sixth case terminated fatally, though the trephine was applied on the tenth day. The patient was a woman, a seller of greens; who, in a quarrel with her husband, had been struck over the head with a moppick. The blow neither fetched blood nor brought her to the ground; and she continued, notwithstanding an irregular life, for a week, without any complaint: she was then taken with the usual symptoms; and, two days after, the operation was performed on one side of the sagittal suture, and close to it. The dura mater was altered from its natural colour, and smeared over with matter. All the symptoms were now aggravated, and a violent erysipelas came on; upon which the trephine was applied on the other side the suture, and the same kind of appearance found as before. The symptoms continued without any abatement; and a third opening being made near to the first, vent was thereby given to so large a quantity of matter, that Mr Pott was convinced the event must be fatal. Accordingly the patient died on the 16th day; and upon opening the head, the dura mater was found covered with matter, under the whole internal surface of both parietal bones; but the firm adhesion of the longitudinal sinus to the sagittal suture had prevented all communication between the two collections of matter.

Of seven cases of contusion with one or more wounds, 156 mentioned by the same author, four died, notwithstanding the operation being performed; the collections of matter being so large, or so situated, that it was impossible to give vent to it by art. One of these

Theory.

cases was remarkable, as it shows the difference between symptoms arising from an injury done to the brain at the time the contusion is received, and that which spontaneously follows the inflammation of the dura mater: we shall therefore give it in Mr Pott's own words.

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A remarkable one.

"A fireman who was at work on the top of an house, fell in with the roof of it; he was taken out senseless, and brought in that state to the hospital.

"He had on different parts of his body several wounds and bruises, but none of them seemed to be of any great consequence. On his head were four, one of some size, on the upper part of the frontal bone, near to the coronal suture; two on the left parietal; one on the right side of his head, just above his ear; and a small bruise on the upper part of the os occipitis. Of all these wounds, the pericranium was divided in one only, viz. that near the coronal suture.

"His wounds were dressed, he was largely bled, a glyster was thrown up, and a purging mixture was ordered to be used *coelebratim*, until he should have a discharge *per anum*. The next day he was in the same state, perfectly senseless, had the apoplectic stertor, a full labouring interrupted pulse, and some difficulty of respiration. He had four or five large stools; wherefore his mixture was discontinued, but sixteen ounces more of blood were drawn from one of the jugular veins; which evacuation was repeated again in the evening of the same day, to the quantity of eight more. On the third day, being still perfectly stupid, discharging both urine and fæces involuntarily, and having still a full labouring pulse, both the temporal arteries were opened, and fourteen ounces drawn from thence. On the fourth, finding no alteration, and being satisfied that the man's state could hardly be made worse, I determined to perforate the cranium; and accordingly let a large trephine on the upper part of the frontal bone, where the pericranium had been divided. The dura mater was found to be thinly covered with grumous blood, some of which I removed, and thereby made way for the discharge of more. The next day (the fifth), finding that what discharge had been made during the night was bloody, and that the man was in no respect altered for the better, I thought I had sufficient authority for repeating the operation; which I accordingly did, close by and below the former; and as the blow by which the wound had been inflicted seemed to have been almost exactly on the top of his head, I made a third opening in the parietal bone, close to the suture. The appearance under all was the same as under the first, viz. a thin layer of grumous, or rather coagulated, blood.

"Next day (the sixth), toward the evening, the man opened his eyes; and on the seventh, in the morning, he spoke. The discharge of blood continued for several days, and at the end of about a week from this time ceased; the dura mater and the wounded scalp wearing as good an aspect as could be wished, and the patient being easy and rational.

"On the 18th day, he complained of pain all over the head; was sick, reached to vomit, and said that he was faint and chilly. On the 19th, his face was flushed, his skin hot, his pulse quick and hard. He was let blood, and ordered to have a glyster, and

to take some medicines of the febrifuge kind. A day or two more passed in this manner, his fever not violent, but rather increasing than remitting; his pain, though not acute, yet such as to deprive him of his sleep; little rigors occurring irregularly, no perspiration, and an excessive languor. At last, on the 21st day, on the upper part of the os occipitis, on the right side, where there had been a small bruise, a tumour arose, so characterized as to satisfy me that the cause of the late alteration of circumstances lay underneath it: it did not rise to any height, and contained a small quantity of sanies, but covered a portion of bone which the pericranium had quitted. I removed the scalp, and would have felt on a trephine; but the man obstinately refused to submit to it.

"On the 25th day he lost the use of his left leg and arm, and was much convulsed in those of his right side; which paralysis and spasm continued until the 27th, and on the 28th he died.

"Upon examining his head, a collection of matter was found under the bare part of the occipital bone; the dura mater under this matter was sloughy and putrid; and about a desert-spoonful of matter lay between the meninges, just under the altered part of the dura mater. In the part where the bloody extravasation had been, every thing was perfectly fair and free from disease.

"In this case, there seems to have been as clear a distinction between the bloody extravasation, with its effects, and the inflammatory state of the dura mater, with its consequences, as can be desired. All the first symptoms were such as were caused by mere pressure of the extravasated blood; an obliteration of every sensible faculty, attended with the principal symptoms of an interrupted circulation. Perforation of the skull, where this extravasation had been made, did, by giving discharge to the blood, happily remove these; and the man was getting well apace, until the ills arising from another cause, viz. the inflammatory secession of the dura mater in consequence of contusion, and that in another place, began to appear: they indeed made their attack rather late, nor did they rise so high as they most frequently do; but then it must be considered what discipline the poor man had undergone, and what evacuation had been made. Notwithstanding which, they bore their true, genuine, febrile, inflammatory character, and produced their most frequent event. What perforation of the os occipitale might have done, I cannot say; I fear but little, as the matter was not only upon but underneath the dura mater, and that too diseased."

Of the caries of the cranium, mentioned n^o 129. ¹⁵⁸four Cases of a caries of the cranium. examples are brought; of which only one terminated fatally, at least from the apparent injury done to the brain; although another died of a peripneumony, after every thing seemed to be in a fair way. In this last the trephine was applied upon the carious part of the bone; but in the other three it separated spontaneously.

Twelve cases are related by our author of fissures and fractures of the cranium without any depression, and of these six recovered, and as many died. ¹⁵⁹Of fissures and fractures without depression. The symptoms were generally the same as in contusions without fractures. In one case, indeed, where a girl of 16 had got a violent blow on the head with an iron poker, she had a large wound on the top of her head,

head, with a considerable fracture on the sagittal future. The broken pieces were so large and so loose that they were removed without any perforation, by which the longitudinal sinus was left bare for at least two inches in length; but no hæmorrhage followed from the removal of the fragments.—For three days she was bled twice a-day from one part or other, and stools were procured: but all to no purpose; she still remained quite insensible. On the fifth day an opening was made with a lancet into the longitudinal sinus, and the blood suffered to run off, until her countenance, which had been much flushed, became pale; her pulse, which till then had been full and strong, faltered considerably, and she showed all the marks of a deliquium from inanition. A bit of lint was then put on the orifice, and the nurse was ordered to keep her finger on it, till Mr Pott had visited the other patients in the house. On his return, the part showed no disposition to bleed again, nor did it ever after. That afternoon she opened her eyes, and moved her arms, and the next morning was sensible enough to ask for drink. She retained her senses for some days: but a fever coming on, she became delirious and convulsed; and thus died on the 17th day. On opening the head, a considerable abscess was found on the surface of the brain, on one side of the falciform process of the dura mater.

In another case, though the skull was fractured, none of the bad symptoms appeared till five weeks after the accident. The patient was a lad of about 22, who had fallen from a high scaffold. In his head he had suffered no apparent injury; but the radius of the right arm, the tibia and fibula of the left leg, together with one or two of the ribs, were broken. In five weeks he was permitted to get out of bed; but the first day of his rising he complained of being sick and giddy, which was imputed to weakness and confinement, and therefore disregarded. For three or four days he complained of continual pain in his head, got no sleep, and was constantly feverish. As no injury in the head was suspected, nothing was prescribed but the common antiphlogistic regimen. At the end of the sixth week he complained that his head was painful to the touch; and the day after he made this complaint, had a rigor which lasted half an hour. At last a swelling, which evidently contained a fluid, appeared on the side of the head; and upon opening it, a fracture of the parietal bone, at least three inches long, was found, through which matter issued freely. The trephine was applied, a large quantity of matter discharged, and the dura mater was found sloughy. Under this sloughy part was another collection of matter between the membranes, and below this the brain was considerably discoloured. The patient died on the 50th day after the accident.

In two cases in which the skull was fractured, the patients recovered without the least bad symptom from first to last; and though the operation was performed, Mr Pott is of opinion that they would have recovered without it: however, such cases are but rare; and it is by no means prudent to delay the operation, though no threatening symptoms occur even for a very considerable time.

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Of fractures with depression. When fractures are attended with a depression of the bone, they are attended with all the danger of the

foregoing classes; with this addition, that the depression is attended with some urgent symptoms, which yet may generally be removed by elevating the depressed parts: yet this ought not to prevent every possible method being used for avoiding the others which appear afterwards, and which are not the less sure on account of the cranium being fractured and depressed. The generality of writers have contented themselves with directing us to raise up the depressed parts, and thereby to endeavour to remove such symptoms as are caused by the mere pressure which the bone makes on the brain: but they have either totally neglected, or very slightly passed over, what is of full as much consequence to the patient; we mean the injury which is most frequently done to the membranes of the brain, and which, if neglected, will certainly produce that fever and those symptoms which so often baffle the whole power of medicine.

The combination of different ill effects, proceeding from the same primary violence, and concurring in the same subject, together with the great difficulty of distinguishing them from each other, is one of the principal causes of that perplexing uncertainty attending wounds of the head. When one cause of bad symptoms has been removed, another, or even several others, may still remain, each of which singly may be sufficient to destroy the patient: and therefore, although the means first made use of may have been such as have been pointed out by the earliest and most alarming symptoms, and extremely proper for the relief of such complaint, had it been the only one the patient laboured under; yet, in the case of a complication, by not being sufficient to answer every requisite intention, they very often answer none, at least not effectually; and, producing only a temporary and partial relief, prove a greater aggravation of our disappointment.

This every practitioner should know, and this the friends of every patient should be made acquainted with; lest the former, being deceived by an appearance of amendment, be induced to promise what it will not be in his power to perform; and the latter, having had their hopes exalted, should be the more severely hurt by their disappointment.

If the fracture be but small, the depression little, and the force with which it was produced not great, the elevator introduced through the perforation may be sufficient to set it to rights; and, if there be no urgent symptoms, nor any mischief done to the internal parts, may be sufficient for all purposes. But if the force was great, if the symptoms are immediate pressed or pressing, if the fracture runs in a form inclined to a circular one, or if the depressed piece be cracked all round, the best and safest way is to remove the whole or greater part of the portion so depressed and ved. circumscribed.

To those who are unused to things of this sort, so large an opening as such method of acting must make will have a very tremendous appearance; and they may be inclined to suspect much hazard and inconvenience from laying bare so large a portion of the dura mater: but let all such remember, that however large the quantity of membrane may be which shall be thus denuded by the operation, yet the same quantity at least, most probably a much larger, would in all like-

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Directions
given by
chirurgical
writers
generally
insufficient.

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Uncertain
prognosis
in wounds
of the head.

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The de-
pression
cracked
bone must
often be to-
tally remo-

Theory.

Theory.

likelihood become inflamed, and generate matter on its surface; which matter, for want of a timely, ready, and sufficient outlet, would do considerably more mischief than the mere detection of the said membrane can do.

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Why the broken pieces of the cranium are to be removed.

In cases where the broken pieces of a depressed fracture are widely separated from each other, and some of them a good deal loosened, the expediency and the propriety of removing such pieces is acknowledged by every body; but few people attend to the reason, or inquire why such practice is just and proper; if they did, they would also see, that the free removal of bone was equally proper in the case of great violence, as in that of loosened or widely separated pieces. In the latter, the broken parts are removed, because their re-union with the rest of the cranium, and the preservation of the attachment of the dura mater to the inner surface of them, is thought impossible, or at least highly improbable; and that therefore they must be in the way, and hinder the free discharge of matter from the suppurating membrane. And is not the same inconvenience full as likely to attend the former? Is it the violence done to the bone, and through it to the membrane, which causes the inflammation and suppuration? or is it the loosened or separated state of the broken part? If it be the former, (as it most undoubtedly must be), the same precautions, the same method of treatment, must be equally necessary in the one as the other; the reasons, the intentions, are the same in each; and if the conduct be not the same, the patient will suffer.

The peculiar circumstances of each individual case must furnish direction to the practitioner for his particular conduct. Rules to be laid down by a writer on such subject can be only general. The parts which are depressed must be elevated; such as are loose and cannot be brought to lie even, such as cannot be prevented from pressing on the membrane, or such as wound or irritate it, must at all events be taken away; the free discharge of blood or lymph in present, and of matter in future, must be provided for; and therefore every symptom and appearance must carefully and early be attended to, lest the most proper opportunity of giving assistance be not embraced.

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Cases of fractures with depression.

Of four cases related by our author of fractures with depression, two recovered, and two died. The first, who was a girl of about 15, being tossed by an ox, and falling with her head against the bones, got a fracture with considerable depression. It traversed the os parietale from before backward, in its middle part between the sigmoid and temporal sutures, and the depression was on the upper part of the bone. The whole was reduced to a perfect equality, the bone being trephined on the inferior and undepressed part. Her head was dressed lightly, and about 16 ounces of blood taken from her. She passed the following night very unequally, and the next morning was still insensible. She was again freely bled, and a purge was given, which soon operated. On the third day she was bled again, on the fourth she became sensible, and on the fifth was surprisingly well: but on the ninth she began again to complain of headach, sickness, and giddiness; and, notwithstanding all the internal remedies which could be used, growing constantly worse, she died in 20 days from the time of the accident. All the internal surface of the os pa-

rietale above the fracture was detached from the dura mater, and covered with matter, which could not be discharged at the perforation, the membrane being inflamed and thrust tight up against it. On this case Mr Pott remarks, that though he will not pretend to assert that repeated perforations of the upper part of the bone would have preserved her; yet it would have been her best, if not her only chance; and that if he had at that time known as much as afterwards, he should certainly have taken away the greatest part, if not the whole, of what had been depressed.

We have already observed, that the very worst symptoms, nay, even death itself, may frequently proceed from an extravasation of the fluids within the cavity of the cranium, or from a concussion of the brain itself.—Extravasations of any kind, and wherever situated, within the cranium, are very hazardous, and much more frequently end fatally than happily: but, considered as relative to the art of surgery, that which consists of merely fluid blood situated between the cranium and dura mater is certainly the best, as it is the nearest to the surface, and admits the greatest probability of being relieved by perforation of the skull; grumous or coagulated blood, although in the same situation, by being most frequently adherent to the membrane, is not so readily discharged as the preceding, and therefore more likely to prove destructive; and all those which are either under the meninges, or within the cavities or substance of the brain, as they are very seldom within our exact knowledge, so they are also generally beyond the reach of our art.

The method of treating people under these unhappy circumstances is somewhat different, according to the supposed or most probable nature of the complaint, and according to the symptoms and appearances which it produces or which accompany it. When the symptoms which imply a pressure made on the brain or nerves have been occasioned merely by a shake or concussion, and neither blow nor other external violence has been offered to or received by the head, we have no rule whereby to form any other than a general opinion; no mark which can point out to us either the precise nature of the disease, or its particular situation; consequently we have no direction from what part of the head to remove the scalp, or where to apply a perforating instrument, and therefore no authority for perforating at all. In this case, the only chance of relief is from phlebotomy and an open belly; by which we may hope to lessen the quantity of the circulating fluids as to assist nature in the dissipation or absorption of what has been extravasated. This is an effect which, although not highly improbable in itself, yet is not to be expected from a slight or trifling application of the means proposed. The use of them must be proportioned to the hazard of the case. Blood must be drawn off freely and repeatedly, and from different veins; the belly must be kept constantly open, the body quiet, and the strictest regularity of general regimen must be rigidly observed. By these means, very alarming symptoms have now and then been removed, and people in seemingly very hazardous circumstances have been recovered. Instances of these successes are not indeed so frequent as we could wish; but they have been sufficiently so to warrant the attempt, especially in cases where there are no indications to authorise the use of any other. But when

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Of extravasations within the cranium.

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Method of treating people under symptoms of extravasation.

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the symptoms of extravasation are the consequence of such external violence as leaves a mark where it was inflicted, and when the scalp is so bruised or wounded as to show the place where, we then have some degree of assistance, both in forming a judgment of the most probable nature of the complaint, and in using the means most likely to prove successful in its relief. For if the effusion has been the consequence of the stroke which the head has received, and such effusion is made immediately under the part so stricken, the perforation of the cranium in this place may give discharge to the extravasated fluid; and the wound or bruise in the scalp shows us the point from whence we ought to remove a portion of it, in order to perforate the cranium. This is sometimes the case; and the consequence is sometimes so fortunate, that we save a perishing patient. But although it does now and then happen that we are so lucky, yet such success is by no means certain or to be depended upon. Every thing relative to this kind of disorder is fallible and uncertain; and though the extravasation is sometimes found immediately under the external mark, yet it often happens that it is not, and that the effusion is made in a part distant from that mark, and to which we have nothing to lead us. Upon the whole, although a bruise or wound of the scalp does not in these cases necessarily or certainly point out the seat of an extravasation; yet when bad symptoms urge, and evacuation hath been fully and unsuccessfully tried, such mark may be deemed a sufficient, though not unerring, authority for making farther inquiry, by removing the scalp and perforating the cranium: for this is a kind of case in which we are not to expect certainty, and in which we must be content with such information as we can obtain. The opportunities which we have of being serviceable are but few; we should therefore suffer none to escape, but embrace every possibility. The general advice given by Fabricius ab Aquapendente is applicable to no part of surgery more than to this; in which the loss of a very short space of time is often absolutely irretrievable.

If the extravasation be of blood, and that blood be in a fluid state, small in quantity, and lying between the skull and dura mater, immediately under or near to the place perforated, it may happily be all discharged by such perforation, and the patient's life may thereby be saved; of which many instances are producible. But if the event does not prove so fortunate, if the extravasation be so large or so situated that the operation proves insufficient, yet the symptoms having been urgent, general evacuation having been used ineffectually, and a wound or bruise of the scalp having pointed out the part which most probably received the blow; although the removal of that part of the scalp should not detect any injury done to the bone, yet the symptoms still subsiding, we cannot help thinking, that perforation of the cranium is in these circumstances so fully warranted, that the omission of it may truly be called a neglect of having done that which might have proved serviceable, and, *rebus sic stantibus*, can do no harm. It is very true, that no man can beforehand tell whether such operation will prove beneficial or not, because he cannot know the precise nature, degree, or situation of the mischief; but this uncer-

tainty, properly considered, is so far from being a dissuasive from the attempt, that it is generally a strong incitement to make it; it being full as impossible to know that the extravasated fluid does not lie between the skull and dura mater, and that under the part stricken, as that it does; and if the latter should be the case, and the operation be not performed, one, and most probably the only, means of relief, will have been omitted.

Of concussions and extravasations Mr Pott relates ^{Cases of} eight instances; six of whom died, and two recovered. ^{concussion and extra-} The first was a young man who fell from a window-^{vasation.} two stories high, and pitched his head upon a sugar hoghead. He was taken up insensible, and continued so for five days; at the end of which he died, notwithstanding he had been very largely bled. No external mark of violence was observed on the head; the cranium was nowhere injured; the dura mater was every where adherent, and no fluid of any kind betwixt it and the skull. Between the dura and pia mater was a considerable quantity of blood, principally towards the lower part of the brain.

The second case was very similar; the patient expired on the third day, without having shown any signs of sense. All the space between the frontal bone and the dura mater was covered with grumous blood, firmly adherent to the membrane.—In the third, a small tumour appeared on the right side of the head, which thus indicated the seat of the mischief; and, by perforating the skull, a large quantity of blood was discharged between the dura mater and the skull; after which the patient recovered. The fourth was much the same; a tumour appeared on the right side near the sagittal suture; which indicated the application of the trephine. Thus a considerable quantity of blood was discharged, and the patient soon recovered.—The fourth case was remarkable, as showing us how very small contusions of the head will sometimes do irreparable mischief. A boy between three and four years of age, when at play with his brother, fell from a bed on a soft carpet. He pitched on his head, and immediately complained of being sick and giddy; but having vomited, was soon after so well, that no farther notice was taken of his fall. On the fourth day after this, he again became sick and giddy. The physician who prescribed for him gave him an emetic, and some of those medicines called *nervous*; however, his sickness and giddiness now and then returned, with a great aversion at motion of any kind. On the 11th day he lost his sight; on the 13th the use of his right arm; on the 15th he could not stand; and on the 18th he died. A considerable quantity of bloody serum was lodged between the dura and pia mater about the basis of the brain.—In the fifth case, the patient continued 12 days without any general complaint; but on the 13th became giddy and dim-sighted, and soon after died. The ventricles of the brain were full of extravasated serum, and near the origin of the medulla oblongata was a lump of firmly coagulated blood.—The seventh and eighth cases were not materially different: the patients both died comatose; and extravasations of blood, serum, or lymph, were found in both.

When the brain itself is wounded, the treatment ¹⁶⁹ Of wounds can only be to remove all such parts of the broken in the brain. Skull as may continue to injure the brain or its mem-^{branes.} branes.

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branes; to take away all such extraneous bodies as can easily be got at and extracted without violence; and to make such openings in the cranium as may best serve for the discharge of extravasated fluids, either immediately or at any future period. When fungi of the brain protrude, it is usual to tie a thread round their neck, upon which they drop off spontaneously.

In contusions of the head, whether attended with fractures or not, Mr Bromfield recommends the use of opium; and insinuates, that most of those patients die who are treated only with evacuations and the antiphlogistic regimen. The medicine he recommends is Dovar's powder; and the effect expected from it is a diaphoresis. For this the warm bath is in general a good preparative, as it promotes perspiration: and should the patient be relieved, the diaphoresis is to be kept up by medicines of a similar kind; such as vinum antimoniale with the tinctura thebaica. Thus he tells us, that every symptom of concussion of the brain has in general gone off on a plentiful sweat being produced by the powder. The medicine was generally continued as the symptoms required, till the patient seemed out of danger; and where they returned again, the medicine was repeated, and the patient did well. In support of this practice, he gives the following instances.

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Examples
in support
of the prac-
tice.

"A gentleman received a violent blow on the top of his head from a large weight falling on it, which fractured his skull and depressed it. I attended at the operation, when every possibility of future pressure on the brain from the fractured bone was entirely prevented by the removal of the depressed pieces. He took Dovar's sweating powder, which, he said, always relieved him when it began to operate. He had stools as often as was thought necessary, and was bled very freely before I saw him. As the wound did not begin to digest kindly at the usual period, in the intermediate time between the sweats, he took the sal abstin- this neutralized with succ. limonium, and a decoction of the bark. About the fifth day he grew comatose; and the gentleman whose patient he was seemed to wish he had been bled again. I desired him to recollect how constantly we consulted the pulse when we met; and that he had always told me, that in my absence he was never induced to bleed him from fulness; and from the quiet state of his pulse whenever we met, we judged it unnecessary. This he allowed; but as the coma was great, I consented to his losing some blood from the jugular vein, which did not make his pulse flag, nor was he relieved by the bleeding. When I saw him the next day, being the sixth from the accident, he was dying. I did not see the patient after he died; but conclude, that the brain had suffered so much from the violence of the blow, that let what method soever have been followed, the event in this case would have been the same.

"John King, aged 35 years, having fallen from a scaffold, was brought to St George's hospital on the 8th of May 1771, quite senseless. He had received by the fall two large wounds; one on the anterior, the other on the posterior part of his head, and his back was violently bruised: he had bled a little at his nose. Immediately after his admission into the hospital he was let blood; and from the administration of a clyster had two stools, and took a scruple of Dovar's sweating powder. On the ninth he was more sensible,

and complained of great giddiness, with pain in his forehead and back. He was then ordered to take 10 drops of the tinctura anodyna antimonialis once in four or six hours, as the effect might indicate; a somentation was applied to his back, a stool procured in the evening by a clyster, and Dovar's powder was repeated at bed-time. On the 10th the giddiness was gone off, the pain was abated, and his head was perfectly easy; the use of the tinctura anodyna was continued, and his body kept open by a laxative mixture. On the 11th he was free from all complaints; granulations began to appear on the wound, which looked well; and the use of the drops was discontinued. He remained well till the 16th; about which time he was seized with giddiness and a sickness at his stomach. Eight ounces of blood were then taken away, and some stools procured by a purging draught. On the 19th the giddiness and sickness entirely left him. On the 21st his sickness returned, with great pain in his head: he was then directed to take a scruple of Dovar's powder at night. On the 26th all his complaints were gone. He was then ordered to take four spoonfuls of the following medicine once in four hours: Sal. abstin. ℥iij. succ. limon. ʒi. decoct. cort. Peruvian. ʒxiv. He remained without any return of his complaints, and was discharged on the 12th of June.

"Patrick Darbon, aged 26 years, was admitted into St George's hospital the 6th of July 1771, having a large wound on the fore-part of his head, and some slight bruises in different parts of his body. He had fallen from a scaffold. It was about an hour after the accident when he was brought to the hospital, where the surgeon was informed that he had continued senseless for half an hour after the fall, and had vomited twice. He had great pain in the parts that were hurt, with stupor and heaviness. Upon a careful examination of the skull, no fracture could be discovered. Some blood had been taken away before he was brought to the hospital, where a purging mixture was given him, and some stools thereby procured. He then took a scruple of Dovar's powder. He complained of great pain in his head and giddiness on the seventh, and had had but little rest. The tinctura anodyna antimonialis was given him, 10 drops of which he took once in four or six hours. He was rather easier in the evening, and the pulv. Dovar's was repeated at bed-time. On the eighth he was much better; the use of the drops was continued. On the ninth the pain in his head and giddiness were quite gone. He continued to take the drops till the 12th; about which time, he being perfectly well, no more were given. Having remained in the hospital till the 31st, without any return of his complaints, and the wound being nearly healed, he was made an out-patient by his own desire, and continued perfectly well.

"John Hyde, a boy about 14 years of age, was, on the 7th of June 1771, admitted into St George's hospital, on account of a hurt he had received on his head by falling backwards. The scalp was much swelled, but without any wound: he complained of giddiness, and vomited frequently. The surgeon made an incision into the tumified part, by which the skull was laid bare, and a fracture, of about an inch in length, discovered upon the superior part of the occipital bone. Some stools were procured as soon as it

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was possible by a purging mixture, and afterwards one scruple of Dover's powder was given. He had a pretty good night; and on the eighth the vomitings ceased, though the pain in his head and giddiness continued. He was that day directed to take 10 drops of the tinctura anodyna antimonialis once in six hours. His giddiness went off entirely in the evening; but he complained of a little pain in the fractured part. A stool was procured by a clyster, and the use of the antimonial anodyne was continued. On the ninth he was free from pain, and took the antimonial anodyne once in six hours till the 11th; during which time he was perfectly well, and afterwards was directed to take the neutral mixture, with a decoction of the Peruvian bark. This course he pursued for about a week, and on the 26th was made an out-patient. In about three weeks after this, the wound was healed, and the boy perfectly recovered."

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of gunshot
wounds.

We shall now proceed to the treatment of gunshot wounds; in which, as the body is frequently mangled in the most dreadful manner, the surgeon must exert the utmost of his skill both with regard to external and internal remedies. In those made by a musket or pistol ball, the most immediate considerations are, To extract the ball, or any other extraneous body which may have lodged in the wounded part; and to stop the hemorrhage, if there is an effusion of blood from the rupture of some considerable artery.

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of extract-
ing the
ball.

As to the first, viz. the extraction of the ball, it is frequently necessary to enlarge the wound in order to answer this purpose; and if the ball has gone quite through, both orifices are to be dilated (provided the situation of the part wounded will admit of its being done with safety); and particular care is to be taken to preserve both openings, especially that which is the most depending.

In order to get at the ball, or any other foreign matter, probing is to be used as sparingly as possible; and this must evidently appear to any one who will only consider the nature of the symptoms attendant on penetrating wounds of the breast or belly, either from a bullet or sharp instrument; the thrusting in a probe to parts under such circumstances being unavoidably a fresh stab on every repetition of such practice. In wounds of the joints, likewise, poking into them must be equally condemned, as it can never be used without very mischievous and pernicious consequences. And indeed, where probing is necessary, the finger is to be preferred as the best and truest probe, where it is practicable to do so.

If a ball, or any other foreign body, happens to be lodged near the orifice, or can be perceived by the finger to lie under the skin, though at some distance from the mouth of the wound; in the first case it is requisite immediately to remove such extraneous matter; and, on the other occasion, to cut upon it and take it out: But when it is sunk deep, and lies absolutely beyond the reach of the finger, we ought never to thrust a pair of long forceps into the wounded body, with scarce any probability of success.

To put this matter in as clear a light as possible, we will suppose a ball to be lodged in any part beyond the reach of the finger, entirely out of the way of being marked by the external touch. Now it will ap-

pear evident, upon the least reflection, that thrusting, first along probe in quest of the bullet, and then, as has been practised likewise, a longer pair of forceps, either with or without teeth, into a wound of that kind, though with a sort of certainty to extract it, must either contuse, or irritate and inflame, the parts to a great degree; and consequently do as much, or more mischief, than the ball did at first by forcing its passage such a length of way. And should they at the same time lay hold of any nerve, artery, or even common membrane of a muscle, together with the ball (which can scarce ever fail of being the case), what shocking consequences would attend such a proceeding! Nor would attempts of this sort be less injurious in case a bullet should happen to be lodged in the cavity of the belly or breast: whereas lead, it is well known, will lie a long time in several parts of the body, without any material hurt, or even inconvenience.

A great number of instances have occurred, where balls have been quietly lodged in several parts of the body, till after many years they have worked themselves a passage towards the surface, and were very easily extracted; and many where balls have been entirely left behind.

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Of dilating
the wound
&c.

In case the wound be occasioned by a musket or pistol shot, and of course but small, it will be necessary to dilate it without delay, provided the nature of the part (as was before observed) will admit of this with safety: for in wounds near a joint, or in very membranous or tendinous parts, the knife, as well as forceps, should be put under some restraint; nor should any more opening be made than what is absolutely requisite for the free discharge of the matter lodged within. Wounds in the joints are always dangerous, from whatever cause they proceed, whether from a bullet or any cutting instrument: and membranous or tendinous parts, whatever sense of feeling they may be allowed, are yet known, past dispute, to suffer much from their being thus exposed to the impressions of the air.

Whenever the wound is attended with a great effu-
sion of blood, from the rupture of some considerable
artery, it will be absolutely necessary, with all ima-
ginable dispatch, to restrain the bleeding with the
needle; and at the same time to be particularly care-
ful that your hold be not clostive. But the bleedings
from the smaller vessels, in all contused wounds, are of
real service, by unloading the clogged parts, cutting
off the main sources of customary inflammations, and
by that means either totally preventing a fever, or at
least rendering it a symptom of no threatening ten-
dency: an event on which, in an especial manner, de-
pends the future laudable digestion. As for styptic
applications, as we have already observed, there is no
trusting to any of them, where the larger arteries are
concerned. Besides, all such rather retard than pro-
mote the cure: for by obstructing the discharge of the
sanies, which in all large wounds precedes digestion,
the digestion is of course suspended, while the pent-up
sanies becomes a constant additional fuel to the fever.

Where the wounded person has not suffered any
great loss of blood, it will be advisable to open a
vein immediately, and take from the arm a good large
quantity; and to repeat bleeding as circumstances
may require, the second, and even the third day. Re-
peated.

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Bleeding
when nec-
essary.

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peated bleedings in the beginning draw after them many advantages. They prevent a good deal of pain and inflammation, lessen any feverish assaults, forward the digestion, and seldom fail to obviate impoſthumations, and a long train of complicated ſymptoms that are wont otherwiſe to interrupt the cure, miſerably harraſs the poor patient, and too often endanger his life. And even where the feveriſh ſymptoms run high, and there is almoſt a certainty that matter is forming, bleeding, in that ſtate, is very frequently of great advantage; the matter will be made the ſooner for it, and the quantity of it will be leſs. The following inſtance, ſays Mr Ranby, in ſome meaſure demonstrates the neceſſity of bleeding freely as ſoon as poſſible.

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A remarkable caſe.

"A young gentleman, a cornet of dragoons, was wounded by a muſket-bullet juſt below the knee, on the inſide. The ball had made a great laceration in the ſkin, and laid the membranes bare about four inches in length. The ſurgeon did not ſee him till two days after the injury. He was then very feveriſh, quite parched up with thirſt, and had a full pulse, with great pain, ſwelling, and inflammation all round the joint. Immediate bleeding was ordered, a cooling regimen, with proper dreſſings, an emollient clyſter, and an opiate. The next day his pain rather increaſed; wherefore he was let blood a ſecond, and after that a third time. Six days were now elapſed when a miliary eruption ſeized him, with frequent bleedings at the noſe, and a diarrhoea, which laſted about ten days. Mean while matter was formed in ſeveral places about the knee; which, on being let out, flowed in prodigious quantities. The fever declining, the bark was given him; but as that, though joined with an opiate, ran through him, it was judged neceſſary to lay it aſide. Notwithſtanding he was now very weak and low, it was thought, in a conſultation, that the only chance which remained of his ſurviving, was the cutting off his leg. The operation was accordingly performed, but without ſucceſs. Upon examining the knee, there appeared ſeveral cells full of matter communicating with the joint; which had in many places eroded the cartilages of both the great bones."

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Of the regimen of the patient in gunſhot wounds.

For the firſt twelve days it will be proper to obſerve a cooling regimen, both in reſpect of the medicines that may be preſcribed, and the diet requiſite for the ſupport of nature. It is abſolutely neceſſary, likewiſe, that the body be conſtantly kept open. Unleſs, therefore, nature does this office of herſelf, a ſtool ſhould be every day procured, either by emollient clyſters, or ſome gentle laxative taken at the mouth; and whenever there is much pain in the wounded parts, immediate recourſe muſt be had to opium.

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Of external applications

In reſpect to external applications, whatever is of a hot, ſpirtuous nature, is remarkably injurious on theſe occaſions; and what no wounded part can in any degree bear. Let the firſt dreſſing be with digeſtive, or lint moiſtened with a little oil; and a very light bandage made, if it can be readily got, with thin flannel: the next with a digeſtive warmed, and over it the bread-and-milk poultice, mixed with a ſufficient quantity of oil to keep it moiſt; and where there is great tenſion, and the wound large, a fomentation ſhould be uſed. This courſe is to be conti-

nued till the ſore is clean.

This method will commonly promote a conſtant eaſy perſpiration, abate the pain, very much facilitate the digeſtion, and remove all apprehenſions of any approaching inflammation. The advantage of moiſtening the lint with oil, is the eaſe that is procured to a contuſed wound from ſuch an application, in comparison of one of an abſorbent drying diſpoſition; which, inſtead of giving free liberty to the ſanious blood to diſcharge itſelf, and conſequently preventing an inflammation, by unloading the part, would poſſibly obſtruct the mouths of the capillary veſſels, and hinder nature from getting rid of that incumbrance which, it is obſervable, the very much affects to throw off. We muſt add here, that tents are never to be made uſe of where they can be poſſibly avoided.

Should an inflammation ſeize any part through the lodgment of a bullet, or any other foreign body, that could with ſafety have been more immediately extracted, all attempts of diſſolving ſuch extraneous matter ſhould be poſtponed till the ſwelling has in ſome meaſure ſubſided, and the inflammatory diſpoſition of the fibres is nearly vaniſhed; unleſs the ball, or other extraneous body, lie at no great diſtance from the oriſce; and there be, on that account, a certainty of removing this incumbrance without any material trouble to the patient.

"If a wound (ſays our author) be of ſuch a deſperate nature as to require amputation (which is always the caſe when it happens in any principal joint), it would certainly be of conſequence could the operation be performed on the ſpot, even in the field of battle; left, by deferring it, an inflammation, which one may very reaſonably expect, ſhould obſtruct a work that ought rarely to be entered upon during the continuance of ſo calamitous a circumſtance. The neglecting this critical juncture of taking off a limb, frequently reduces the patient to ſlow a ſtate, and ſubjects the blood and juices to ſuch an alteration, as muſt unavoidably render the ſubſequent operation, if not entirely unſucceſſful, at leaſt exceedingly dubious. And in wounds even where no amputation is required, it is equally adviſable not to defer the care neceſſary to be taken of them; left, by the parts being expoſed to the air, there might ariſe a ſeries of very dangerous ſymptoms."

"Wounds that border on any conſiderable artery, are very apt to bleed aſreſh upon motion, or the return of a free circulation of the blood into the part, which was interrupted at firſt by the violence of the injury offered it; and this is almoſt always the caſe when the ſlough begins to ſeparate. For which reaſon, one ſhould never attempt to remove it by force, but wait with patience till there be a perfect ſeparation of this ſlough; nor be in the leaſt ſhocked at the accident of arteries thus opening themſelves, which a very moderate experience will convince one to be almoſt inevitable. The patient frequently gives warning of what is coming upon him, by complaining of great weight and fulneſs in the limb, which are ever accompanied with more or leſs pulſation in it: an inſallible prognotic of the conſequences. Let the wound aſſiſt whatever part, if theſe complaints attend it, bleeding and the bark are inſtantly to be enjoined."

"I

Theory.

Theory.

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Why a person sometimes dies by losing a small quantity of blood after an amputation.

"I have known (says Mr Ranby) several instances of persons losing their lives from the starting of an artery before the surgeon could reach them; particularly where an amputation has preceded. And I dare affirm, the quantity of blood lost, especially in the case last mentioned, has not amounted to 12 ounces. I do not know how to account for this, otherwise than by the drain which had been made from the mass of blood both before and during the operation; whence a sudden gush (though but a moderate one) of blood, after the great quantity already lost, gives a check to the circulation, and causes immediate death. This reflection, I think, ought to be a lesson of instruction to every practitioner to be particularly intent on the faithful discharge of his duty in regard to tying the vessels."

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The bark extremely useful in gunshot wounds.

In all large wounds, especially those made by a cannon ball, there is constantly a great laceration of the parts endued with an exquisite sensation. These are ever attended with an excruciating pain, and a discharge of a gleet matter; which, if not restrained, proves often of the worst consequence, by reducing the patient almost to a skeleton; there being no possibility of receiving a supply of nourishment proportioned to the discharge. In this unhappy state, the bark (in doses of a dram each, and repeated every three hours, or oftener if the stomach will bear it) with surprising efficacy repairs the breach made in the constitution by this terrible havoc. In whatever form it be administered, whether in tincture, extract, or resin, we must ever have an eye to the proportion: for the prescribing it in less quantity is one reason why our expectations are often frustrated, and the medicine brought unreasonably into disrepute; the failure, in point of success, being generally owing to some irregularity in the giving of it, either by under-doing it, or not sufficiently persisting in its use. Elixir of vitriol, taken three times a-day in a glass of water, is of singular benefit, and proves a very good assistant to the virtues of the bark: and if the body be coëstive, to each dose of the bark four or five grains of rhubarb must be added, till that inconvenience be remedied. Should the bark run off by more than four or five successive stools, this effect of it will be checked by a few drops of laudanum, or two spoonfuls of the diascordium mixture along with it, every time it is given.

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And elixir of vitriol.

Where the fore discharges a considerable quantity of gleet matter, is flabby, looks pale and glossy, (which appearances are often consequent to a loss of substance), the bark continually relieves the pain that is predominant in this case, and quite changes the complexion of the wound. Nor, in administering it, is the least attention necessary to the quickness of the pulse. And in wounds where, upon every dressing, there has been an oozing from the capillary arteries, like water squeezed from a sponge, subjecting, of course, the patient to no little hazard, the bark, by thickening the matter and lessening its quantity, procures the most surprising good effects.

186
Mr O'Halloran's opinion of gunshot wounds.

On the subject of gunshot wounds Mr O'Halloran observes, that of all the symptoms which attend external accidents, none is more dreaded than inflammation and fever; to guard against which, profuse bleedings, antiphlogistics, diluting liquors, and low diet, are strongly recommended. Yet, necessary as

these means are, we may go to too great excess in them. Inflammation is the natural consequence of every wound, and is absolutely necessary for bringing about the process of healing. The more violent the hurt, the greater is its concomitant inflammation. The latter therefore, so far from being an object of terror, is greatly to be wished for: its absence is always a bad sign; and where it is but flow, the act of reunion or healing is very distant. If, then, a slight inflammation is absolutely necessary to bring a trivial hurt to heal, it must of consequence follow, that a more violent one is requisite to promote a reunion of parts after a more desperate accident. Inflammation therefore should not be hastily repressed: it is a true concomitant on all all hurts; and its excess or absence are the only symptoms of this class against which we should guard.

SECT. III. Of Fractures and Dislocations.

This is one of those parts of surgery which is generally thought to be well understood, and the treatment of broken bones to be very easily learned. Hence we find it practised by those who do not attempt the practice of other parts of the science; yet, notwithstanding these pretensions, it is certain that much attention and care is necessary in reducing fractured and luxated bones, in order to prevent a deformity in the limb, or perhaps worse consequences. The general doctrine of fractures is contained under the following heads, as part of the treatment of them. Extension; counter-extension; coaptation or setting; application of medicaments; deligation or bandage; position; prevention or relief of accidents.

This is the general arrangement of the subject by most of the writers on it, and a very just and proper one it is; but, notwithstanding the parade of books under these various heads, much less alteration will be met with, since the times of Hippocrates, Galen and Celsus, than an inquirer might expect, or than the subject is capable of.

The first article in the general arrangement is extension; under which may also be comprehended the second, or counter-extension. In order to accomplish this, we are directed, if the fracture be of the thigh or leg, to place the patient in a supine posture, and the broken limb in a straight one; than having the upper part of it held firm and steady by proper assistants, we are ordered, by means of hands, ligatures, laces, or even in some cases by pieces of machinery, to make such an extension or stretching of the limb lengthwise as shall enable the surgeon to place the ends of the broken bone in as apt, that is, in as even a position, with regard to each other, as the nature of the fracture will admit.—This is a short description of what in the vulgar phrase is called *setting a broken bone*; and is most commonly a painful operation to the patient, a fatiguing one to the operator and his assistants, and, what is worse, is in many instances found to be inefficacious, at least not fully to answer the intention of the one or the expectation of the other.

Writers in general are very precise and formal in the directions which they have given for the due and proper accomplishment of this purpose. They have told us, that the extension should be made slowly and gradually, and should be continued till the ends of the bone

Theory.

bone are separated from each other sufficiently, to admit of the fracture being set without risk of breaking off any points or inequalities, and to enable us to place them perfectly smooth and even. All this, like many other of the preceptive parts of physic and surgery, is very pretty on paper, but not often found to be practicable in the chamber. The directions to continue the extension until the ends of the bones are at a certain distance, lengthwise from each other, plainly implies a considerable degree of violence; the limb must by such force be not only made longer than its fellow, or than nature ever intended it should be; but it is ordered to be executed while the limb is in such position as to put all the muscles most on the stretch, and render them least likely to yield to it.

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When extension is necessary.

In order to understand the dangers of this method rightly, let us for a moment consider what is or ought to be meant by the terms *extension* and *counter-extension*, and why they become necessary: and here it is plain that neither of them can ever be necessary on account of the mere fracture considered abstractedly. The broken ends of the bone or bones are of themselves inactive; and if not acted upon by other parts, they would always remain motionless. When any attempt is made to put them into motion, they of themselves can make no possible resistance, nor can any be made on their part, save an accidental one, arising from the points of the fracture being entangled with each other; and when they have been once, by the hand of the surgeon, placed properly and evenly with regard to each other, they would of themselves for ever remain so. What then is the reason why fractured bones always suffer a greater or a less degree of displacement? why is a broken limb almost always shorter than its fellow? what creates the resistance which we always find in attempting to bring the fractured parts aptly together? whence does it proceed, that when we have done all that is in our power (according to this mode of acting), the ends of the fracture will, in many cases, become again displaced, and lameness and deformity frequently ensue? In short, what are the parts or powers which act on the bones, and which, by so acting on them, produce all these consequences?

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The action of the muscles the only obstacles to the reduction of a fracture.

These parts are the muscles, the only moving powers in an animal-body. By the action of these on the bones, all locomotion is performed, and cannot be performed without them: and although all bones, when broken, are in some degree displaced and shortened; yet it will always be found, that in proportion as the muscles surrounding or in connection with a bone are strong or numerous, or put into action by inadvertence or spasm, so will the displacement of the ends of such bone, when fractured, be. The even and smooth position of the fractured ends of a tibia, when the fibula of the same leg is entire and unhurt, that is, when the muscles therefore cannot act upon the former; the visible and immediate deformity when both the before-mentioned bones are broken nearly in the same place, that is, when the muscles can act upon and displace such fracture; the great difficulty frequently met with in endeavouring to get a broken os femoris to lie even tolerably smooth, and to prevent such broken limbs from being much shorter than the others; are, among others which might be produced, such strong and irrefragable proofs as need no comment.

Theory.

From the muscles then, and from them only, proceeds all the difficulty which we meet with in making our extension; and by the resistance of these, and of these only, are we prevented from being always able to put the ends of a fractured bone immediately into the most apt contact.

Let us in the next place consider what it is which gives to a muscle, or to the principal muscles of a limb, the greatest power of resisting any force applied to them *ab externis*, in order to draw them out into greater length; for, whatever that is, the same thing will be found to be the cause of the different degrees of resistance in setting a fracture.

Does not the putting the muscles in a state of tension, or into a state approaching nearly to that of tension, almost necessarily produce this effect? or, in other words, does not that position of a limb which before we put its muscles into, or nearly into, such a state, give such muscles an opportunity of exerting their greatest power either of action or of resistance? This cannot be denied. On the other hand, what is the state or position of a muscle which is most likely to prevent it from acting, and to deprive it most of its power of resistance? or what is that position of a limb, which in the case of a broken bone will most incapacitate the muscles from acting on and displacing it, and in the greatest degree remove that resistance which they have it in their power to make to the attempts for the reduction of such fracture? Is it not obvious, that putting a limb into such position as shall relax the whole set of muscles belonging to or in connection with the broken bone, must best answer such purpose? Nothing surely can be more evident. If this be granted, will it not follow, that such posture of a broken limb must be the best for making the reduction? that is, it must be that in which the muscles will resist the least, and be least likely to be injured; that in which the broken bone will be most easily set, the patient suffer least pain in present; and that from which future lameness and deformity will be least likely to happen. A little attention to what frequently occurs, may perhaps serve to illustrate and confirm this doctrine better than mere assertion.

What is the reason why no man, however superficially acquainted with his art, ever finds much trouble easy to set in setting a fractured os humeri, and that with very a fractured os humeri. little pain, and a very small degree of extension? Is it not because both patient and surgeon concur in putting the arm into a state of flexion, that is, into such a state as relaxes all the muscles surrounding the broken bone? and is it not for the same reason that we so very seldom see (comparatively speaking of this bone with others) a deformity in consequence of a fracture of it? Let the reduction be attempted with the arm extended from the body, and the difficulty of setting will be much increased: let the arm be deposited in an extended straight position, and the fracture will be displaced, and lie uneven.

Apply the same kind of reasoning to the os femoris; and diff- that bone whose fracture so often lames the patient, cult to set and disgraces the surgeon. Will it not be more co- the os femoris. gent, and more conclusive, in proportion as the muscles in connection with this bone are more numerous and stronger? Let any man, who has been much conversant with accidents of this kind, be asked, what is the posture

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Hence the muscles ought to be relaxed attempt the reduction.

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Why it is so easy to set a fractured os humeri.

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And difficult to set the os femoris.

Theory.

Theory.

posture which almost every person whose os femoris has been newly broken puts himself into, in order to obtain ease, until he gets proper assistance? Such people almost always bend their knee, and lay the broken thigh on its outside, because this is the most easy posture, for obvious reasons.

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When the reduction of a fracture ought not to be attempted.

It is a maxim universally taught and received, that a fractured limb may be in such state as not to admit of the extension necessary for its being set: that is, if assistance be not at hand when the accident happens; if they who bring the patient home do it so awkwardly or rudely as to bruise and hurt the part; if from drunkenness, folly, or obstinacy in the patient, it happens that the limb is so disordered that it is found to be much swollen, inflamed, and painful; it is allowed not to be in a state to admit extension.

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Erroneous doctrine concerning fractures.

This maxim is indeed founded upon very just principles; but what is the general practice in consequence of it? It is, to place the limb in an extended straight position; to secure it in that; and then by proper means, such as fomentation, poultice, &c. to endeavour to remove the tension and tumor. Now if it be considered that the swollen, indurated, and inflamed state of the muscles is the circumstance which renders extension improper, surely it must be obvious, that such position of the limb as necessarily puts these very muscles in some degree on the stretch, must be a very improper one for the accomplishment of what ought to be aimed at. Under this method of treatment, the space of time which passes in the removal of the tension is sometimes so considerable, that a happy and even coaptation becomes afterwards impracticable; and then this accident, which nine times in ten is capable of immediate relief, is urged as an excuse for unnecessary lameness and deformity.

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Of the posture of the limb during extension.

Here the nature of the complaint points out the relief. Extension is wrong; a straight position of the thigh or leg is a degree of extension, and a still greater degree of it in proportion as the muscles are in such circumstances as to be less capable of bearing it. Change of posture, then, must be the remedy; or rather the placing the limb in such a manner as to relax all its muscles, must be the most obvious and certain method of relieving all the ills arising from a tense state of them: which change of posture will be attended with another circumstance of very great consequence; which is, that the bones may in such posture be immediately set, and not one moment's time be thereby lost: a circumstance of great advantage, indeed; for, whatever may be the popular or prevailing opinion, it is demonstrably true, that a broken bone cannot be too soon put to rights; as must appear to every one who will for a moment consider the necessary state of the muscles, tendons, and membranes surrounding, and the medullary organs contained within a large bone broken and unset; that is, lying in an uneven irregular manner. In short, if the experiment of change of posture be fairly and properly made, the objections to immediate reduction, from tension, tumour, &c. will most frequently be found to be groundless, and the fracture will be capable of being put to rights, as well at first as at any distance of time afterwards.

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Reduction ought to be performed as soon as possible.

Extension having been made, and the broken ends of the bone having been placed as smooth and as even

as the nature of the case will admit, the next circumstance to be attended to is the application of some medicament to the limb; particularly to the fractured part of it. In this, different people act differently. Some make use of an adhesive, or what they choose to call a *robortant, plaster*; some, of what is commonly called a *cerecloth*; others apply spirit of wine, with oil, vinegar, and white of egg; and others the *spiritus Mindereri*, the solution of crude sal ammoniac in vinegar and water, or some such kind of medicine. But let the form and composition of the application made to the limb be what it may, one thing is clear, viz. that it should be put on in such manner as that it may be renewed and shifted as often as may be necessary, without moving the limb in any manner; it being certain, that when once a broken thigh or leg has been properly put to rights, and has been deposited properly on the pillow, it ought not never to be lifted up nor moved from it again without necessity, until the fracture is perfectly united; and it is as true, that such necessity will not very often occur. This may perhaps seem strange to those who are accustomed to roll simple fractures, and consequently to lift them up every three or four days in order to renew such kind of bandage; but the necessity of this motion arises merely from the kind of bandage made use of, and not from any circumstance of the fracture itself. That the frequent motion of a fractured limb cannot possibly contribute to the ease of the patient, will be readily admitted; as also it will, that when a broken limb has been once deposited in the best position possible, it is impossible to mend that position merely by taking such limb up and laying it down again: from whence it must follow, that such kind of apparatus as necessitates the surgeon frequently to disturb the limb, cannot be so good as one that does not; provided the latter will accomplish the same kind of cure as the former.

The prevention of a flux of humours to a broken limb by bandage, is a common phrase; but if by the tight bandages and edges of the broken bone the muscles and membranes be unavoidably wounded and torn, or if the same kind of mischief be incurred by the inadvertence or indiscretion of the patient, or of those who assisted in getting him home, or from the violence used in extending the limb and setting the fracture, inflammation must be excited, and pain and tumefaction will be the consequence: and these will continue for some time in every fracture; but that space will be longer or shorter in different cases and under different circumstances. Evacuation, rest, and a favourable position of the limb, will, and do in general, remove all these complaints; but bandage can contribute nothing more than by keeping the applications in their proper place; so far from it, that if the bandage be a roller, it must, by the frequent necessity of its being adjusted, and the frequent motion of the limb, in some degree counteract the proper intention of cure.

The old writers are in general very precise as to the number of days during which the roller should be exactness suffered to remain without being shifted, and the number of times which such shiftings should be repeated within the first fortnight. This exactitude is by no means necessary; but if the bandage be supposed to be of any use at all, it is obvious, that it ought to be

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Proper applications to the fractured limb.

211
Motion to be avoided as much as possible.

212
And too tight bandages.

213
No great necessity in shifting the bandages.

renewed or adjusted as often as it may cease to perform the office for which it is designed, or whenever it shall be found to counteract such office, that is, as often as it shall become so slack as not to contain the fracture at all, or whenever the limb shall be so swollen that the roller makes an improper degree of stricture; the former generally occurs every four or five days, the latter is most frequent within the first week.

In most of the writers on the subject of fractures, we also find marks or signs laid down for our information concerning the due or undue effect of the bandage on the limb. They tell us, that when that part of it which is below the termination of the roller does not swell at all, the bandage is not sufficiently strict, and will not retain the fracture; that when the same part is considerably swollen, or tense, or inflamed, it implies that the binding is too strait; and that a moderate degree of tumefaction is a sign that the deligation is properly executed.

In consequence of these precepts, many practitioners look more anxiously after this degree of tumefaction, than after the true and exact position of the limb, and cannot be induced to believe that any thing can be wrong under this appearance: although it is plain, that even this degree of swelling is wrong; that it implies some kind of obstruction to the circulation, and cannot serve any good purpose; and consequently, that as far as it may be supposed to be the effect of bandage, so far that bandage must be faulty.

The third purpose for which the roller is said to be used, is the regulation and restraint of the callus.—If we were to form our notion of callus by what the generality of writers have said on this subject, we should suppose, that it was not only a particular juice always ready for the purpose; but that, if not restrained and regulated by art, it would always flow in such quantity, as to create trouble and deformity; that there were specific remedies for increasing or decreasing it, and that it always required the hand and art of surgery to manage it. That the callus is so far a particular juice, as that it consists of whatever is destined to circulate through the bones for their particular nourishment, is beyond all doubt; and that this gelatinous kind of fluid is the medium by which fractures are united, is as true; but that it requires art to manage it, or that art is in general capable of managing and directing it, is by no means true. That this callus or united medium does oftentimes create tumefaction and deformity, or even lameness, is true also; but the fault in these cases does not lie in the mere redundancy of such juice; it is derived from the nature of the fracture, from the inequality of it when set, and from the inapt position of the broken ends with regard to each other; nor is surgery or the surgeon any otherwise blameable in this case, than as it was or was not originally in their power to have

placed them better. It is the inequality of the fracture which makes both the real and apparent redundancy of callus, and the tumefaction in the place of union. When a bone has been broken transversely, or nearly so, and its inequalities are therefore neither many nor great; when such broken parts have been happily and properly coaptated, and proper methods have been used to keep them constantly and steadily in such state of coaptation, the divided parts unite by the intervention of the circulating juice, just as the softer parts do, allowing a different space of time for different texture and consistence. When the union of a broken bone under such circumstances has been procured, the place where such union has been made will be very little perceptible; it will be no deformity, nor will it occasion any inconvenience. It will indeed be discoverable, like a cicatrix of a wound in a softer part: but there will be no redundancy of callus, because none will be wanted; neither will there be a necessity for any particular management on the part of the surgeon, to repress or keep it in order. But when a bone has been broken very obliquely or very unequally; when the parts of a fracture are so circumstanced as not to admit of exact coaptation; when such exact coaptation as the fracture perhaps would have admitted, has not been judiciously made; when, from unmanageableness, inadvertence, or spasm, the proper position of the limb has not been attended to or preserved; in all such cases there must be considerable inequality of surface; there must be risings on one side, and depressions on another; and in such cases the juice circulating through the bone cannot accomplish the union in the same quantity, the same time, or in the same manner. The broken parts not being applied exactly to each other, there cannot be the same aptitude to unite; and according to the greater or lesser degree of exactitude in the coaptation, that is, according as the ends of the bones are or have been placed more or less even with regard to each other, will the inconvenience and the deformity be, and still must, when the fracture is not set at all; but the broken ends of the bone unite laterally, or by touching each other's sides. The periosteum covering every fracture will remain thickened for some time, and a degree of fullness or rising will be thereby caused about the place where such fracture has been united; but time, and the use of the muscles, soon in general remove this.

Two kinds of fracture there are which do not admit of the bent position of the joints, viz. that of the process of olecranon at the elbow, and that of the patella: in these a straight position of the arm and leg is necessary; in the former, to keep the fractured parts in contact till they are united; in the latter, to bring them as near to each other as may best serve the purpose of walking afterward (A).

With regard to the fracture of the patella, an opinion

(A) Although a straight position of the limb is necessary for the broken patella, yet this very position becomes so, upon the same principle, as renders the bent posture most advantageous in the broken tibia and femur, viz. the relaxation of the muscles and tendons attached to the fractured bone.

Whoever for a moment attend to the disposition of the pieces in a patella which has been broken transversely, will see how little necessary or useful the many contrivances of bandages, straps, compresses, buckles, buttons, &c. to be found in writers are, especially all that part of them which are applied to the inferior fragment.

By the action of the united tendons of the extensors muscles of the leg, the superior fragment is pulled upward and

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Superfluous
directions
concerning
them given
by many
writers.

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Bandages
cannot re-
gulate or
restrain the
callus.

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Why the
callus some-
times pro-
duces de-
formity and lame-
ness.

217
In what
of the cases the
joints can
not be
bended.

Theory.

Theory.

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Why a
fracture of
the patella
frequently
produces a
stiffness of
the joint.

nion has long and generally prevailed, which seems to have no foundation in truth, or even in probability: it is, that the great degree of stiffness in the joint of the knee, which is sometimes found to be the consequence of this kind of fracture, is owing to or produced by a quantity of callus falling into it from the edges of the broken bone; and that the nearer the broken pieces are brought to each other, the more likely such consequence is. But, in the first place, the fractured bone is by no means capable of supplying such a quantity of callus as to produce this effect; in the second place, if this was the case, the most likely, and indeed the only probable way of preventing the deposition of such juice, must be by bringing the broken pieces into close contact; and, in the third place, there is no authority from the appearance of such joints after death, to suppose this to be the case, or to countenance such opinion. The cause, therefore, of this rigidity, which is now and then found to attend the broken patella, must be sought for elsewhere, viz. in the long rest and confinement of the joint, as a means used by many to procure exact union; in mischief done to the ligament, which is formed by the united tendons of the four extensor muscles of the leg, at the time of and by the fracture; and in the nature of the fracture itself, that is, the manner in which the bone shall happen to be broken.

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What cases
of this
fracture are
most fa-
vourable.

But, be all this as it may, the fact undoubtedly is, that they walk best after such accident whose patella has been broken transversely, and that into two nearly equal fragments; whose confinement to the bed has been short, that is, no longer than while the inflammation lasted; whose knee, after such period, has been daily and moderately moved; and in whom the broken pieces are not brought into exact contact, but lie at some small distance from each other.

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Of the ri-
sing end of
the broken
bone.

We cannot take leave of this subject of simple fractures without mentioning a circumstance relative to them, which, although, when rightly understood, is of little or no importance, yet, by being misunderstood, becomes frequently of considerable consequence, viz. the use of the term *rising end of a broken bone*.

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The term
improper.

By the expression, any one unacquainted with these things would be inclined to think, that the prominent part of a broken bone rose or was elevated from its natural place, and became by such rising superior to the other part or extremity of the fracture. This would certainly be the idea of an ignorant person, and as such would be of little consequence: but by the practice of many surgeons, it is as certainly their idea also; and this renders it a matter of great consequence. The truth is, that there is really no rising end to a broken bone, when applied, as the term usually is, to the leg, thigh, and clavicle. There is indeed a superior or prominent end or part, and an inferior or depressed one: but the former of these is in its proper place, from which it cannot by art be moved; and the latter, which is not in its proper place, is very capable by art of being put into it.

When a collar-bone, os femoris, or tibia and fibula, are

are broken by the action of the muscles, by the motions of the patient, and by the mere weight of the inferior part of the arm, thigh, or leg, the fractured ends of such bones are displaced, and always displaced in such manner, that the inequality occasioned necessarily by such displacement, proceeds from the inferior end of the fractured bone being retracted or drawn under the superior. This produces a tumefaction or unequal rising; and the upper extremity of the fracture is therefore called the *rising end of it*. Now the man who regards this rising end as that part of the fracture which has by such rising got out of its place, and not as having accidentally become the prominent part merely by the inflexion or retraction of the other part underneath it, will go to work with bolster, compress, and bandage, in order to bring and keep such end down: by which means he will give his patient considerable pain; and, while he depends on such means alone, will most certainly be frustrated in his intention and expectation, the means not being adequate to the proposed end. But the man who looks on this in the true light, that is, who looks on the superior part as being in its proper place, and the inferior as being displaced by the weight of the limb and the action of the muscles, will know, that by the mere position of such limb, he shall be able to remedy all the inconvenience and deformity, as far as they are by art capable of remedy, without the parade or the fatigue of useless apparatus.

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We must
not attempt
to depress
the promi-
nent part.

He will, for example, know, that the prominent part of a broken clavicle, that part of it which is next to the sternum, is just where it should be; and that the inferior part, that which is connected with the scapula, is out of its place, by being drawn down by the weight of the arm; and therefore, instead of loading, as is usual, the prominent part with quantities of compress, which never can do any service, he, by a proper elevation of the arm, will bring the lower end upward into contact with the other, and thereby with very little trouble easily accomplish what he never can do in any other manner, however operose.

The same thing will happen, from the same principles, in the leg and thigh. A prominence, or a rising end, there always will be; but that rising end is never to be brought down by any pressure from compress or bandage; the fallen or inferior one must always be brought up to it by the proper position of the rest of the limb: this will always remove the inequality as far as it is removable; and nothing else can.

We come now to speak of *compound fractures*, or those in which the breaking of a bone is complicated with a wound. In this case, the first object is whether the limb can be preserved or not. Many circumstances concur to make this doubtful. For instance,

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fractures.

the bone or bones being broken into many different pieces for a considerable extent, as when a person's limbs are crushed by the wheels of heavy carriages passing over them; the skin, muscles, tendons, &c. the limbs being so much lacerated and destroyed, as to render can- gangrene and mortification the most probable conse- quence;

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and separated from the inferior; but the latter remains nearly, if not absolutely, where it was before the accident: there is nothing to act upon it; and therefore it cannot, nor does it move.

The extension of the leg puts the muscles attached to the upper part of the broken bone into a state of relaxation, and prevents their acting; and though a small compress just above this piece, with a moderate bandage, may be useful toward retaining it, yet it is the position of the leg which must keep the broken piece down, and effect the cure.

Theory.

Theory.

quence; the extremities forming a joint being crushed, or, as it were, comminuted, and the ligaments connecting such bonds being torn and spoiled, with other circumstances of the same kind, are, by very eminent practitioners, reckoned sufficient reasons for performing immediate amputation. On the other hand, there are not wanting men, whose knowledge in their profession can by no means be doubted, that absolutely deny the usefulness of immediate amputation almost in any case, unless the limb is already torn off and hanging almost by the skin. Mr Boucher, of the Royal Academy of Surgery, gives twelve remarkable instances of desperate fractures in which the limbs were preserved. The first was a shot through the thigh, with a considerable fracture of the os femoris near the condyles. The patient refused to submit to the operation, and was completely cured, but with one thigh shorter than the other, in ten months, notwithstanding the frequent incisions, fever, and large splinters of bone that came away from time to time. The second had a fracture of the lower extremity of the arm, and was also cured without amputation. The third was shot in the fore-arm by a pistol ball, which wounded the internal condyle of the humerus and olecranon; yet the patient not only was cured of the wound in the space of 12 months, but recovered of the anchylosis also. The fourth and fifth were similar. In the sixth, the shot penetrated the lower part of the femur, in which the inner condyle was engaged; yet, notwithstanding a variety of bad symptoms, he obtained a cure in the space of 11 months. In the seventh case, the inferior part of the radius was fractured, with considerable laceration of the tendons; nevertheless this patient also was cured, but with a stiffness in the joint. In the eighth, the ball passed from the malleolus internus through the malleolus externus; yet the patient was completely cured in nine weeks. The ninth patient had received a ball which tore through the deltoid muscle, fractured the head of the humerus, and part of the clavicle. The extirpation of the humerus was judged absolutely necessary, which yet the patient resolutely opposed; and by that means saved his arm, being discharged only with a small fistula, which the warm bath soon cured. The tenth was a soldier, wounded by a musket-ball in the upper part of the humerus, with a fracture of this bone; yet he also got a cure without amputation. In the eleventh, a musket-ball fractured the head of the bone at the elbow. In the twelfth, a ball was lodged in the calcaneum; yet, after extraction, the wound was cured without any bad accident.

Notwithstanding this great success, however, M. Boucher is of opinion, that there are certain accidents which nothing but amputation can remove. Such, for instance, are fractures of the larger extremities, where numbers of splints stick out, and cannot be removed; when the same bone is fractured in several different places; when the extremity of one of these bones is separated from its body, and shattered in many places; when the wounded parts are seized with violent convulsions which cannot be cured; where the bone is surrounded with loose flabby flesh, and a sanious discharge with acute pain, which indicate the bone to be disordered; and where a sphacelus is formed. Where these symptoms indicate amputation, he thinks that

the sooner it is performed the better; for when it is deferred, he says, the violent irritation of the nervous and vascular systems, which in a short time succeeds the accident, puts the whole animal economy and mass of fluids into such disorder, that the pus requisite for the cure is defective, and the recovery becomes doubtful. And he attributes this want of success where the operation is delayed, not to the first cause, but to the alteration caused by the delay.

On the other hand, M. Faure, in a paper presented to the Academy, attempts to prove, that where amputation is necessary, it ought always to be deferred till the bad symptoms occasioned by the wound have abated. The reason he gives for this practice is, that nature having already sustained a violent shock, is unable to bear the succeeding one arising from amputation: and for the truth of this he appeals to the cases of about 300 persons, who underwent the operation after the battle of Fontenoy, of whom scarce one in ten escaped. Convinced, by this sad example, that amputation had been too hastily performed, he selected ten patients on whom the operation was judged unavoidable, and directed them to be let alone for a month; after which he performed the operation with success on them all. The cases were the worst that can almost be imagined. The first had the head of the os humeri fractured by a cannon-ball, while a complicated fracture of the leg was made by a musket-ball. The others were a complicated fracture of the thigh; a fracture in the articulation of the knee, thro' which the ball passed; a complete fracture of the forearm, which extended to the os humeri; a wound of the inferior part of the forearm, with shivering of the bones of the carpus; a wound at the upper part of the humerus, with a fracture above an inch broad; a fracture of the bones of the carpus; the os calcis shivered, and the tendo Achillis torn; a complicated fracture of the tibia; a fracture of the tibia in which the tarsus was engaged.—From all these cases, M. Faure strongly contends, that where amputation is unavoidable, it should always be delayed till the fever and other bad symptoms cease; and he exclaims against the contrary method; adding, that “we might even say, the sooner the limbs were amputated, the sooner were the patients condemned to death.”

M. Boucher presented a second paper to the Academy, in which he adhered to his former opinion, and gave his reasons for immediate amputation. These were, that at the time of the hurt, or soon after it, the body must be in the best state for enduring the operation; and by neglecting this time, the efforts of nature are useless, and she becomes weaker; the melancholy effects of which, he says, he has been witness of. “For how can we expect (says he) that a body exhausted with pain and misery for five or six weeks, should then be in a better condition to support a terrible operation, than when in full vigour, as must be the case at the time of the accident?” Several instances are adduced in favour of his doctrine; but Mr O'Halloran, from whom we have taken this account, is of opinion, that his reasoning is quite unsatisfactory. “The great point,” says he, “for which M. Boucher contends, is the advantage arising to the patient by having his limb taken off in the first period, or before the fever, inflammation, &c. come on, which

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Theory. in themselves endanger the life of the party. But it is highly probable this gentleman never once recollected, that this fever, and all other alarming symptoms, tho' they do not immediately appear, are nevertheless the effect of the derangement in the constitution on receiving the accident: that on this account it is certainly very bad practice to amputate till at least part of these symptoms are abated, for three excessive strong and clear reasons. First, so much depends upon the habit of body, that we cannot be too cautious in our prognostics: for if the slightest hurts, happening in constitutions seemingly sound, are often attended with the most fatal symptoms, in spite of the earliest and best resources of art; how then can we, with any degree of certainty, immediately promise ourselves success, by performing a terrible operation, till we first know if the very juices themselves will not be the greatest obstacle to a re-union? Secondly, how often does it happen, in the best constitutions, that the terrible shock which the whole frame sustains on a violent gunshot wound, nay, even in a fall, without any fracture or visible hurt, that the parts can never recover their tone, and the patient in some days expires? What else are concussions of the brain, violent leaps, where, though the party comes down on his legs, and has no visible hurt, yet dies with all the appearance of a concussion of the brain? What else but the velocity of the circumambient air of a discharged cannon-ball, which, by deranging the whole animal-system, kills the party without sign of hurt? If these account for the death of the patient, will not this be a strong reason for delaying amputation, till we know whether nature is strong enough to recover from this shock, without adding to his misery that of a cruel and terrible operation? Thirdly, let us suppose, to give this gentleman and his partisans argument their utmost force, that happily for the patient, though unknown, or never reflected on by the surgeon, first, that the juices are balsamic and kind; and, secondly, that nature is strong enough to recover from the shock which every accident, more or less, subjects the constitution to: how can we possibly foresee, or at least is not the presumption very strong, that by an immediate amputation, after such a terrible violence as absolutely indicates it, we expose the constitution to the severest trials and the greatest danger possible? If in anchylosis of the tarsus, with great pain, which has reduced the patient very low, we find a severe fever and inflammation ensue, the consequence of the pain and the shock the human frame has sustained by an amputation, how much more is it to be dreaded after a terrible gunshot wound or complicated fracture; which accidents alone bring on all these symptoms in an higher degree? Justly then does M. Faure exclaim, "That the sooner their limbs were taken off, the sooner were they condemned to death!"

"The few instances advanced by M. Boucher, of the success of immediate amputation, for the reasons I have above assigned, can prove nothing for him. If any thing can be granted, it is, that, happily for the patients, their constitutions surmounted the rashness of their surgeons, as well as the severe trials of nature. Amputation, then, should never be practised after sudden accidents, till at least the violence of the symp-

toms proceeding from it are abated, for the reasons assigned, and which I again inculcate; namely, first, till by laudable suppuration we are assured that the juices are balsamic, and which becomes manifest in eight or ten days. Secondly, till we are certain that nature recovers from the shock; which we will also be certain of, by reason's becoming restored if lost, or by the state of the pulses and nervous system: this also becomes apparent about the eighth or ninth day. And, thirdly, till it becomes manifest, that the pain, fever, and inflammation, will not terminate in gangrene, sphacelus, or death. This the state of the pulse and spirits, and the nature of the suppuration, will determine.

"But besides these advantages, at least these points of knowledge gained by the delay, another and a greater also follows; namely, that the abatement of the fever, and the laudableness of the suppuration, are the highest preparations, and the most useful, the patient can possibly have previous to the operation: he is, at the time of amputation, in the same state that we could wish a patient to be in who is to suffer inoculation; and a great degree of certainty attends the recovery of the patient, especially in our method. I shall just single out one observation, which first threw me into this chain of thinking.

"A girl about 16, of a good constitution, some few years past, on Pennywell road, adjoining this city, was accidentally shot in the thigh. The swan-shot fractured the femur at the lower condyles, and the rotula anteriorly, and passed through the parts with a very large wound. In this situation she lay extended on a table for about two hours, when assistance came. Her pulse was regular, she spoke sensibly, and seemed more alarmed than pained. We judged amputation absolutely unavoidable; and her thigh was taken off directly, but she died in about four hours after. Here the death of this girl was visibly hastened, by adding amputation before nature had time to recover from the first accident.

"The truth of this reasoning will appear still stronger by the following observations:

"John Quinlon, a sedan-chairman of this city, in a dispute with another chairman, received a fall by a trip, so that the tibia tore through the flesh at its articulation with the astragal, and reached down a little below the os calcis, and the fibula was consequently terribly fractured. This accident happened the latter end of August 1760. To reduce these parts was absolutely impossible; because a less force than was necessary for this must separate the foot from the leg. Amputation was the only resource left. The man was strong, and about 35 years of age; so that every thing might be expected from the constitution. However, on mature deliberation, though amputation was absolutely unavoidable, I was determined to defer it for some days. Accordingly I laid open the flesh below the protruded bone, and formed an eighteen-tailed bandage, in which, after a gentle extension, I laid the leg, bled the man, and had the parts often wet in brandy. In a few days the inflammation became violent; which was somewhat allayed by bleeding, fomentations, and poultices. In 12 days from the accident, finding the foot gangrened, I determined to amputate. The next morning I performed the operation;

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Mr O'Halloran's directions.

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Examples in confirmation of his doctrine.

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Why M. Boucher's cases are insufficient to prove the truth of his doctrine.

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tion; and though, after taking off the limb, some real pus (the remains of the inflammation) flowed from the stump spontaneously, yet did the cure go on as happily as could be wished; and in about ten weeks he was completely cured.

"Alice Blachall, about 15 years old, subject to epileptic fits, and paralytic in the right side, leg, and arm, in one of these fell into the fire, and had the diseased leg so miserably burnt, that the bones of the toes and metatarsus spontaneously dropped off, and those of the tarsus were uncovered and ready to separate. In this condition she was left at our hospital-door July 17th 1762; but with an hectic, lax, and a large discharge from the leg, which was also burnt. This accident happened about 10 days before. The sores, which were filthy, I had carefully stuped, and washed with a decoction of wormwood; and finding amputation absolutely unavoidable, I performed it; and she was discharged, completely cured, in the latter end of the following month, with a firm coat of flesh to cover the extremity of the stump, notwithstanding that this whole side was completely paralytic, and of course the balsamic juices were greatly deficient.

"John Deelan, a poor man, received the fire from a mulket, charged with small shot, in his right hand, and so near, that the wadding rested in the fore. Being recommended to our hospital by the reverend dean Maffy the day after the accident, he was immediately admitted. The little and ring fingers were quite tore off, and hanging by a little flesh; the two metacarpal bones that supported them were also fractured and terribly tore; and the shot was promiscuously thrown into every part of the hand. It was judged impossible to preserve the hand; but, for the reasons already specified, I was determined to defer amputation till the inflammatory state was over. However, I separated the two fingers from the hand; dilated the sores; and extracted a great deal of shot, tow, broken bones, &c. The inflammation which followed was very violent, and extended very high up the arm; but was relieved by profuse bleedings, emollient embrocations, poultices of flummary half-boiled, nitrous medicines, &c. In about 12 days this orgasm was greatly abated; and willing to preserve part of his hand if possible, I extracted the entire remains of the two metatarsal bones, and by this means a great deal more shot, splints, &c.; and, contrary to expectation, this man was discharged with two fingers and part of his hand, with which he has been able to support his poor family since by day-labour.

"One O'Neal, returning from town much in liquor, fell into a sand-pit on the high road near this city, and a very large stone fell on his right leg with such a force, as to fracture the tibia for above three inches in a most dreadful manner, with a wound of a larger surface. Indeed the bone was broke into numberless bits; inasmuch that, considering the length of the fracture, it may be safely affirmed, that a quarter of an inch of it was not entire. He was carried to the turnpike-house, and I was sent for. On the spot I prepared an eighteen-tailed bandage, dilated the wound, extracted a great many loose bits of bone, dressed with soft lint, and bled him. Next morning he was brought to town on a door, and dressed lightly

for some days, till the state of inflammation was somewhat abated; when I determined to take off his leg, which was judged impossible to be saved: and I dare say, from this slight description of the case, every surgeon would conclude the same. Nevertheless, so bountiful was nature in this case, and so strong in her resources, that in four months from the accident, this man could use this leg, and is now a living witness of this truth. So that, besides the reasons already advanced, we have a chance for one more, and that the greatest, advantage to the patient, namely, the chance of saving the entire limb by delaying the operation.

"But as M. Faure does not absolutely determine the precise time of performing the operation after the accident, and that by the delay of six weeks, or till the symptoms cease, numbers of lives must be lost, I observe, that this is very vague and uncertain; because, by the nature of the accident, many symptoms must subsist, even after the general inflammation is passed. Such are extraneous bodies constantly irritating, splints of bones, too abundant suppuration, &c. In such cases, it will be in vain to expect an abatement of symptoms till the cause of them is removed, namely, the limb taken off. Upon maturely, then, considering the whole affair, I boldly affirm, that the shock from the general inflammation, the patient's state of blood and habit of body, &c. will be thoroughly known in about 20 days from the accident; and every symptom that continues subsequent to this must take its rise from the sore itself, and that where amputation is absolutely unavoidable. Supposing the patient to be treated all the time preceding this according to the rules of art, it should not be deferred longer, lest the patient sink under it. By this means, instead of about one in three amputated patients recovering, we should scarce lose, almost to a certainty, one in twenty."

Mr Pott seems to be an advocate for immediate amputation, or at least to dread none of those fatal consequences from amputation which we have just now mentioned. His words are, "When a surgeon says that a limb, which has just suffered a particular kind of compound fracture, ought rather to be immediately cut off, than that any attempt should be made for its preservation, he does not mean by so saying, that it is absolutely impossible for such limb to be preserved at all events; he is not to be supposed to mean so much in general, though sometimes even that will be obvious: all that he can truly and justly mean is, that from the experience of all time it has been found, that the attempts to preserve limbs so circumstanced, have most frequently been frustrated by the death of the patients in consequence of such injury; and that from the same experience it has been found, that the chance of death from amputation is by no means equal to that arising from such kind of fracture."

"Every man knows, that, apparently, desperate cases are sometimes cured; and that limbs so shattered and wounded as to render amputation the only probable means for the preservation of life, are now and then saved. This is an uncontroverted fact, but a fact which proves very little against the common opinion; because every man of experience also knows, that such escapes are very rare, much too rare to admit of being

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Mr Pott's opinion.

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Theory. ing made precedents, and that the majority of such attempts fail (a).

"This consideration, relative to amputation, is of the more importance, because it most frequently requires immediate determination; every minute of delay is, in many instances, to the patient's disadvantage; and a very short space of time indeed frequently makes all the difference between probable safety and fatality. If these cases in general would admit of deliberation for two or three days, and during that time such circumstances might be expected to arise as ought necessarily to determine the surgeon in his conduct, without adding to the patient's hazard, the difference would be considerable: the former would not seem to be so precipitate in his determination as he is frequently thought to be; and the latter, being more convinced of the necessity, would submit to it with less reluctance. But, unhappily for both parties, this is seldom the case; and the first opportunity having been neglected, or not embraced, we are very frequently denied another. Here therefore the whole exertion of a man's judgment is required, that he may neither rashly and unnecessarily deprive his patient of a limb; nor, through a false tenderness or timidity, suffer him to perish, by endeavouring to preserve such limb. Some degree of address is also necessary upon such occasions, in order to convince the patient, that what seems to be determined upon hastily and with precipitation, will not safely admit of longer deliberation."

²³⁵
Of reducing a compound fracture.

The limb being thought capable of preservation, the next consideration is the reduction of the fracture. The ease or difficulty attending this depends not only on the general nature of the case, but on the particular disposition of the bone with regard to the wound.

If the bone be not protruded forth, the trouble of reducing and of placing the fracture in a good position, will be much less than if the case be otherwise; and in the case of protrusion or thrusting forth of the bone or bones, the difficulty is always in proportion to the comparative size of the wound through which such bone has passed. In a compound fracture of the leg or thigh, it is always the upper part of the broken bone which is thrust forth. If the fracture be of the transverse kind, and the wound large, a moderate degree of extension will in general easily reduce it; but if the fracture be oblique, and terminates, as it often does, in a long sharp point, this point very often makes its way through a wound no larger than just to permit such extension. In this case, the very placing the leg in a straight position, in order to make extension, obliges the wound or orifice to gird the bone tight,

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and make all that part of it which is out of such wound press hard on the skin of the leg underneath it. In these circumstances, all attempts for reduction in this manner will be found to be impracticable; the more the leg is stretched out, the tighter the bone will be girt by the wound, and the more it will press on the skin underneath.

Upon this occasion, it is not very unusual to have recourse to the saw, and by that means to remove a portion of the protruded bone; but this practice is frequently erroneous.

²³⁶
Of sawing off the end of a broken bone.

In some few instances, and in the case of extreme sharp-pointedness of the extremity of the bone, it may be, and undoubtedly is, right, but in many instances it is totally unnecessary.

The two most proper means of overcoming this difficulty are, change of posture of the limb, and enlargement of the wound. In many cases, the former of these, under proper conduct, will be found fully sufficient; and where it fails, the latter should always be made use of. Whoever will attend to the effect which putting the leg or thigh (having a compound fracture and protruded bone) into a straight position always produces, that is, to the manner in which the wound in such position girds the bone, and to the increased difficulty of reduction thereby induced, and will then, by changing the posture of such limb from an extended one to one moderately bent, observe the alteration thereby made in both the just-mentioned circumstances, will be satisfied of the truth of what has been said, and of the much greater degree of ease and practicability of reduction in the bent than in the extended position; that is, in the relaxed, than in the stretched state of the muscles. Reduction being found impracticable either by extension or change of posture, the obvious and necessary remedy for this difficulty is enlargement of the wound. This, to some practitioners who have not seen much of this business, appears a disagreeable circumstance: but here there is neither difficulty nor danger; it is the skin only which can require division; and in making such wound there can be no possible hazard. It is needless to say, that the division should be such as to render reduction easy; or to remind the practitioner, that such enlarged opening may serve very good future purposes, by making way for the extraction of fragments, and the discharge of matter, sloughs, &c.

²³⁷
Of enlarging the wound in the integuments.

If the bone be broken into several pieces, and any of them be either totally separated or as to lie loose in the wound, or if they be so loosened and detached as to render their union highly improbable, all such pieces ought to be taken away; but they should be

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removed

"(a) The baron Van Swieten, writing as many others have done, that is, theoretically, on surgery, advises us, in the case of very bad compound fractures, which may most probably require amputation, to defer the operation until we have tried the force of antiseptic fomentations, and applications of like kind, for two or three days; and this opinion and advice he builds, in some measure, on the remarkable success of La Motte, in a seemingly desperate case, of a man's leg mangled by the wheel of a heavy carriage.

"That De La Motte's patient escaped I make no doubt, because he has said so: but the surgeon showed much more rashness in attempting to save such a limb, than he would have done in the amputation of it; the operation would have been the more justifiable practice.—With regard to the baron's advice, to stay two or three days, I take the liberty to add, that if you do that, stay several more; for at the end of that time (I mean two or three days) the patient will have very little chance indeed from the operation, much less than he would have had at the time of the accident.

"I should be very sorry to be thought a patron or an adviser of rashness or cruelty; but in what I have here said, I believe I shall have every man in the profession, who has either true humanity, or sound judgment founded on experience, on my side."

Theory.

removed with all possible gentleness, without pain, violence, or laceration; without the risk of hæmorrhagy; and with as little poking into the wound as possible. If the extremities of the bone be broken into sharp points, which points wound and irritate the surrounding parts, they must be removed also. But the whole of this part of the treatment of a compound fracture should be executed with great caution. The objects of fear and apprehension in a compound fracture (that is, in the first or early state of it) are, pain, irritation, and inflammation: these are to be avoided, prevented, and appeased, by all possible means, let every thing else be as it may: and altho' certain things are always recited as necessary to be done, such as removal of fragments of bone, of foreign bodies, &c. &c. yet it is always to be understood, that such acts may be performed without prejudicial or great violence, and without adding at all to the risk or hazard necessarily incurred by the disease.

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Of dislocations.

In dislocations of the joints, as well as in fractures of the bones, our great attention ought to be paid to the muscles belonging to the part affected. Tho' their action is regular and just, when the bone to which they are attached comes to be displaced, they pull and distort the limb in many different ways; and from them only arises the great difficulty in reducing luxated joints. From this consideration, Mr Pott lays down the following maxims with regard to luxated joints:

"1. Although a joint may have been luxated by means of considerable violence, it does by no means follow that the same degree of violence is necessary for its reduction.

"2. When a joint has been luxated, at least one of the bones of which it is composed is detained in that its unnatural situation, by the action of some of the muscular parts in connection with it; which action, by the immobility of the joint, becomes as it were tonic, and is not under the direction of the will of the patient.

"3. That the mere bursal ligaments of some of the joints, endued with great mobility, are weak, distractile, and constantly moistened: that, for these reasons, they are capable of suffering considerable violence without being lacerated; but that they are also sometimes most certainly torn.

"4. That did the laceration of the said ligaments happen much more frequently than I believe it does, yet it cannot be a matter of very great consequence, as it neither totally prevents reduction, when timely and properly attempted, nor a consequent cure (c).

"5. That supposing such accident to be frequent, yet as it is impossible to know, with any kind of certainty, whether it has happened or not, or in what part of the ligament, it cannot be admitted as a rule for our conduct, nor ought such mere conjecture to produce any deviation from what we ought to do were there no such supposition. Could we know with cer-

tainty when and where this had happened, very useful information might indeed be drawn from it.

"6. That all the force used in reducing a luxated bone, be it more or less, be it by hands, towels, ligatures, or machines, ought always to be applied to the other extremity of the said bone, and as much as possible to that only.

"7. That in the reduction of such joints as are composed of a round head received into a socket, such as those of the shoulder and hip, the whole body should be kept as steady as possible, for the same reason as in the foregoing.

"8. That in order to make use of an extending force with all possible advantage, and to excite thereby the least pain and inconvenience, it is necessary that all parts serving to the motion of the dislocated joint, or in any degree connected with it, be put into such a state as to give the smallest possible degree of resistance.

"9. That in the reduction of such joints as consist of a round head moving in an acetabulum or socket, no attempt ought to be made for replacing the said head until it has by extension been brought forth from the place where it is, and nearly to a level with the said socket.

"10. The last principle which I shall take the liberty to mention, and which I would inculcate very seriously, is, that whatever kind or degree of force may be found necessary for the reduction of a luxated joint, that such force be employed gradually; that the lesser degree be always first tried, and that it be increased gradatim."

SECT. IV. Of Abscesses and large Suppurations.

Under the article MEDICINE, n° 154. it has been observed, that one of the ways in which inflammation terminates is by suppuration; in which case an *abscess* is formed. This takes place in consequence of that part of the body which was inflamed being rendered impervious to the circulating fluids; whence they are at last melted down, and converted into what is called *pus* or *matter*.—That an inflammation will terminate in an abscess, may be known from the length of time it has continued, from the remission of the pain and hardness, the greater elevation of the skin in the middle part, a change of colour from red to bluish or livid, a slight fever with shivering, and from a fluctuation of matter perceived on handling the part.

During the first stage of the inflammation, however, we ought, for the most part, to endeavour to resolve it, or prevent the formation of an abscess. Yet some cases must be excepted. For instance, those inflammatory swellings which sometimes occur in fevers, or succeed to them, ought always to be brought to suppuration; and it might be very dangerous to attempt a resolution of them. In swellings of a seropulous nature, it is perhaps best to do nothing at all, either

(c) In the accident of a dislocated tibia from a broken fibula, the strong, inelastic, tendinous ligaments, which fasten the end of the former bone to the astragalus and os calcis, are frequently torn; and as these, by proper care, almost always do well, and recover all their strength, there is the greatest reason to expect, that the more weak distractile ones do the same. The only mischief which seems most likely to follow from a laceration of the latter, is from an effusion of the synovia; of which, Mr Pott thinks, he has seen an instance in the joint of the ankle. That the laceration of the bursal ligament of the shoulder cannot be a frequent or general impediment to reduction, appears from his never having, in more than 20 years care of an hospital, met with a single instance of its impracticability, when attempted in time.

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In what cases we might attempt the resolution of an inflammation

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Theory.

either with a view to resolve or suppurate. Thus it might be dangerous to make use of repellant applications, at the same time that it is by no means advisable to promote their suppuration; the cure of such swellings, when opened, proving always very troublesome; while at the same time it is known, that such swellings may remain for a very long time without any risk to the patient. In the lues venerea, too, as we are possessed of a certain antidote for the disorder, it is best not to attempt the suppuration of any buboes which may appear; as the cure of them, when opened, very often proves extremely troublesome; and as their being opened cannot contribute any thing towards their cure.

Where the inflammation is but beginning, and the symptoms are not so violent as to affect the general system, topical remedies, with a due attention to regimen, often answer in resolving them. But when the inflammation runs high, with general symptoms of fever, it then becomes necessary to pay attention to these at the same time. Warm fomentations and cataplasms have generally been recommended for all inflamed parts: but these have a great tendency to promote suppuration, and are therefore very improper while the inflammation may be supposed capable of resolution. The first thing, therefore, to be attended to in the case of every inflammation, is the removal of the exciting causes, which either have brought it on originally, or which may continue it after it is begun. Such are extraneous bodies in wounds, pieces of fractured bones, luxations, &c. with whatever else may have had a tendency to foment and keep up the disease. Of all the various applications for an inflamed part, those of a sedative nature are chiefly to be depended upon; and, next to these, emollients. Of the former kind we may consider all the different preparations of lead dissolved in vinegar; together with the vegetable acid itself, which generally acts also as a sedative. Among the latter we may place, in the first class, the mild expressed oils, as also the soft ointments made with these oils and pure wax.

When we speak of sedative medicines, however, it must not be understood that all of that class are to be used indiscriminately. Thus opium, though one of the most powerful of all sedatives, yet as its application, externally, to the human body, is always attended with some degree of irritation, however useful it may at times be found in some particular species of inflammatory disorders, will never, probably, as an external application, become of general use in these cases. Warm emollient fomentations, too, though powerful sedatives, as tending more effectually to remove tension and pain than perhaps any other remedy, yet are constantly found to be improper where a resolution is to be wished for, as we have already observed. Their constant effect is, either to bring the swelling to a suppuration, or to relax the parts in such a manner as to render the removal of the disorder always exceedingly tedious.

Mr Bell recommends the preparations of lead as the proper applications, in cases of external inflammation, where we wish for a resolution. These medicines have lately drawn the attention of the public by the great encomiums passed upon them by M. Goulard, who thus endeavoured to pass off one of his own compositions

under the very improper name of *extract of lead*. This medicine, which at best can only be a saturated solution of lead in strong vinegar, Mr Bell justly observes, has not the advantages of saccharum saturni. "For (says he) although in the *Extrait de Saturn* of Goulard, as likewise in the *Acetum Lithargiræ* of our dispensatories, which are both, it may be observed, very nearly the same, we may be very certain of the quantity of lead employed to the vinegar; yet we can never, but by crystallization, know exactly, or even nearly, how much of the former the menstruum may have dissolved, as that must depend on a variety of accidents; and particularly on the strength of the acid and exact degree of heat employed; which are circumstances we have not always in our power exactly to regulate. For these reasons, therefore, the salt or sugar of lead, as it is called, should, for external use, be always preferred." The best method of applying it, he says, is in the form of a watery solution; and he gives the following formula: "℞. Sacchar. saturni. ʒiſs. solve in acet. pur. ʒiv. et adde aq. fontan. destillat. ℥ij."

The addition of vinegar renders the solution much more complete than it otherwise would be; and without it, indeed, a very considerable proportion of the lead generally separates and falls to the bottom.

In making use of this solution in cases of inflammation, as it is of consequence to have the parts affected kept constantly moist with it, cataplasms prepared with it and crumb of bread, in general answer that intention exceedingly well. But when the inflamed part is so tender and painful as not easily to bear the weight of a poultice, which is frequently the case, pieces of soft linen moistened with the solution answer the purpose tolerably well; although, when there is not that objection to the use of cataplasms, as they retain the moisture longer, they should always be preferred. But whichever of the two are had recourse to, they should always be applied cold, or at least with no greater warmth than is merely necessary for preventing pain or uneasiness to the patient: they should be kept almost constantly at the part, and renewed always before turning stiff or hard.

Among the remedies recommended for external use, Of emollients in cases of inflammation, were mentioned emollients, &c.

These, when the tension and irritation on the skin are considerable, are often attended with very great advantage: the parts affected being, in such a state of the disorder, gently rubbed over with any of the mild expressed oils two or three times a-day, the tension, irritation, and pain, are often very much relieved, and the discussion of the tumour thereby greatly promoted.

In every case of inflammation, indeed, emollient applications would afford some relief. But as the preparations of lead, already recommended, prove, in all such disorders, still more advantageous; and as unguents of every kind tend considerably to blunt the action of lead; these two sets of remedies should as seldom as possible be allowed to interfere with one another: and emollients should accordingly never be prescribed, but when the circumstances already mentioned, of irritation, tension, and pain, are so considerable as to render their application altogether necessary.

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The applications proper for inflammation.

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Of the preparations of lead.

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Unctuous substances have, too, been condemned in such cases upon a different principle, as tending to stop the pores, and consequently to obstruct the perspiration of those parts to which they are applied. It is not, however, probable, that in this way they could prove very hurtful in preventing the resolution of inflammation; which must always, it is imagined, be effected in a very different manner than by perspiration.

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Of the method of using the vegetable acid.

When the part affected with inflammation is very tender, or lies deep, applications of the vegetable acid are then often had recourse to with considerable advantage; and the most effectual form of using it seems to be by way of cataplasm, made with the strongest vinegar and crumb of bread. In such cases, too, an alternate use of this remedy, with the saturnine solution, has produced more beneficial effects than are commonly observed from a continued course of any one of them.

At the same time that these applications are continued, bleeding with leeches, or cupping and scarifying, as near as possible to the part affected, is generally of very great service; and in no case of local inflammation should ever be omitted. In all such cases, the whole body, but more especially the diseased part, should be preserved as free as possible from every kind of motion; and, for the same reason, the necessity of a low cooling diet, in every inflammatory disorder, appears obvious, as does also a total abstinence from spirituous and fermented liquors.

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Of blood-letting and other evacuations.

In slight cases of inflammation, a due perseverance in the several articles taken notice of, will, in general, be found sufficient for every purpose. But when there is likewise a full, hard, or quick pulse, with other symptoms of fever, general blood-letting becomes then always necessary; the quantity of blood taken away being always to be determined by the violence of the disorder, and by the age and strength of the patient. The use of gentle laxatives, too, together with cooling diaphoretic medicines, are always attended with very good effects.

These different evacuations being premised, the next object of consequence is to procure ease and quietness to the patient; which is often, in inflammatory cases, of more real service than any other circumstance whatever. The most effectual remedy for this purpose is opium; which, when pain and irritation are considerable, as in extensive inflammations very frequently happens, should never be omitted. In large wounds, especially after amputations and other capital operations, in punctures of all kinds, too, large doses of opium are always attended with remarkable good effects. In all such cases, however, opium, in order to have a proper influence, should, as was observed, be administered in very large doses: otherwise, instead of proving serviceable, it seems rather to have the contrary effect; a circumstance which is, perhaps, the chief reason for opiates in general having been very unjustly condemned in every case of inflammation.

By a proper attention to the different circumstances taken notice of, in the course of three or four days, and sometimes in a shorter space of time, resolution of the tumour will in general begin to take place; at least before the end of that period, it may, for the most part, be known how the disorder is to terminate.

If the heat, pain, and other attending symptoms, abate, and especially if the tumour begins to decrease, without the occurrence of any gangrenous appearances, we may then be almost certain that by a continuance of the same plan a total resolution will in time be effected.

But, on the contrary, if all the different symptoms rather increase; and especially, if the tumour turns larger, and somewhat soft, with an increase of throbbing pain; we may then, with tolerable certainty, conclude that suppuration will take place; and should therefore immediately desist from such applications as were judged proper while a cure was thought practicable by resolution, and endeavour to assist nature as much as possible in the formation of pus, or what is called *maturation* of the tumour.

For this reason, in every case of inflammation, the different evacuations, especially that of blood-letting, which may have been advisable while the swelling was attempted to be dissipated, should never be carried a greater length than may be merely necessary for moderating the febrile symptoms: for by reducing the system too much, and a suppuration afterwards taking place, its progress in that case becomes always much more slow and uncertain than it would have been had a due attention been paid to these evacuations; nor will the patient be afterwards so able to bear, especially if it is considerable, the discharge that must necessarily ensue from opening the abscess.

Although it was remarked above, that if in general, in the course of three or four days, there does not some appearance of resolution occur, that suppuration will most probably take place, and that consequently a change of treatment becomes necessary; yet this, it must be observed, is only to be taken in a limited sense: for the time of desisting from one mode of treatment and commencing the other, must always depend very much on the seat of the inflammation; such disorders being, in some parts, much more apt to terminate in a speedy suppuration than in others.

Thus, in the cellular membrane, and in different soft parts, inflammatory disorders of all kinds terminate much more readily and quickly than when any of the tough membranous parts are affected. Hence, in the coats of the eye and of the testicles, very violent inflammations often continue for many days, nay, even for weeks, without either abating in the symptoms or ending in suppuration. In such cases, therefore, which go on even to a very considerable length, we need not be afraid of continuing the discutient applications for a much longer time than would in general be otherwise proper: we should never therefore be deterred from using them, unless either an evident suppuration has taken place, or there appears, from the violence of the symptoms, a certain risk either of gangrene or of some incurable obstruction; in which event, we are, no doubt, always to endeavour to procure the suppuration of the tumour.

When the means used for discussing or resolving an inflamed tumour have proved ineffectual, the next attempt of the surgeon ought to be to bring it to maturity as soon as possible; and for this purpose there is nothing better than to preserve a proper degree of heat in the parts. The method commonly had recourse

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Of bringing a tumour to suppuration.

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course for the application of heat to an inflamed part, is by the means of warm fomentations and cataplasms; and when these are regularly and frequently renewed, nothing, it is probable, could more effectually answer the purpose. But in the ordinary manner in which they are applied, by the cataplasms being renewed only once, or at most twice a day, they must always, it is imagined, do more harm than good. For so soon as the degree of heat they were at first possessed of is dissipated, the moisture kept up by them, with the consequent evaporation that ensues, must always render the part a great deal colder than if it had been merely wrapped in flannel without the use of any such application.

In order to receive all the advantages of such remedies, the part affected should be well fomented with flannels pressed out of any warm emollient decoction, applied as warm as the patient can easily bear them, continued at least half an hour at once, and repeated four times a day.

Immediately after the fomentation is over, a large emollient poultice should likewise be applied warm, and renewed every second or third hour at farthest. Of all the forms recommended for emollient cataplasms, a common milk-and-bread poultice, with a proportion of butter or oil, is perhaps the most eligible; as it not only possesses all the advantages of the others, but can at all times be more easily obtained.

Roasted onions, garlic, and other acrid substances, are frequently made use of as additions to maturing cataplasms. When there is not a due degree of inflammation in the tumour, and when it appears probable that the suppuration would be quickened by having the inflammatory symptoms somewhat increased, the addition of such substances may then be of service; but when stimulants are necessary in such cases, a small proportion of strained galbanum, or of any of the warm gums, dissolved in the yolk of an egg, and added to the poultices, is not only a more elegant, but a more certain form of applying them.

Whenever the inflammation, however, takes place to a proper degree, such stimulating substances never can be necessary; and in many cases, it is apprehended, they may even do mischief.

In such tumours as, from their being possessed of little or no inflammation, are commonly said to be of a cold nature, as they are generally indolent, and proceed very slowly to suppuration, plasters composed of the warm gums are often had recourse to with considerable advantage. In such cases, they are not only of use by the stimulus and irritation they occasion, but by the heat which they tend to preserve in the part. They become particularly necessary when the patient, by being obliged to go abroad, cannot have cataplasms frequently enough renewed, or so conveniently applied; but when some such objection does not occur, the latter, for very obvious reasons, should always be preferred.

Dry cupping, as it is termed, that is, cupping without the use of the scarificator, upon or as near as possible to the part affected, is frequently had recourse to with advantage in promoting the suppuration of tumours. It is only, however, in such as these last mentioned, where there seems to be a deficiency of inflammation, that it can ever either be necessary or

useful; but in all tumours of a real indolent nature, and where there is still some probability of a suppuration being effected, I have seldom observed such effects from any other remedy.

These different applications, under the restrictions taken notice of, being continued for a longer or shorter time, according to the size of the tumour, its situation, and other circumstances, a thorough suppuration may in general at last be expected.

Matter being fully formed in a tumour, is known by a remission of all the symptoms taking place: the dolor pulsatilis, that before was frequent, now goes off, and the patient complains of a more dull, constant, heavy pain: the tumour points at some particular part, generally near to its middle; where, if the matter is not encephaloid, or deep seated, a whitish yellow appearance is observed, instead of a deep red that formerly took place; and a fluctuation of a fluid underneath, is, upon pressure, very evidently discovered. Sometimes, indeed, when an abscess is thickly covered with muscular and other parts; and when, from concurring circumstances, there can be little doubt of there being even a very considerable collection of matter; yet the fluctuation cannot be readily distinguished: but it does not often happen, that matter is so very deeply lodged as not to be discovered upon proper examination.

This, however, is a circumstance of the greatest consequence in practice; and deserves, it may be remarked, more attention than is commonly given to it. In no part of the surgeon's employment, is experience in former similar cases of greater use to him than in the present; and however little it may appear, yet nothing, it is certain, more readily distinguishes a man of observation and extensive practice, than his being able easily to detect collections of deep-seated matter; whilst nothing, on the contrary, so materially affects the character of a surgeon, as his having, in such cases, given an inaccurate or unjust prognosis; as the event, in disorders of that nature, comes generally at last to be clearly demonstrated to all concerned.

Together with the several local symptoms of the presence of pus, already enumerated, may be mentioned the frequent shiverings that patients are liable to on its first formation: these, however, seldom occur so as to be distinctly observed, unless the collection is considerable, or seated internally in some of the viscera.

After the matter is fully formed, and the abscess brought to maturity, the only remedy is to open it, and give vent to the pus it contains. In many cases, indeed, nature will do the work, and abscesses when superficially seated will certainly burst of themselves; but where the matter lies deep, we are by no means to wait for this spontaneous opening; as the pus will acquire an acrimony, before it can break through the integuments, which may prove very prejudicial to health. However, it is a general rule not to open abscesses till a thorough suppuration has taken place; for, when laid open long before that period, and while any considerable hardness remains, they commonly prove more troublesome, and seldom heal so kindly.

In some cases, however, it is necessary to deviate from this general rule, and to open them a good deal sooner; particularly in all such critical abscesses as occur

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Signs of an abscess already formed.

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Of opening abscesses.

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common method of applying cataplasms improper.

Theory.

occur in malignant fevers. In the plague, too, we are commonly advised to open such tumours, so soon as they are at all tolerably advanced, and not to wait till they are fully matured; as, from experience in these disorders, it is found to be of more consequence, for the removal of the original disease, to have a quick discharge of matter produced, than any harm the patient can ever suffer from having a swelling somewhat prematurely laid open.

In abscesses, too, situated on any of the joints, or upon either of the large cavities of the breast and abdomen, and more especially when they seem to run deep, they should always be opened as soon as the least fluctuation of matter is discovered. For, when the resistance is on every side equal, they just as readily point internally as outwardly: and the consequence of a large abscess bursting into either of the large cavities especially, is well known most frequently to prove fatal: An instance of which, in the following case, with very little attention, might have been prevented.

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Case of an
abscess
breaking in-
wardly.

A surgeon of eminence, and of very extensive practice, was applied to by a young healthy-looking man, with a large abscess upon the left side of his chest. A fluctuation of a fluid was, upon pressure, very evidently discovered; and it was agreed, by other two practitioners that were present, that an opening should be made to give vent to the matter. But the operator, being much engaged in business, could not fix on an earlier period for doing it than the third day from the patient's applying to him: unluckily, however, the patient died suddenly in his bed the night before the abscess was to have been opened.

On examining the body, the tumour had disappeared entirely, without any external opening being observable; and, on opening the thorax, it was found to have burst inwardly upon the lungs, and so had produced immediate suffocation.

In every other circumstance, however, except in the cases alluded to, the rule in opening abscesses, is, as was already remarked, To allow a thorough suppuration to take place, before any vent whatever be given to the matter; and it being then determined to lay the collection open, the next question that occurs, is with respect to the manner of doing it. But the consideration of this belongs to the next Part.

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Of white
swelling.

Under the head of *abscesses*, we may reckon those tumours of the joints usually called *white swellings*; for though they never suppurate in such a kindly manner as the common abscess, yet they certainly contain collections of a kind of pus as much as the former.—The only regular treatise which has yet appeared on white-swellings is that of Mr Bell surgeon in Edinburgh. He observes, that there are two species of the disease; the one of a mild nature, and frequently admitting of a cure; which the other never does. The former, named by our author the *rheumatic* species of white swelling, begins with an acute pain, seemingly diffused over the whole joint, and frequently extending along the tendinous aponeuroses of the muscles which communicate with it. There is, from the beginning, an uniform swelling of the whole surrounding integuments; which in different patients is in different degrees, but always sufficient to occasion an evident disparity between the size of the diseased joint and the other. Great tension generally prevails; but

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Of the
rheumatic
white swell-
ing.

Theory.

in this period of the disorder there is seldom any external change of colour. From the commencement of the disease, the motion of the joint is attended with exquisite pain, and the patient keeps it constantly in a relaxed posture, finding that the easiest. Hence the tendons become extremely stiff and rigid, till at last the joints have the appearance of complete and real anchyloses. The swelling now begins to augment, till the joint has acquired three or four times its natural size: the cuticular veins become turgid and varicose; at the same time that the muscular substance of the limb below decays, though it frequently acquires an equality in size by becoming oedematous: the pain becomes intolerable, especially when the person is warm in bed or otherwise heated: abscesses form in different parts, which, either breaking of themselves, or by being laid open, discharge considerable quantities of matter, but without any remarkable effect in reducing the size of the swelling. The pus discharged from these is at first of a tolerably good consistency, but soon degenerates into a thin ill-conditioned sanies. However, the orifices from whence it flows soon heal up, unless they are kept open by art; and new collections breaking out, they burst and heal up as before; so that in long-continued disorders of this kind, the surrounding integuments are often entirely covered with cicatrices.

In the mean time the health of the patient gradually declines; first from the violence of the pain, which often deprives him of sleep and appetite; and then from the absorption of matter into the system, which always certainly takes place in some degree from its first formation in the different abscesses; but which indeed never appear so evidently till the different abscesses have been laid open; after which a quick pulse, night-sweats, and a weakening diarrhoea, are sure to occur, and which generally carry off the patient, if the member is not either amputated, or the disease cured some other way.

On dissection limbs which have been amputated for white swellings, the original disease appears to have ances on been a morbid thickening of the surrounding liga- dissection the limbs amputated for this species of white swelling.
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Appear-
dissection
the limbs
amputated
for this
species of
white swell-
ing.

ments, without any other affection of the joint whatever; the bones and cartilages always remaining perfectly sound, as likewise the synovia both in quantity and consistence. In some instances where the disease has been very violent, this thickness of the ligaments appears to have increased much more than in others where it was more mild. But in the more advanced stages of the disorder, when abscesses have formed in different parts, when the pain has been long very violent, with great addition of swelling, the thickness of the ligaments is then more considerable, and is generally, if not always, attended with an effusion, into the surrounding cellular substance, of a thick glairy matter, which gives to swellings of this kind an elastic springy feel, independent of the collections of matter above-mentioned, the fluctuation of which may also be perceived. Through this glairy matter the collections of pus are found to run in various directions, without seeming, however, to mix with it. In some instances a great many small hydatides are observed along with the collections of matter; all which form a confused mass, incapable of further dissection.

All the above-mentioned appearances have been observed

Theory. served without any affection of the bones or cartilages. But when, by a very long continuance of the disorder the ligaments come to be corroded by the different collections of matter, the cartilages then, and in consequence thereof the bones, soon begin to suffer. The tendons of the flexor muscles, though very stiff and contracted, do not, upon dissection, show any signs of disease.

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Of the
serophulous
white swelling
ing.
The above is an history of the most mild species of the serophulous white-swelling; the more inveterate kind our author names the *serophulous white swelling*. In this the pain is commonly very violent; more acute than in the former; and, instead of being diffused, is confined to a particular spot, commonly the very middle of the joint; so that patients will sometimes say they could cover the whole pained part with a crown-piece or less. The swelling also is commonly inconsiderable at first; inasmuch that, on some occasions, even when the pain has been very violent, little difference in point of size could be observed between the diseased joint and the sound one of the opposite side. Here also the motion of the joint is attended with very great pain, and the tendons become stiff, for the same reason as in the former. As the disorder advances, the pain becomes more violent, and the swelling increases, with an evident enlargement of the ends of the bones composing the joints. The same elastic feel, together with similar abscesses, occur in this as in the last: but upon opening them they commonly discharge a thin fetid stuff; the bones are found to be carious, and pieces of them are frequently discharged at the openings.

On the farther continuance of the disorder, the constitution comes here likewise to suffer as in the first species of the disease; and a diarrhoea with night-sweats commencing, the patient is soon reduced, from perhaps the fullest habit, to little more than skin and bone.

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Appear-
ances on
dissection
the ampu-
tated limbs.
Upon such joints being dissected, either after death, or after amputation of the member in the first stages of the disorder, the soft parts seem very little affected: but in all, even the very slightest cases, there is constantly observed an enlargement either of the whole ends of the bones, or of their epiphyses; frequently of those on one side of the joint only; in others, again, the bones on both sides have been affected.

This enlargement sometimes occurs without any other evident disease: but in general, and always in a more advanced state of the complaint, the soft spongy parts of such bones appear dissolved into a thin, fluid, fetid matter; and that too, in some cases, without the cartilages which surround them seeming much affected. In process of time, however, the cartilages come likewise to be dissolved; and then the different matter, viz. that of the bones and softer parts, all mixing together, such swellings being in that state laid open, exhibit a still more confused collection than is generally observed even in the worst stages of the other species of the disorder.

Although it was remarked, that in the early periods of the complaint, the surrounding soft parts do not always appear much affected; yet, in its farther progress, they likewise are always brought to suffer. The ligaments become thickened, and the contiguous cellular membrane stuffed with that viscid glairy kind

of matter as observed in the other species of the disorder.

Having thus given a particular account of the different appearances generally observed in both species of white swelling, we come now, in course, to the consideration of the different causes which tend to produce them. That the ligaments of the joints only are first affected in this disorder, is from the history of the dissections rendered evident; they, in the first stages of the complaint, being almost the only parts that are found diseased. The effusions, into the cellular membrane, of that thick glairy matter taken notice of, are probably occasioned by an exudation from the vessels of those ligaments that have been originally inflamed, it being known that such parts never furnish a proper fluid for the formation of purulent matter: In the course of the disease, indeed, abscesses containing real pus do always appear; but never till inflammation has been communicated to the surrounding parts, which more readily afford a fluid proper for that purpose.

Upon the whole, therefore, we may conclude, that the first species of white swelling is always occasioned by an *inflammatory or rheumatic affection* of the ligaments of such joints as it attacks, and that too from whatever cause such inflammation may originally have proceeded.

The other species of the disorder, from all the symptoms enumerated, and from the appearances on dissection, seems evidently to be originally an affection of the bones; the surrounding soft parts coming only to suffer in the progress of the disease, from their connection with and vicinity to these.

This last species of white swelling very seldom occurs as the consequence of any external accident; generally beginning without the patient being in the least able to account for it: And from the effects which it usually produces on the bones attacked, it would appear to be a species of the real *spina ventosa*; and which again is very probably a disease of the same nature in the bones, as serophula is of the soft parts. Indeed, the appearances of the two disorders, after making allowance for their different situations, are exceedingly similar: they both begin with considerable enlargements or swellings of the parts they invade; which afterwards in both, too, generally end in evident ulcerations; and they both likewise frequently occur in the same person and at the same time.

It is likewise observed, that this species of white swelling is generally either attended with other evident symptoms of serophula subsisting at the time; or that the patient in an early period of life has been subject to that disease; or, what is nearly the same, that he is descended from serophulous parents, and consequently most probably has the seeds of that disease lurking in his constitution.

From all these circumstances, it may with probability be concluded, that this species of white swelling is commonly, if not always, of a serophulous nature: and it having already been shown, that the other species of the disorder is to be considered as an inflammatory, or what we have termed a *rheumatic*, affection; and a thorough distinction of the two different species being, in the treatment, a matter of very great importance; it will not here be improper to

give

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Causes of
white swell-
ing.

Theory.

give a short enumeration of the several diagnostic or most characteristic symptoms of each.

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Diagnostics
of the dif-
ferent
species of
the disease.

The pain in the white swelling from a rheumatic disposition is, as was formerly remarked, always, from the beginning, diffused over the whole joint, and on some occasions extends even a considerable way along the muscles that are attached to it; whereas, in the other species of the disorder, the pain is not only always at first, but sometimes even when the complaint has been of considerable standing, confined to a very small circumscribed space.

In the former, the swelling is always confined to the soft parts, and is from the beginning exceedingly evident: but in the latter, there is seldom for some time any perceptible swelling; and when it does more sensibly appear, the bones are found evidently to be the parts chiefly affected, the surrounding teguments coming only to offer on a farther progress of the disease.

These are the chief local differences of the two species of this disorder; but some assistance in the distinction may likewise be obtained, from the general habit of the patient, and from the manner in which the complaint may seem to have been produced.

Thus, when such swellings occur in young, strong, plethoric people, especially in such as have formerly been subject to rheumatism, and that whether in consequence of an immediate external accident or not, such, most probably, will always prove to be of the mildest or rheumatic species of the disorder.

Whereas, when swellings of this nature appear in such patients as are otherwise evidently of scrophulous dispositions; where, together with a fine skin and delicate complexion, there are either, on examination, found hardened glands in the neck, arm-pits, or inguina; or it is discovered that the patient has, from his ancestors, a title to such complaints; when either any or all of these circumstances occur, and if the disorder has begun in the manner formerly described, without any evident external cause, we need be under very little doubt in concluding it to be of a scrophulous nature.

The great utility of properly distinguishing the two different species of white swellings, appears in no circumstance so evident as in the treatment. In the one, there being some chance, by proper remedies, of being serviceable to the patient; whereas in the other, *viz.* the scrophulous, it is not probable that art will ever be able to afford much assistance.

In the rheumatic white swelling, as it is always at first evidently of an inflammatory nature, considerable advantages are commonly obtained by a due attention to a proper antiphlogistic course.

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Method of
cure in the
rheumatic
white swell-
ing.

The first remedy which, with this view, should be put in practice, is blood-letting; but instead of general evacuations from the arm or elsewhere, it proves always more effectual to take the blood immediately from the part affected. Cupping and scarifying is here a principal remedy. The instrument should be applied to each side of the diseased joint; on each side of the rotula, for instance, when the knee is the part affected, and at least eight or ten ounces of blood discharged; and this to be repeated at proper intervals, once, twice, or oftener, according to the violence of the symptoms and state of the patient's strength at the time.

In the ordinary way of discharging only an ounce or two of blood by this operation, it has in general very little or no influence; but in the quantities mentioned, and which, by those accustomed to the practice, is commonly easily obtained, it most frequently is attended with very considerable effects.

It must here be observed, that cupping is, in these cases, much superior to leeches; which is not only a more tedious method of getting the same quantity of blood, but the swelling occasioned by the application of any considerable number of these animals proves frequently very troublesome; and, what is often of worse consequences, gives sometimes an interruption, for a time, to the use of other remedies.

Upon the anterior part of the joint, where the cupping-glasses have not been placed, a small blister should be directly applied, and the part kept open with issue-ointment, till the wounds from the scarificator are so far healed, that a vesicatory may likewise be laid on one side of the joint; and so soon as that is nearly healed, the other side should be also blistered.

By thus alternately applying them, first to the one side, and then to the other, almost a constant stimulus is kept up; which, in deep-seated inflammations, seems to have fully a greater influence than all the discharge occasioned by blisters.

Gentle cooling laxatives at proper intervals are here of use too; and the patient should, in every respect, be kept upon a strict antiphlogistic course, both as to diet and every other circumstance. From a due attention to which, with a continuance of the topical treatment already recommended, considerable advantages have frequently been observed, more indeed than from any other remedies ever used in this complaint.

It is in the first stages only, however, of the disease, that such a course can probably be of much service; and in such it has frequently been a means of curing disorders, which otherwise would probably have proceeded to the last stages of white swellings.

The original inflammatory affection being once over, these sort of drains seem to have little or no influence, and ought not then to be long persisted in, as tending to prevent the use of other remedies, which, in an advanced state of the disease, prove commonly more efficacious.

The inflammation being mostly gone, and while there are yet no appearances of the formation of mat-
ter, mercury, in these circumstances, has sometimes been known of use; not given so as to salivate, but merely to affect the mouth gently, and to keep it somewhat sore for a few weeks.

The best form of using mercury, in such cases, is certainly by way of unction; as it allows, at the same time, of the application of friction; which, in all such swellings, may of itself be in some measure considered as a remedy. For this purpose, an ointment of quicksilver and hog's lard should be prepared; but with so small a proportion of the former, that the patient may admit of two drams of the ointment being rubbed in three times a-day. In order to rub that quantity of the medicine in with gentle friction, an hour each time is at least necessary, and which is as little as should ever be given in order to receive all the advantages that attend the practice: for however useful friction,
in

Theory.

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When mer-
cury is use-
ful.

Theory. in such cases, may be, when properly applied, in the ordinary way of continuing the remedy for a few minutes only, it is not probable it can ever have much influence.

Gentle mercurials, given internally, are here sometimes of service too; but as all the advantages to be derived from them in that form are obtained from the union, together with that of the friction necessary for its application, the latter, in all such cases, should certainly be preferred.

By Le Dran, and other French writers, falls of warm water on swellings of this nature are much recommended; and there is no sort of doubt, but a long-continued and reiterated application of that remedy may, in the first stages of such complaints, be often attended with very good effects.

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A stiffness of the joint sometimes remains after white-swellings.

By a proper use of these different applications, *viz.* of the several topical remedies in the first or inflammatory state of the disease, and afterwards (still, however, before the formation of matter) of mercurials, friction, &c. many affections of this nature have been entirely removed. But in many instances, when, either by the use of medicines, or by an effort of nature, the swelling and pain are almost entirely, or even wholly removed, it frequently happens, by the bent position the limb has been for a long time kept in, that the use of the joint comes to be entirely lost, having often acquired such a degree of stiffness, that any attempts to move it are commonly attended with very great pain.

260
Mistakes concerning stiffness of the joints.

Unluckily, in all such cases, these affections of the joints have been constantly attributed to one or other of two different causes, which are both in their nature incurable, *viz.* either to the ends of such bones as compose the joints having run into one another, so as to become firmly conjoined in consequence of the surrounding cartilages being abraded; or to the inspissation, as it is termed, of the synovia of the joints, whereby their cavities are supposed to be entirely filled up, and no space thereby left for the future motion of the different bones.

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Mr Bell's opinion.

"Both these opinions, however, (says Mr Bell), I can, from a great number of facts, assert to be in general at least very ill founded: for although, by an abrasion of the cartilages which surround the different bones at the joints, an union of their extremities may very readily be occasioned, and is no doubt on some occasions the cause of such affections; yet from a variety of dissections, I am convinced that it is an exceeding rare occurrence, and, in cases of white swelling, never happens but in the most advanced stages of the disorder: the only causes almost of the stiffness of the joints, in such cases, being that contracted state of the flexor tendons, formerly taken notice of in the description; at least, in nineteen cases out of twenty, it probably is so.

"There is nothing indeed more deceiving than the feel on such occasions: for when the disorder has been of long standing, the stiffness and immobility are generally so considerable, as, at first sight, always to appear as if a real conjunction of the bones certainly subsisted; many instances of which I have known, that had been all along considered as real anchylosis of the joint kind; but which, on dissection, were constantly

found to proceed merely from a contracted state of the flexor muscles and tendons.

"With respect to the other opinion, which did formerly so universally, and with many still does, prevail, of such affections generally proceeding from an inspissated state of the synovial fluid, it has for some time, by many anatomists, been much doubted if it ever occurs; and from all the opportunities I have had of dissecting such diseased joints, I am pretty much convinced, that it either never does take place, or at least that it is an exceeding rare occurrence: for in every case of this kind, even when the disease had been of very long continuance, if the capsular ligament of the joint remained undivided, so that no matter from the surrounding soft parts got admittance, and when the ends of the bones were not become carious, the synovia always retained its natural appearances both in colour and consistence. So that it is very probable, the many causes of diseased joints, attributed to affections of that fluid, have been more founded on mere hypotheses than on facts and experience.

"This stiffness of the joint, therefore, which to a certain degree always occurs in white swellings, proceeding seldom or never from either of the causes mentioned, which might probably both be considered as incurable, but merely from a preternatural contraction of the muscles and tendons, we have from that circumstance great reason to expect, that in many situations a good deal may be done towards its removal. And in fact, there is no sort of doubt but complaints of this kind, which often remain after every other symptom of white swelling has disappeared, may, on many occasions, be got the better of, merely by a long-continued use of emollients: several instances, indeed, of this I have seen, some of which had been thought to be of the worst species of anchylosis.

"The best, and probably least offensive, emollient that can be used, is pure olive oil applied warm; as much of it as can be easily rubbed in by an hour's gentle friction should be regularly done at least three times a-day; and instead of confining the friction altogether to the rigid tendons, as is commonly done, it should be extended over the whole muscles, even to the insertions of their other extremities; but more especially on their fleshy muscular parts, where the principal cause of the continuance of such complaints is probably seated; these parts being chiefly, if not altogether, possessed of the contractile, and consequently of the resisting, powers.

"I have known used, too, in this complaint, as an emollient, and often with advantage, an oil extracted from animal-substances, known by the name of *neats foot oil*: but as it is more apt to turn rancid than olive oil, it is not therefore such a pleasant application; and not being possessed of any superior relaxing properties, the other will probably, for that reason, be commonly preferred.

"The disorder now under consideration, *viz.* a stiff joint, is so evidently one of those which particularly require the use of emollients, that almost every old woman has some particular form or other of recommending them; one of which I cannot avoid mentioning, as I have frequently known it used, and in two cases particularly, with very evident advantages,

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Oil olive the best emollient.

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Neat's-foot oil some-what inferior.

Theory.

Theory.

viz. the web or omentum of a new-killed sheep, or of any other animal, to be applied over all the diseased parts directly on being cut out of the animal.

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Omentum
of a new-
killed ani-
mal re-
commended

"In the two cases alluded to, one was in the knee, and the other in the hand; and the joints, from having been totally useless, were almost perfectly restored. The application should be renewed as frequently as possible, once a-day at least, or oftener when it can be done; for on being more than four or five hours applied it becomes disagreeable; and after that time, indeed, as it commonly turns stiff, it cannot then probably be of much service. The same kind of remedy, used in somewhat a different manner, I find recommended by Lieutaud, a celebrated French practitioner.

"I have been the more particular on this part of the subject, as I have often thought, with a little attention, the use of many joints might be recovered, which, from a mistaken notion concerning their causes, have generally from the first been considered as incurable.

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Treatment
of a white
swelling
when mat-
ter is form-
ed in it.

"The disorder has hitherto been supposed not to be so far advanced as to have occasioned the formation of matter; for when come that length, no considerable advantages can be expected from any of the remedies as yet recommended: but even in that state of the complaint, if the patient's health does not absolutely require it, amputation of the member should by no means be immediately had recourse to, as it most frequently is. For by paying attention to open the different abscesses soon after their formation, the matter may in that way be pretty certainly prevented from destroying the capsular ligaments of the joints, which, if once effected, would no doubt in time render that operation necessary.

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Of the pro-
per period
for ampu-
tating limbs
affected
with white
swellings.

"It may be here observed too, with respect to the most proper period of the disease for amputating such limbs, that, even in point of success from the operation, it ought never to be advised till the complaint is pretty far advanced: for though, *a priori*, it might be imagined, that the more early in the disease amputation of the member is had recourse to, the more successful it should prove; and although this, indeed, has been made a common argument for amputating very early in every case of white swelling, yet, however plausible the observation may appear, it will not, from experience, I am certain, be found to hold good. For in this disorder especially, I have constantly observed, that amputation has more frequently succeeded, that is, a greater proportion of such patients have recovered from it, who have previously been considerably reduced by diarrhoeas and other weakening symptoms, than of such as have still remained in a full plethoric habit of body.

"In the former, when the constitution has not been too much broken, and which practitioners have always in their power to guard against, the several symptoms of hectic which previously took place, are commonly removed in a very few days after the limb is taken off. No high inflammatory affections are ever produced; the patient daily mends in his health; and a complete cure, if the patient has not been too much reduced, is generally very soon obtained. In the latter, again, the very reverse of all these circumstances occur: the pa-

tient, from being in high health at the time of the operation, is generally thrown into a smart inflammatory fever; which is no doubt very often got the better of, but which frequently either carries off the patient immediately, or produces such effects as he never thoroughly recovers from.

"So that in no case whatever should amputation be had recourse to, until every probable means for saving the limb has been tried in vain.

"All the different observations hitherto made upon the treatment, relate particularly to the rheumatic species of the disorder; and when had recourse to in time, and duly persisted in, they will frequently be found of service: but when the disease is so far advanced as to have destroyed the capsular ligaments of the joint, and perhaps even the cartilages and bones themselves, amputation of the member is then no doubt the only resource.

"In the more fatal species of white swelling, *viz.* A scrophulous white swelling not to be cured but by amputation, and even that not to be depend-

"In the small joints, when the diseased parts of the bone begin to cast off, a cure may in that way, by assisting the efforts of nature, be sometimes obtained; but in all the large joints, as the knee, ankle, &c. it is not probable that any other resource than amputation will ever afford much relief. And even the effects of that operation can seldom be depended on as lasting; for when the general scrophulous taint still subsists in the constitution, the disorder will most probably appear again in some other part; which, however, in the advanced stages of the disease, it is sometimes necessary to run the risk of, the pain being often so tormenting as to make it more eligible to submit to any hazard rather than to bear it longer.

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When pal-
tation is determined against, as there being almost a certainty of the complaint soon returning, from the scrophulous disposition appearing very strong in the system, it then becomes necessary to have recourse to palliatives, so as to render the complaint as tolerable as possible; and with this view, opiates in large doses, by moderating the pain and procuring rest to the patient, will in general be found the principal remedy. In other respects, all such medicines and articles of regimen as are found beneficial in scrophula, may be had recourse to."

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Of encysted
tumours.

To the head of abscesses we may likewise refer those tumours which are contained in cysts, and which sometimes increase to an extraordinary size. These appear on the head, the eyebrows, or other parts of the body, and are at first but of a small size. They are seated in the adipose and cellular membrane; whence it not unfrequently happens that they take place in the viscera themselves, where they are almost always mortal. The contents of these tumours are very different in consistence. Sometimes they are filled with a substance of the consistence of honey, and are then thence called *mucigerous* tumours; sometimes they are filled with an harder substance, and are then called *atheromatous* tumours; at other times they are filled with a substance of the consistence of fat, and are then called

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A scrophulous white swelling not to be cured but by amputation, and even that not to be depend-

268
When pal-
tation is determined against, as there being almost a certainty of the complaint soon returning, from the scrophulous disposition appearing very strong in the system, it then becomes necessary to have recourse to palliatives, so as to render the complaint as tolerable as possible; and with this view, opiates in large doses, by moderating the pain and procuring rest to the patient, will in general be found the principal remedy. In other respects, all such medicines and articles of regimen as are found beneficial in scrophula, may be had recourse to."

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Of encysted
tumours.

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Different
kinds of
them.

Theory.

Theory.

called *scatomatous*. Sometimes, however, they are found to be replenished with a fluid lymph coagulable by fire, and are then called *hydatids*.

Tumours of this kind are easily distinguished from all others, as having neither heat, pain, nor pulsation, as is to be observed in those which incline to suppurate. Sometimes, however, they will burst like abscesses, and the matter which is in them will flow out; but unless the whole cyst which contained it be removed, the ulcer refuses to heal, and even sometimes degenerates into a cancer.

Encysted tumours are often the consequence of an itch, *tinea capitis*, or other cutaneous disorder; and sometimes they arise after ulcers have been hastily dried up: but it also frequently happens that people are born with them, or that they arise spontaneously without any apparent cause.—When they are recent, and neither very large nor hard, they may sometimes be dissipated by the application of the common topical remedies made use of for resolving inflammations. But if these should not succeed, the only method is to dissect off the bag from the parts to which it adheres, preserving it as much as possible from being wounded; because then the operation becomes more difficult. If this cannot be done, they must be consumed by caustic; and where this operation is performed in time, there is seldom any danger, though Plater instances a young man who died in consequence of a very large tumour of this kind on the scapula, which had arisen after a *tinea capitis*.

Tumours akin to these frequently are met with in the eye-lids. Sometimes they are of a soft consistence, and sometimes harder: but the cure is the same in both, namely excision; carefully observing to take off all the roots, either by caustic or the knife, lest the distemper should return.

Ganglions of the tendons may also be taken notice of here; which though they never come to suppuration, yet sometimes break, and discharge a fetid sanies. These arise in the tendons which are most employed in the common offices of life; and hence are frequently to be met with in the tendons of those muscles which move the fingers. Plater gives an instance of a ganglion which destroyed the patient. It was situated on the *tendo Achillis*; and took its rise from the person's jumping out of a carriage, at which time he felt an acute pain in that part. A tumour began to arise on the inside of the tendon; which being thus compressed, swelled out on each side of it. Being situated in such a place, surrounded with membranous parts, the wounding of which would have been very dangerous, surgeons of character declined the performing of any operation upon it; but the patient having applied to some empirics, the tumour, by means of their applications, increased to the size of the man's head, and at last began to discharge an ichor, at the same time that he was seized with an hectic. Amputation was now proposed: but as the patient refused to submit to the operation, an incredible quantity of putrid sanies discharged itself daily from the place; which increasing the fever, soon destroyed him. All this time the tumour, though grown hollow by the discharge, yet increased in its circumference at the bottom; so that the two opposite sides of it almost met on the fore-part of the leg.

In the cure of ganglions, we are never to attempt to bring them to suppuration: for of this they are incapable; and if unfortunately they should increase in size and burst, they will only discharge such an ill-conditioned sanies as that above-mentioned. The only method, therefore, is to attempt discussion. This is frequently accomplished by friction, and keeping a piece of lead on the part. Some commend plasters of different kinds; but as all of these are of a relaxing nature, there is great danger of their increasing the bulk of the tumour, at the same time that they render it softer. If, however, discussion shall be found impracticable, these tumours may be extirpated with the knife; but in such operations, great care is to be taken not to wound the tendon, lest the mischiefs already enumerated, arising from such wounds, should ensue.

The only other kind of tumours which can be referred to the head of abscesses, are those very malignant ones called *cancers*.—These most commonly arise in the glandular parts of the body, where they are occasioned by any bruise or contusion, sometimes a very slight one: and hence they are more common in the lips, and in the breasts of women, than in any other parts of the body.—Cancers have been generally distinguished into *occul* and *open*. By the former are meant such hard scirrhus swellings as are attended with frequent shooting pains, and which at last generally terminate in the latter.

By the *open cancerous ulcer*, is understood that species of sore which commonly succeeds to hard swellings of the glands; although in some instances it occurs without any previous hardness. The edges of the ulcer are hard, ragged, and unequal, very painful, and reversed in different ways, being sometimes turned upwards and backwards, and on other occasions inwards. The whole surface of the sore is commonly very unequal, there being in some parts considerable risings, and in others deep excavations. The discharge, for the most part, is a thin dark-coloured fetid ichor; and is often possessed of such a degree of acrimony as to excoriate, and even destroy, the neighbouring parts. In the more advanced stages of the disease, too, by the erosion of blood-vessels which occurs, considerable quantities of pure blood are sometimes discharged.

Patients labouring under real cancerous affections, universally complain of what they term a *burning* heat over the whole ulcerated surface; which in general, it may be remarked, is the most tormenting symptom that attends the disorder; and those shooting lancinating pains, which were troublesome in the more occult state of the complaint, become now a great deal more so.

These are the most frequent symptoms which attend an ulcerated cancer; but the appearances of such sores are so various, that it is almost impossible in any description to comprehend every one. When two, three, or more, however, of those enumerated, concur together in the same ulcer, we may always be pretty certain of its being of the cancerous kind.

Concerning the causes of cancers, there have been a great many conjectures, but without any solid foundation. It is of some moment, however, to determine whether they arise from some general disorder in the system,

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Causes of
these tu-
mours.

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Tumours
in the eye-
lids.

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Of gan-
glions in
the tendons.

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They can
only be cu-
red by dis-
cussion or
excision.

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Of
cancers.

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How distin-
guished.

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Symptoms
of an ulce-
rated can-
cer.

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Of the cau-
ses of can-
cer.

Theory.

system, or whether they are only to be accounted local diseases. Many of the most eminent practitioners have been of opinion that they arise from a general disorder of the system; and hence consider them as totally incurable even by extirpation, as the latent seeds of the disease, in their opinion, will not fail to bring on a return of it somewhere or other. Of this opinion the late Dr Monro appears to have been; and in a paper on this subject in the Edinburgh Medical Essays, declares, that "of near 60 cancers which he had been present at the extirpation of, only four patients remained free of the disease at the end of two years." From this bad success, and the violent progress of the disease, he finally concludes against the extirpation of cancers, and proposes only the palliative method of cure. But later practitioners have been a great deal more successful; and a late publication by Mr Hill surgeon at Dumfries has put the usefulness of extirpation beyond a doubt, when the operation is performed in time: though, after the disease has continued long, and the virus been absorbed, the whole system acquires a cancerous disposition, and the disease almost certainly recurs in some other part. From internal medicines we can expect little or nothing in the cure of cancers; and external applications can do no more than palliate. Great expectations were formed from the powder and extract of cicuta; but it has so universally failed, that few put much confidence in it at present. However, it has sometimes been of service in cases of a simple indurated gland; and even where the disease has been farther advanced, it has produced a better discharge, and diminished the fetor of the sore; but as it cannot be depended upon for a radical cure, a delay of the operation is never to be recommended.

SECT. V. Of Hernia.

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Definition
of an her-
nia.

THE name of *Hernia* might with propriety be applied to every swelling occasioned by the dislodgment of parts from those boundaries within which, in a state of health, they are contained; but the general acceptance of the term implies a tumour produced by the protrusion of some part or parts from the cavity of the abdomen.

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Situation
and con-
tents of
hernia.

The parts in which these swellings usually appear, are the groin, scrotum, labia pudendi, the upper and fore part of the thigh, the umbilicus, and in different points between the interstices of the abdominal muscles.

If the situation of such tumours be various, the viscera which produce them are still more so; instances having occurred of the stomach, uterus, liver, spleen, and bladder, being found to form their contents. But a part of the intestinal canal, or a portion of the omentum, are from experience known to be the most frequent cause of their formation.

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Their dif-
ferent ap-
pellations.

From these circumstances of situation and contents, all the different appellations are derived by which hernia are distinguished. Thus they are termed *inguinal*, *scrotal*, *femoral*, *umbilical*, and *ventral*; from their appearing in the groin, scrotum, thigh, navel, or belly. When the tumour is confined to the groin, the hernia is said to be incomplete, and is termed *bubonocoele*; but when the swelling reaches down to the bottom of the scrotum, the rupture is then supposed

to be complete, and the disease obtains the name of *scrotal rupture*, or *oshibocoele*.

When a portion of gut alone forms the tumour, it is called an *enterocoele*, or *intestinal hernia*; when a piece of omentum only has got down, it is termed *epiplocele*, or *omenta hernia*; and if both intestine and omentum are down, it is called an *entero-epiplocele*, or *compound rupture*.

A portion of some of the abdominal viscera getting into the tunica vaginalis testis, forms that species of hernia to which new-born infants are liable, termed by Haller the *hernia congenita*. The testicle and protruded intestine being here in contact with one another, the tunica vaginalis testis forms the hernial sac.

If the gut, or other parts which have fallen down, be again pushed into the abdomen, and are retained there by proper bandages, or any other means, in that case the passage is soon closed up, and no return of the disorder is observed. But this being neglected, and the gut being allowed to remain long down, the parts forming the passage seem thereby in a great measure to lose that power of adhesion which naturally they are known to possess: instances of such cases having occurred where no art has been able to produce this wished-for obliteration of the opening.

The hernia congenita is usually produced in the manner now described: it is probable, however, that the same disorder may, and frequently does, occur from this passage between the abdomen and testicle, after having been once closed, being again rendered pervious, in consequence of the parts being over-stretched by those violent fits of coughing, crying, and other convulsive affections to which children soon after birth are now and then liable. The intestinal canal and other viscera being on such occasions pushed with violence against all the containing parts, these will most easily give way where the least degree of firmness occurs; and this we may readily suppose will most probably happen in such parts as have been most recently united. In this manner, it is probable that the greatest proportion of those cases of hernia are produced which occur in the early months of infancy; and it is probable, that in some occasions, in more advanced periods of life, the same species of hernia may likewise occur from the same cause.

The causes which tend to the production of hernia in its more usual form, are as follows:

I. The containing parts of the abdomen we know to be elastic and compressible; whatever, therefore, tends to produce a diminution of capacity in the cavity of the abdomen, must occasion a proportional degree of risk of some of the contained parts being pushed from their natural situations. Violent coughing, crying, laughter, or great bodily exertion, are attended with more or less contraction of the abdominal muscles, and particularly of the diaphragm; and as the contraction of these muscles must always diminish the abdominal cavity, these causes therefore are frequently found to be productive of hernia.

II. Falls, in consequence of the derangement they produce in the abdominal viscera, from the sudden and violent shock with which they are often attended, are not unfrequently the immediate causes of hernia.

III. Persons of a preternatural laxity of frame are very liable to hernia. The containing parts of the abdo-

Theory.

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Of the her-
nia conge-
nita of in-
fants.

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How pro-
duced.

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Of the cau-
ses of her-
nia in its
usual forms.

men

Theory. men, from the want of a sufficient tone and firmness, are unable in such people to resist on all occasions the weight of the different viscera; and they are therefore more particularly exposed to disorders of this kind on the slightest application of any of the causes already mentioned.

IV. Sprains are apt to induce a laxity of the part injured; and have therefore a similar influence in inducing hernia with general laxity.

V. It has been observed, that the people of those countries where oil is much used as an article of diet, are particularly liable to hernia.

In whatever parts the parietes of the abdomen happen to be weakest, these various causes will most readily operate in producing hernia; and accordingly we find, that descents of the bowels usually occur only in such parts.

The parts which from anatomy we would *a priori* suspect to be most liable to such protrusions, are the openings in the external oblique muscles; the arch formed by Poupart's ligament for the passage of the great blood-vessels of the thigh; and the umbilicus, where the same degree of firmness does not take place as is met with in the rest of the tendinous expansion of the abdominal muscles. Sometimes, however, it happens, that parts of the viscera are protruded between the interstices of the different muscles of the abdomen; but these are not frequent occurrences.

In whichever of these situations a protrusion of any portion of the intestines occurs, except in the case of the hernia congenita, as all the viscera are contained within the peritonæum, a portion of that membrane, it is evident, must be carried down together with the parts protruded; and in every such instance, it is this portion of the peritonæum, which goes down along with the gut, that is termed the *hernial sac*. The size of this sac is various in different subjects, and in different stages of the same disorder.

On the first appearance of the disease, the sac is commonly of no very considerable size, as such swellings seldom acquire any great bulk at once; but by repeated descents of the bowels, the sac comes to be pushed lower and lower, till in some instances its bulk becomes very considerable indeed; and when in this advanced period of the disorder the sac happens to be laid open, it is found to contain either large quantities of omentum or intestine, and frequently large portions of each.

As the peritonæum has this property in common with many other parts of the body, of thickening according to the degree of any gradual extension applied to it, so in many instances the thickness and firmness of the hernial sac are often really astonishing.

Although every instance of a bowel protruded from its natural situation is to be considered as a derangement, and as such ought to excite our attention for its reduction; yet daily instances occur both of recent hernia, and of those of longer standing, in which no bad symptoms are produced from such protrusions of the viscera. Thus it is well known, that hernial swellings of every kind very frequently happen, without the patient suffering in any other manner than from the inconvenience arising from the bulk of the tumours. But in general the case is otherwise; troublesome symptoms most frequently occur; and at all events,

when the reduction of a hernia can be accomplished with any kind of propriety, it ought always to be effected as quick as possible.

All the bad symptoms which are found to occur in hernia, proceed, as may be readily supposed, either from obstruction to the passage of the faeces when the intestinal canal forms the tumour, or from a stoppage of circulation occasioned by stricture on the prolapsed parts; so that the attending symptoms, it is evident, will be always more or less hazardous, according to the nature of the parts so protruded.

Thus, when omentum alone forms the substance of hernial swellings, as that organ does not appear to be so immediately necessary for life as many of the other viscera, such tumours accordingly are not so frequently productive of bad consequences, at least they are seldom in any degree so hazardous as when a part of the alimentary canal is either protruded by itself or along with omentum.

Although this, however, is in general the case; yet it does sometimes happen, that even an omental rupture is productive of no small degree of danger. When a stricture so complete upon it occurs as to occasion a stoppage of circulation in the protruded part, mortification with all its bad consequences must be the certain event: And besides, the connection between the omentum, stomach, and other viscera, is such, that a sudden descent of any considerable portion of the former sometimes brings on vomiting, hiccup, and other troublesome symptoms: And lastly, although a rupture containing omentum only, might not of itself produce any thing bad; yet as the passage through which the omentum has slipped, must of necessity continue open so long as that viscus remains protruded, and as that circumstance alone must so long as it continues render it more easy for a portion of gut likewise to get down, this of itself is a sufficient reason for even this species of hernia deserving the serious attention of practitioners.

But whatever the contents of such swellings may be, as their remaining in some instances for a considerable length of time without being productive of any bad symptoms, must proceed entirely from the circulation continuing to go freely on, notwithstanding the derangement of parts; so, whenever a stricture occurs upon the protruded viscera, sufficient to produce either a stoppage of the circulation, or of the fecal contents of the alimentary canal when a portion of gut forms the disease, the following in general are the symptoms which accrue.

An elastic colourless swelling is observed at the part affected. A slight pain is felt not only in the swelling itself, but, if part of the alimentary canal is down, an universal uneasiness is perceived over the whole abdomen; and this pain is always rendered worse by coughing, sneezing, or any violent exertion. The patient complains of nausea; frequent retching; can get no discharge by stool; becomes hot and restless; and the pulse is commonly found quick and hard. When the swelling is entirely formed by a portion of gut, if no faeces be contained in it, it has a smooth, equal surface; and is easily compressible, but instantly returns to its former size on the pressure being removed: but, in gut-ruptures of long standing, where hard faeces have collected in the protruded bowels, considerable

Theory.

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Causes of the bad symptoms attending hernia.

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An omental hernia the least dangerous.

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Yet may sometimes bring on a mortification.

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Enumeration of the symptoms attending a hernia with stricture.

able

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Of the hernial sac.

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An hernia of long standing becomes enlarged in bulk, and has its sac thickened.

Theory.

able inequalities are detected. When again the tumour is composed both of gut and omentum, its appearance is always unequal, it feels soft and somewhat like dough, and of course is not so elastic as when part of the intestinal tube only is down; for although, like the other, it is compressible, it does not so readily regain its former dimensions on the pressure being taken off.

It has been a received opinion, that in cases of strangulated hernia the symptoms should be less violent when the intestine is accompanied by a portion of omentum, than when gut alone is down. Little or no difference, however, is produced by this circumstance; for when a gut becomes obstructed and inflamed, the symptoms thereby induced are nearly the same whether the omentum be down with it or not.

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These symptoms cannot be occasioned by the mere descent of the omentum.

It will be readily supposed, however, that the symptoms we have described never can happen from the presence of omentum *only*: For although stricture produced on a portion of omentum, even when no part of the intestinal tube is down, does now and then occasion a good deal of distress, such as pain in the part, sickness, vomiting, and twitching pains through the whole belly; yet no obstruction of the gut ever occurs from this, and of course none of the symptoms ever prove so alarming as when any part of the gut is affected. If these symptoms we have described as being produced by a strangulated gut, are not now obviated by a removal of the stricture which produced them, the nausea and retching terminate in frequent vomitings, first of a bilious, and afterwards of a more fetid matter; the belly becomes tense; the pain turns more violent; a distressing convulsive hiccup comes on; the fever, which before was not apparently of much consequence, now becomes very formidable; and a total want of rest, with a very disagreeable state of anxiety, continues through the whole course of the complaint.—These symptoms having gone on with violence for some time, the patient is at last commonly suddenly relieved from all manner of pain; when he flatters himself every risk is for certain over. But instead of that, the pulse, from having been hard and frequent, becomes languid and interrupted; cold sweats break out over the whole body, but especially on the extremities; the eyes acquire a kind of languor; the tenderness of the abdomen subsides, and the swelling of the part affected disappears; the teguments covering the parts, which before were either of a natural appearance, or had somewhat of a reddish inflamed cast, now acquire a livid hue, and a windy crepitous feel is distinguishable all over the course of the swelling. If the protruded parts have not of themselves gone entirely up, their return is now in general easily effected by a small degree of pressure, and the patient then discharges freely by stool; but the cold sweats increasing, the hiccup turns more violent, and death itself is at last ushered in by its usual forerunners, subsultus tendinum, and other convulsive twitchings.

These are the ordinary symptoms of what is termed a *strangulated or incarcerated gut-hernia*: that is, when the parts protruded become so affected by stricture as to produce pain; and do not either return to their natural situations on the patient's getting into a hori-

zontal posture, or cannot even be immediately replaced by the hands of a practitioner.

In whatever situation a strangulated hernia occurs, the only rational method of cure, it is evident, must consist in the removal of that stricture which prevents the return of the protruded parts. It is that stricture which ought to be considered as the cause of all the mischief; and unless it be removed, nothing effectual can be done for the relief of the patient.

Various methods have been attempted by practitioners for the removal of stricture in these disorders; all of them, however, may be comprehended under two general heads.

I. Such as effect a reduction of the protruded parts, without the interposition of incision or any surgical operation properly so called; and,

II. A division of the parts producing the stricture, so as to admit of a replacement of the deranged viscera, constituting what is termed the *operation for the hernia*.

The remedies to be employed for accomplishing the first of these, are, a proper posture of the patient, with the manual assistance of a practitioner; blood-letting, stimulating glysters, opiates, the warm bath, and proper applications to the tumour itself.—If these fail, there is then no other means of cure left but the operation of dividing the integuments, and replacing the viscera in the manner afterwards to be described.

SECT. VI. Of an Erysipelas, Gangrene, and Mortification.

It has been already observed, that inflammation of a membrane produces an erysipelas, as the inflammation of a muscular or fleshy part produces a tumour and abscess. The disease is attended with a much greater fever than a common inflammation, and it is much more dangerous. The internal medicines proper in these cases have been taken notice of under the article MEDICINE, n° 324. It remains therefore to treat only of the external applications; and here we find, that till very lately there have been such strong prejudices against applying any thing cooling or emollient to parts afflicted with an erysipelas, that the most absurd practices have been adopted. Those who maintain the chimerical opinion that a volatile acid was the cause of the disease, advise chalk to be strewed upon the inflamed part: some use fomentations of soap; others medicated bags filled with elder-flowers, moistened with wine and water or vinegar: some a decoction of sheep's dung in wine; while others employed epithems composed of Venice treacle and spirit of wine. Some thought lixivium and oil a better remedy, while others preferred a poultice made of oatmeal and water made without boiling.—Hoffman adhered to the method of applying dry medicated powders; and modern physicians have followed him, though they have thought proper to substitute wheat-flour, or Peruvian bark in powder, as preferable to the remedies recommended by him. Amidst all this variety of prescriptions, however, the use of cooling and emollient applications has been almost universally reprobated, from a notion of their checking perspiration and repelling the disease: but Dr Kirkland, who has treated this matter at great length, is entirely of opinion that emollients are the only remedies

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Method
cure.

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Absurd
prescriptions
concerning
this disease

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Emollients
recommended by
Dr Kirkland.

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Signs of a
mortification
of the
intestine.

Theory.

Theory.

medies to be depended upon; and recommends a cataplasm composed of four ounces of the soft crumb of bread, a quart of milk, and four ounces of hog's lard, boiled slowly together till the poultice acquire such a consistence that it will not stick to the fingers. Poultices, he says, can never be good without long boiling; but as they are at any rate inconvenient when the disease is seated in the head and face, he recommends cooling emollient ointments.

It is not very uncommon for an inflammation, whether of the common or erysipelatous kind, to terminate in a gangrene and mortification: nor is it uncommon for this disease to arise in different parts of the body from internal causes, without any external tumour appearing; or at least the tendency to gangrene is so strong, that it may be said to take place almost instantaneously. The internal causes of gangrene, according to Mr O'Halloran, are,

1. An highly vitiated disposition both of solids and fluids; and of this our author reckons four classes. 1. When the solids and fluids are so much vitiated, that all attempts to restrain the disease are vain, and only hurry on death the sooner. 2. When the whole body is vitiated, yet in a less degree than the former; in which case, by strong stimulants and cordials, the patient may survive by means of nature throwing the general vice to some particular part, by the loss of which life is preserved. 3. Where the malignity is much less, so that the patient may be cured without the loss of a limb. And, 4. Where the blood, though not highly vitiated, is yet deprived of its balsamic properties, so that all forces are healed with great difficulty and very considerable length of time.

II. Gangrene may arise from an hot, bilious, and inflammatory state of the blood; in which case the parts are endowed with a great degree of sensibility, and a slight hurt will frequently bring on the most alarming symptoms.

III. Where there is a grossness of the humours, with no great degree of activity in the blood itself, and a wound or hurt supervenes. Here the system has not sufficient power to raise the degree of inflammation necessary for producing pus; nor often, by the assistance of art, to discuss the tumour.

IV. A concentered disposition of the juices often brings on the most dreadful species of gangrene. In this, from the hurting of a wart, a slight itching, &c. a sharp humour will gradually form, by which the muscles, ligaments, blood-vessels, and bones, are gradually consumed; nor will it cease its advances till the injured parts are totally separated from the body.

V. Another species of gangrene, Mr O'Halloran says, is endemic to the poor of Ireland; and consists in an anchylosis and caries of the bones of the tarsus, coming with or without hurt. The cause of this he supposes to proceed either from the extreme poverty of these people, or from their working continually in bogs and marshy lands.

A gangrene is known to be approaching, when the pain, redness, and tension of the inflamed part, together with the concomitant fever, increase, at the same time that little change is made in the size of the tumour. Mortification or sphacelus first appears by a change of colour in the part, from a bright red to a leaden or livid cast, with small vesicles containing a thin acrid

serum dispersed over its surface. In the mean time the pain abates; the pulse sinks, but continues frequent; the tumour at last loses its tenderness, and turns quite black and flaccid. This blackness is the sign of the mortification becoming complete; the part, meanwhile, losing all sensation, at the same time that it emits a considerable fetor; at last, too, a softness or flaccidity in general takes place, together with an entire dissolution of the different parts of which the organ is composed. There are, however, some instances of what is called *dry gangrene*, in which the parts continue totally mortified for a great length of time, without either turning very flaccid, or running into dissolution. But such cases never occur from inflammation; they happen commonly from the flow of blood to such parts being put a stop to by compression of one kind or another, as tumours, ligatures, or other similar causes, obstructing the principal arteries that used to supply them; which, when the stoppage of the circulation is complete, always occasion a very slow, tedious, mortification; and as the parts in such instances are no longer supplied with fresh quantities of fluids, while a considerable evaporation must still be going on, such a degree of humidity cannot, therefore, possibly occur as does in other cases of gangrene. So that species of the disorder has, perhaps, with propriety enough, been termed the *dry gangrene*.

There are many other varieties of the disease enumerated by authors, as the *white gangrene*; in which the parts supposed mortified do not turn black, but retain nearly their former colour, &c. Whether such complaints, however, can with propriety be denominated *gangrene* or not, may properly be doubted: but as it is chiefly that species of the disorder which succeeds to inflammation that is now particularly to be treated of, and in which no such varieties are ever observed, it is not here necessary to carry the inquiry farther; and that especially as nearly the whole mode of treatment, afterwards to be pointed out, applies with almost equal propriety to every variety of the disease.

Of all the inflammatory complaints to which the *Erysipelas* system is liable, that species of the disorder termed *Erysipelas* is observed most frequently to terminate in gangrene; and whenever phlegmon is in any degree conjoined with an erysipelatous affection, which it not unfrequently is, it seems thereby to have acquired the same tendency, by being, as was already remarked, more difficult to bring to suppuration than the true phlegmon, and by going on more frequently to the mortified state.

The best and most effectual means of preventing mortification in every case of inflammation, is to endeavour either to obtain its resolution or suppuration; the different remedies for both which purposes have already been fully pointed out. But in some cases, the disorder is far advanced, and gangrene already begun, before the surgeon's assistance is called in: in others, the inflammation runs so high, and proceeds so quickly, that gangrene occurs notwithstanding the use of all the remedies that can be applied; in some instances, as we have already observed, so quickly, even that the inflammatory state is scarcely thoroughly discerned till mortification appears to be beginning.

This is most remarkably the case in carbuncles, which

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Of a dry
gangrene.

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Of the
white gan-
grene.

303
Erysipelas
most liable
to end in
gangrene.

304
Means of
preventing
the disease.

305
Of car-
buncles.

300
Internal
causes of
gangrene,
according
to Mr
O'Halloran

300
Signs of an
approach-
ing gan-
grene.

Theory. what by the French are termed *charbons*; in which the inflammation proceeds so rapidly to mortification, that there is seldom any evident tumour raised, the parts turning black, and ending in real gangrene, often in the course of 24 hours from the first attack.

The quick progress usually made by this disorder renders it the worst, and perhaps the most dangerous, species of inflammation. For when it occurs internally upon any of the viscera, as it sometimes does, it must, probably in every instance, prove fatal, as no remedies we are acquainted with can ever prevent its progress towards the last stage of mortification. Externally, indeed, when not very extensive, and not seated on any of the large blood-vessels and nerves, carbuncles are frequently got the better of; that is, with the loss of the affected parts.

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They al-
most always
occur from
a putrid
state of the
juices.

As carbuncles always appear without any evident external cause, they are in general most probably owing to a scorbutic or putrid state of the fluids; for when putrefaction prevails in the system, every inflammatory affection that occurs, proceeds much more readily to the mortified state than inflammation in other circumstances ever does. This opinion with respect to the cause of carbuncles depending upon a putrescent state of the system, is particularly confirmed by their occurring most frequently as a symptom in pectilential disorders; for although they are sometimes met with even in this country, where the plague is now never known, yet the real carbuncle is far from being a common occurrence.

The internal remedies proper for preventing gangrene have been already mentioned under the article MEDICINE, n° 281. In the way of external application, a variety of remedies have been pointed out, and particularly those of the antiseptic kind; such as all the warm gums and balsams, ardent spirits, and even alcohol: and to admit of their nearer application to the sound parts, with a view to the preservation of these from putrefaction, deep scarifications through the diseased and into the sound parts have been generally recommended. But although such articles may be of use in preserving dead animal-substances from corruption; yet that they will always prove serviceable in the same manner in living bodies, is probably very much to be doubted. And it is even apprehended, by the strong irritation they always occasion when applied to a living fibre, that, in such cases as the present, they may rather do mischief; it being only a very slight degree of inflammation that is required to bring on a suppuration. The incisions, too, when carried into the sound parts, with a view to facilitate the operation of such remedies, may likewise do harm; not only from the risk of wounding the blood-vessels, nerves, and tendons, that lie in the way, but also by allowing a free and farther entrance of the putrescent fluids into the parts not yet affected: and unless they are carried so deep as freely to reach the sound parts, applications of the antiseptic kind can never have any effect in answering the purpose for which they were intended.

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Scarifica-
tions of no
advantage.

For these reasons, and from never having observed any advantage to accrue from scarifications in mortification, the best practitioners are of opinion that they may be entirely laid aside. Theriac was in former times, and still is with some practitioners, a very

common application in every case of gangrene; but, from the best experience, it seems never to produce any evident good effects.

All the advantages commonly observed from the great variety of applications recommended for gangrene, are obtained with more ease, and generally too with more certainty, from the use of any gentle stimulating embrocation; which, by exciting a slight irritation upon the surface, and especially when assisted by a free use of the bark, at last commonly produces such a degree of inflammation as is wished for. With this view, a weak solution of sal ammoniac in vinegar and water has been known to answer exceedingly well; a dram of the salt to two ounces of vinegar and six of water, forms a mixture of a very proper strength for every purpose of this kind; but the degree of stimulus can be easily either increased or diminished, according to circumstances, by using a larger or smaller proportion of the salt.

Although, for the reasons formerly advanced, incisions may not in general be proper; yet in such cases where the mortification runs very deep, it is sometimes of service to make scarifications into the diseased parts, so as to remove part of them; which by taking off a considerable load perhaps of putrid dead flesh, not only lessens the fetor, which in such cases is always considerable, but often renders it more easy for the sound parts to free themselves from the remainder. When with this view, however, incisions are had recourse to, care should always be taken that they be not carried the length of the sound parts.

Whenever, either by the means recommended, or by the effects of a natural exertion of the system, a slight inflammation appears between the diseased and sound parts, we may in general, with tolerable certainty, expect, that in due time a thorough separation will take place; and when a full suppuration is once fairly established, there can then be little doubt but that the mortified parts will be very soon and easily removed.

A separation being altogether effected, the remaining part being then to be considered merely as a simple purulent ulcer, may be treated in the same manner as such sores generally are, with very slight easy dressings; at the same time that proper attention must always be paid to the support of the general system, by the continuance of a nourishing diet, the bark, and such quantities of wine as may seem necessary.

Although, however, such ulcers as remain after gangrenous affections that have not been very extensive, may in general be healed in the manner now mentioned; yet in mortifications seated on the extremities, and that have penetrated to the bones, it sometimes happens that the whole surrounding soft parts come to be destroyed, so that amputation of the member is thereby rendered necessary. Amputation, however, should never be had recourse to, till a full and thorough separation of the mortified parts has taken place: for it is now, in every case of gangrene, from undoubted experience, an established maxim in surgery, That though the parts immediately contiguous to those evidently diseased may outwardly appear sound; yet as there can be no certainty of those even directly below remaining so, till a full stop, or even till a complete separation, of the mortification has been

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An embro-
cation re-
commended
by M. Bell.

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Or Signs of a
separation of the mor-
tified part

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In what
circumstances ampu-
tation is ne-
cessary, and
when it should be
performed

^{Theory.} been produced; so, till that has evidently taken place, it is in such cases a general rule never to amputate a member; there being no other security for the disorder not returning, and that immediately too upon the remaining stump.

It must be observed, however, that so soon as an entire separation of the gangrene has occurred, no time should be unnecessarily lost in having recourse to the operation; for so long as any of the corrupted parts remain in contact with the sound, the system must still be suffering considerably by the constant absorption of putrescent particles, that so long will undoubtedly take place.

SECT. VII. Of Diseases of the Bones.

³¹³
^{Exostosis} THE bones, as well as the softer parts, are liable to be swelled, either throughout their whole length, or to have tumours formed on particular parts of them.

Exostosis is one species of tumour of the bone; but, according to Mr Bromesfield, in strictness of definition, no swelling should be called so, but an excrescence continued from a bone, like a branch from the trunk of a tree. Under this head, therefore, is ranked the *næde*; which may be produced by external injury, such as contusions and fractures: but in both these cases, the tumour has had the epithet of *benign* affixed, and can hardly be called a disease, as pain is seldom consequent to such risings from the bone; but it rather should be termed a deformity.

There are risings or tumours observable on the bones which are often the consequents of venereal virus, and are termed *tophi*, *gummi*, or *nodes*.—Tophus, is a soft tumour in the bone; and seems to be formed of a chalky substance, that is intermediate between the osseous fibres. These cretaceous extravasations sometimes are found on the ligaments and tendons, as well as on the bone; and when collected into a toph, may sometimes be taken out by the knife. We have many instances, where chalk stones in gouty people make their way out through the skin of the fingers and toes.

³¹⁴
^{Tophus.} ³¹⁵
^{Gummi.} Gummi is likewise a soft tumour; but is on the surface of the bone, between it and the periosteum; and its contents resemble gum softened, from whence it has taken its name. Possibly, by obstruction in the nutrient vessels of the bone, a rupture of some of them occasions the ferous liquor to escape, which, by making its way between the fibres of the bone, arrives at its surface; and being detained by the resistance of the periosteum, its most liquid parts being evaporated, and the remainder condensed by the inflammation, and consequently this inelastic covering being stretched, it becomes inspissated, and forms this species of *exostosis*, as it is generally called. When this is the cause, and the indispotion of the habit in general got the better of, pressure by a steel instrument, adapted to the part affected, is the proper cure.

³¹⁶
^{Nodes.} The confirmed venereal node has the appearance of a divarication of the osseous fibres, probably from some inspissated humour obstructing the nutrient vessels, but not extravasated; this occasioning an extension of the periosteum, produces a violent pain, which, when nocturnal, is the characteristic of a venereal cause. When only the periosteum is thickened, but the bone not affected, a course of mercury, by attenuating the obstructed humour, and fitting it to be carried out of the

body by the proper outlets, will often produce a perfect cure: but when the bone itself is diseased, this method will fail. But here the division of the extended periosteum has been known to give perfect ease.

The usual method, formerly, was to apply a caustic equal to the extent of the node, which being laid bare, required exfoliation before it could be cicatrized. If the incision is made early, that is, before matter be formed under the invelling membrane, it seldom requires exfoliation; and, as we often find that the bone itself is not affected, but only the periosteum thickened, we may be deceived even after a careful examination: it is therefore proper that the patient should be pretty far advanced in a course of mercurial unction, before even the incision is made; for, should the tumour decrease and the pain abate during the course, chirurgical assistance, with the knife, most likely may become unnecessary.

The name *exostosis* may not be improper to those ³¹⁷
^{Of a spine} excrescences that are found on the surface of a bone in a *spina ventosa*, or in consequence of a caries from other causes; and it is not unfrequent for the ossific matter, being let loose by the separation of a caries, to flow in such quantity as even to incrust, and sometimes to form a case to a diseased bone. But where a bone is enlarged throughout its whole length, or its epiphyses become swelled, as in scrophulous cases, particularly in children, which case is in them called *pararthrocæ*, such swellings cannot with propriety be ranked in this class; and whether scorbutic, scrophulous, or venereal leaven gives rise to these tumours of the bone, the habit of the body in general must be corrected, to give any chance of a cure.

A bone may become carious first in its internal parts; and that from external injury, as well as from a vitiated state of the animal-fluids. Authors seem not to agree as to the technical term for this kind of disease of the bones; some calling it *cancer* or *gangræna ossis*; others, *spina ventosa*, from the pointed exuberances usually attendant on this disorder of the bone; and some again, *teredo*, from the appearance of the carious bone, like wood that is worm-eaten.

It is universally allowed, that this disease takes its rise from matter being formed either in the diploë, or in the marrow: whenever obstruction is begun in the vessels expanded on, or terminating in, the medullary cysts, the consequence will be inflammation, and, if not early removed, will form matter; for this reason, this case may be called *abscessus in medulla*. ³¹⁸
^{Symptoms} Whenever, then, a patient complains of dull, heavy pain, of this deeply situated in the bone, possibly consequent to a temper- violent blow received on the part some time before, and though at the time the patient complains of this uneasiness, within the bone, the integuments shall appear perfectly sound, and the bone itself not in the least injured, we have great reason to suspect an abscessus in the medulla. Children of a bad habit of body, though they have not suffered any external injury, will often become lame, and complain of the limb being remarkably heavy; and though not attended with acute pain, yet the dull throbbing uneasiness is constant. If rigors happen during the time the patient labours under this indispotion, it generally implies that matter will be formed within the substance of the bone. On the age of the patient, and the

solidity of the bone, will in a great measure depend the next alarming symptoms, to those who are not acquainted thoroughly with the case and the constitution of the patient. As mothers and nurses are often inattentive to children on the first complaining of pain and heaviness in a limb, if, after rubbing it with their hand a few minutes, the child, amused by some new toy or play-fellow, think himself easier, the good women, as they cannot see any thing wrong, determine it a growing-pain, as they call it; but, soon after, the extremities of the bone formerly complained of begin to swell, or, possibly throughout its whole extent, it becomes enlarged; a surgeon is then sent for, who, if a man of experience, will know this to be an abscessus in medulla, or true spina ventosa, as it is called: if neither of these symptoms should be consequent to the first complaint, the great insensibility of the bone in some subjects will prevent that acuteness of pain usual in other parts where matter is formed, though the acrid matter is eroding the bone during the whole time it is contained within it. This matter at length having made its way through, arrives at the periosteum, where it creates most violent pain, as well from its sharpness as from its increased quantity, occasioning an extension of the periosteum. The integuments then become swelled and inflamed, and have a sort of emphysematous feel. On being examined by pressure, the tumour will sometimes be lessened, from part of the matter retiring into the bone: from this appearance to the touch, most likely the name of *ventosa* was added to the term *spina*. When we are assured of matter being under the periosteum, we cannot be too early in letting it out, as it will save a considerable deal of pain to the patient, though probable it may not be of any considerable advantage in respect to the carious bone; for, where the fluids in general are vitiated, no chance of cure can be expected from topical remedies; but where the constitution is mended, nature will sometimes astonish us in her part; as the carious bone will be thrown off from the epiphyses, or the teredines will be filled up by the ossific matter that flows from the parts of the bone where some of the spinæ have come away.

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Of the method of cure.

If proper medicines are given, the children well supported, and the parts kept clean and dry, patience and perseverance will frequently give great credit to the surgeon. In case it should have been thought advisable to apply the hand of a trephine at the upper and lower extremities of the tibia, to give free discharge to the matter, the washing it away, as well as the small crumbings of the carious bone, by means of detensive and drying injections, has been known to contribute greatly to the curing this kind of caries, after the habit of body in general had been mended.

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Of the friableness and shortness of the bones.

Besides those above-mentioned, the bones are liable to two opposite diseases; the one termed *friabilitas*, the other *nullitas*: the former peculiar to adults, the latter more frequent in infants, though sometimes seen in adults, from a vitiated state of their juices.

The bones, when deprived of their cementing liquor, by passing through fire, become friable. From repeated salivations, and in old people, they have been rendered extremely brittle; inasmuch that in many subjects they have been fractured merely from their weight and the action of the muscles: but in such cases, this is not owing to the friability of the bones,

but to the loss of substance, from the erosion of the bone by an acrimonious humour thrown on it; to which cause perhaps may be attributed the disease called *rickets* in children. The effects of scorbutic humour in rendering the bones soft in many instances, have often been remarked.

From the observations we daily make, that the bones of rickety children become soft and flexible, in different parts of the same bones, though their shape is preserved; that the known effect on bones when soaked in an acid menstruum, is, that the cretaceous particles being destroyed, they become membranous; from these remarks, we are induced to attribute the species of the disorder to an acrimonious humour thrown on the bones, and obstructed in their internal vessels. By proper diet, gentle friction with coarse cloths, exercise, and cold bathing, these invalids will frequently get their constitution so much changed, as that by the time they arrive at the age of twenty years there shall not remain the least vestige of their former disease. The epiphyses are generally most affected in this species of the disorder.

For want of early attention to invalids of this sort, we find that their bones not only become soft, and yield to the powers of the muscles, but remain distorted the rest of their lives, though they have acquired a perfect degree of solidity. In such cases, correcting the vitiated juices only will not restore the bones to their natural state; therefore the assistance of a skilful mechanic is necessary both to support the parts improperly acted on, and to alter the line of direction of the distorted osseous fibres.

Though the curvature of the extremities, or thick-
322
ness of the ends of the bones near their articulations, may give the first alarm to those who are constantly with children, yet there are other symptoms that give earlier notice than these, which, had they been timely discovered by proper judges, it is highly probable that the curvature of the limbs in many children might not have happened. The belly generally becomes larger in this disease, from the increased size of the contained bowels, as it is not unlikely but that the mesenteric glands are the first parts obstructed; obstructions of the liver, spleen, and pancreas soon follow; the head then becomes enlarged; then a difficulty of breathing, which is generally supposed to be the effects of taking cold, succeeds; the sternum is elevated and sharp, and the thorax becomes contracted; the spine is protruded in several parts; the pelvis altered, according to the pressure of the parts within, and habitual inclination of the patient, at times, to obtain that line of direction in which the perpendicular from the centre of gravity may fall within the common base of the body, the extremities of the cylindrical bones, and the ends of the ribs, next the sternum, become enlarged; soon after this the bones in general become soft and flexible, yielding in such directions as the strongest muscles determine by their actions.

The bones of children who die of this disorder, we
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observe, are not only rendered soft, but the vessels an-
ce of the bones are often
within their substance are replete with blood, whose
texture is totally broken, and has more the appearance
of thin chocolate than blood: the periosteum in many
places is separated, and the intermediate space between
it:

Theory. it and the bone filled with extravasated fluid; and caries is almost as frequent as the separation of the periosteum. The muscles in such bodies generally appear pale and flabby.

325
Mr. Bromfield's method of cure.

Where the affection of the mesenteric glands is evident, Mr Bromfield asserts, that after a dose or two of the pulvis basilicus to empty the intestines thoroughly, the purified crude quicksilver is by much the most efficacious medicine to remove obstructions in those glands. When the belly begins to soften and subside, the chyle passes without interruption, and the child begins to get flesh; then the cold bath becomes truly serviceable, and the decoction or cold infusion of the Peruvian bark is a proper restorative; but the cold bath used too early, or the bark given before there is a free circulation of chyle through the lacteals, would be very injurious.

The mollities ossium, in some cases, may be produced from a redundancy of the oleaginous parts of the blood, or from a laxity of the solids, by which the fluids are not sufficiently attenuated, nor properly blended and mixed: the consequence of which will be obstructed perspiration, the habit in general loaded with gross, phlegmatic, and serous humours, and the ossific matter not united or condensed as in an healthy state.

From this debility and laxity of the solids, and consequent viscosity and lentor of the fluids, the rickets are produced; and, from what has been remarked, we may account for the largeness of the brain, liver, and spleen, and the swelled belly, the distortion of the vertebræ and pelvis, contracted thorax, and curvature of the extremities.

The method of cure confirms us likewise in the cause of these symptoms; for, by strengthening the fibrous system, by using gentle exercise, a dry diet, good air, aromatics, and cold bathing, this kind of invalids are generally restored to health.

326
Of the palsy of the lower extremities with curvature of the spine.

Among the diseases of the bones we may likewise take notice of that *palsy of the lower extremities* which takes place, as is generally supposed, in consequence of a curvature in some part of the spine. To this distemper both sexes and all ages are equally liable. When it attacks an infant of only a year or two old or under, the true cause of it is seldom discovered until some time after the effect has taken place. The child is said to be uncommonly backward in the use of his legs, or it is thought to have received some hurt in the birth. When the child is of an age sufficient to have already walked, and who has been able to walk, the loss of the use of his legs is gradual, though in general not very slow. He at first complains of being very soon tired, is languid, listless, and unwilling to move much or at all briskly. Soon after this he may be observed frequently to trip and stumble, though there be no impediment in his way; and whenever he attempts to move briskly, he finds that his legs involuntarily cross each other, by which he is frequently thrown down without stumbling; and when he endeavours to stand still in an erect posture without support, even for a few minutes, his knees give way and bend forward. As the distemper advances, it will be found that he cannot, without much difficulty and deliberation, direct either of his feet exactly to any one point; and very soon after this, both legs and thighs

lose a good deal of their natural sensibility, and become quite useless. In adults, the progress of the disease is much quicker, but the symptoms nearly the same.

Until the curvature of the spine is discovered, the complaint generally passes for a nervous one; but when the state of the back-bone is adverted to, recourse is almost always had to some previous violence to account for it. That this might have been the case in some few instances, might be admitted; but in by far the greatest number some predisposing cause must be looked for.

Mr Pott, who has written a treatise upon this disease, recommends it to our observation, that though the lower limbs are rendered almost useless, or even entirely so, yet there are some circumstances in which it differs from a common nervous palsy. The legs and thighs, though so much affected, have neither the flabby feel of a truly paralytic limb; nor have they that seeming looseness at the joints, nor the total incapacity of resistance which allows the latter to be twisted almost in all directions: on the contrary, the joints have frequently a considerable degree of stiffness, particularly the ankles; by which stiffness the feet of children are generally pointed downward, and they are prevented from setting them flat upon the ground.

The curvature of the spine, which is supposed to be the cause of the complaint, and with which it is always accompanied, is various in situation, extent, and degree, being either in the neck or back, and sometimes, though very seldom, in the upper part of the loins. Sometimes it comprehends only two vertebræ, sometimes three or more, by which the extent of the curve necessarily becomes more or less; but whatever may be the number of the vertebræ concerned, or whatever may be the degree of curvature, our author never saw the arms affected.

When a weak infant is the subject of this disorder, and the curvature is situated in the vertebræ of the back, it is not uncommon for the whole back to become what is called *humped*, at the same time that the bones of the thorax are considerably altered; whence such persons are justly said to be shortened in their stature; but in all cases where this effect has been gradually produced, the curvature of the spine is always the first of these deformities which makes its appearance.

Before the curvature of the spine is discovered, or while no attention is paid to it, the complaint is, as we have already said, looked upon to be nervous; such internals as are supposed to be proper in nervous cases are given, together with warm liniments, embrocations, and blisters, to the part affected: and when the true cause is known, recourse is always had to steel flays, the swing, screw-chair, and other pieces of machinery. But all these are productive of no real or permanent good; the patient becomes unhealthy, and, languishing for some time under a variety of complaints, dies in an emaciated state, or drags on a miserable existence, confined to a great chair or bed, totally deprived of the power of locomotion, and useless both to himself and others.

At first the general health of the patient seems not to be at all, or at least not materially, affected; but when the disease has continued for some time, and the

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Differences between this and a common palsy.

328
Of the curvature of the spine in this disease.

Theory.

curvature is thereby increased, many inconveniences and complaints come on; such as difficulty in respiration, indigestion, pain, and what they call *tightness at the stomach*, obstinate constipations, purgings, involuntary flux of urine and faeces, &c. with the addition of some nervous complaints, which are partly caused by the alterations made in the form of the cavity of the thorax, and partly by impressions made on the abdominal viscera.

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Not the
original
cause of the
disorder.

Mr Pott was led to a knowledge of the true cause and cure of this distemper, from observing the case of a youth of 14, who was restored to the use of his limbs immediately after a seemingly accidental abscess near the part. From this he was inclined to think, that the curvature of the spine was not the original cause of the disorder, but that the surrounding parts were predisposed towards it by some affection of the solids and fluids there. For these suspicions he had the following reasons:

1. That he had never seen this paralytic effect on the legs from a mal-formation of the spine, however crooked such mal-formation might have rendered it, or whether such crookedness had been from the time of birth, or had come on at any time afterwards during infancy.
2. That none of those strange twists and deviations, which the majority of European women get in their shapes from the very absurd custom of dressing them in stays during their infancy, and which put them into all directions but the right, ever caused any thing of this kind, however great the deformity might be.
3. That the curvature of the spine, which is accompanied by this affection of the limbs, whatever may be its degree or extent, is at first almost always the same, that is, it is always from within, outward, and seldom or never to either side.
4. That since he had been particularly attentive to the disorder, he had remarked, that neither the degree nor the extent of the curve made any alteration in the nature or degree of the symptoms at first, nor for some time after the appearance; or, in other words, that the smallest curvature, in which only two or three of the vertebræ were concerned, was always at first attended by the same symptoms as the largest.
5. That although it sometimes happened that a smart blow, or a violent strain, had immediately preceded the appearance of the curve, and might be supposed to have given rise to it; yet in many more adults it happened that no such cause was fairly assignable, and that they began to stoop and to falter in their walking, before they thought at all of their back, or of any violence offered to it.
6. That exactly the same symptoms are found in infants, and in young children, who have not exerted themselves, nor have been injured by others, as in the adult who has strained himself or received a blow; and that the case was still the same in those grown people who have neither done nor suffered any act of violence.
7. That although it must be allowed that a dislocation of any of the vertebræ would most probably be attended with the same kind of symptoms from the

pressure it must make on the spinal marrow, yet it is also most probable, that such symptoms would be immediate, and attended with great pain in the part; neither of which is in general the case here.

"These considerations (says he) appeared to me to have much force; but what confirmed me in my opinion was the state of the parts forming the curvature, and which I had several fair opportunities of examining after death. By these examinations I found, in infants, in young children, and in those who had been afflicted with the disorder but a small space of time, that the ligaments connecting the vertebræ which formed the curve, were in some degree altered from a natural state, by being somewhat thickened and relaxed; and that what are called the bodies of those bones, were palpably spread and enlarged in their texture, just as the bones forming the articulations are in children who are called *rickety*. That in those who had long laboured under the distemper, and in whom the symptoms were aggravated, whatever might be their age, the ligaments were still more thickened, relaxed, and altered; the bodies of the bones more spread, more enlarged, and more inclining to become carious; and the cartilages between the bodies of the vertebræ much compressed and lessened in size: and that in all those who had so long laboured under the disease, as to have been destroyed by it or by its consequences, the corpora vertebrarum were completely carious, the intervening cartilages totally destroyed, and a quantity of sanies lodged between the rotten bones and the membranes investing the spinal marrow (A).

"All these circumstances put together, induced me, as I have already said, to suspect, that when we attribute the whole of this mischief to the mere accidental curvature of the spine, in consequence of violence, we mistake an effect for a cause; and that previous both to the paralytic state of the legs, and to the alteration of the figure of the back-bone, there is a predisposing cause of both, consisting in a disordered state of the ligaments and bones, where the curve soon after makes its appearance.

"While the subject was fresh in my mind, I happened to be at Worcester; and in a conversation on it with the late Dr Cameron of that place, I mentioned to him my opinion and my doubts. The doctor concurred with me; and at the same time mentioned a circumstance which made a strong impression on me. He said, that he remembered, some years ago, to have noted a passage in Hippocrates, in which he speaks of a paralysis of the lower limbs being cured by an abscess in the back or loins; and that, taking the hint from this, he, Dr Cameron, had, in a case of a palsy of the legs and thighs, attended by a curvature of the back-bone, endeavoured to imitate this act of nature, by exciting a discharge near the part; and that it had proved very advantageous. He also referred me to Mr Jeffrys, a surgeon of eminence at Worcester, for a farther account of the same kind of attempt. This gentleman confirmed what Dr Cameron had told me; and assured me that he had found the method equally successful.

It

(A) In the body of a man who died not long since of this disorder in its last and worst state, the bodies of three of the vertebræ were not only quite carious, but completely separated from all connection with the other parts of the same vertebræ.

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Appear-
ances af-
ter death in
those afflic-
ted with
this dis-
order.

Theory.

Theory.

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Cases of the
difterper,
by Mr Pott

It may easily be fupposed, that thefe accounts, from gentlemen of veracity, and of reputation in their profeffion, ftill added to my defire of knowing more on this fubject, and determined me to lofe no opportunity of getting information.

"The firft that offered was an infant, whofe curvature was in the middle of the neck, and who had loft the ufe of its legs for about two or three months. I made an iffue by incifion on one fide of the projection, and gave ftrict charge to the mother to take care that the pea was kept in: the woman, who had no faith in the remedy, did not take the proper care; and confequently the difcharge was not equal to what it fhould and might have been: but notwithstanding this neglect, at the end of about three weeks or a month the child was manifefly better, and began to make ufe of its legs; it was then feized with the fmall pox, and died. The bodies of the vertebrae concerned in the curve were larger than they fhould be, and than thofe above and below were, and their texture much more open and fpongy; which difference appeared immediately, before the parts covering them were diffefted off.

"Some time paffed before I had another opportunity. My next patient was a tall thin man, about 35 years old, who thought that he had hurt himfelf by lifting a heavy weight. His legs and thighs were cold, and what he called *nummy*, but not abfolutely ufelefs: he could with difficulty go about the room with the help of a pair of crutches; but he could neither rife from his chair, nor get on his crutches, without the affiftance of another perfon, nor could he without them walk at all.

"I made a feton on each fide of the curve which was in his back, about the middle; and having given his wife directions how to drefs them, I called on him once in three or four days. At the end of fix weeks he had recovered the due degree of fenfation in his limbs, and found much lefs neceffity for the ufe of his crutches. He could rife from his bed and from his chair without affiftance: and, by means of one crutch and an underhand flick, could walk for an hour or more without refting and without fatigue. The fetons had now, from not having been properly managed, worn their way out; and I would have converted each of them into an iffue: but as neither the patient nor his wife had ever believed that the difcharge had had any fhare in his amendment, but, on the contrary, that he would have been better without it, he would not fubmit to what I propofed, and I left him. At the diftance of about three weeks from the time of my leaving him, I met him in the ftreet walking very ftoutly with a common cane, of which he made little or no ufe. I afked him what he had done: He told me that the forces had continued to difcharge till within a few days; but that he had drank a great deal of comfrey-root tea with ftinglafs; and he fupposed that had cured him.

"I believe that the cure of this man will, by all who know any thing of medicine, be thought to be fo unlikely to have been effected by the comfrey and ftinglafs, that my inference in favour of the feton will not be thought unreafonable, and that my determination to profecute the method, from what I had heard and feen, was well founded.

"Within the courfe of the laft ten or twelve months,

I have had feveral fair opportunities of doing this, both in St Bartholomew's hospital and out of it; and am very happy to be able to fay, that it has not only always answered, but in moft inftances greatly exceeded, my moft fanguine expectations, by reftoring feveral moft miferable and totally helpiefs people to the ufe of their limbs, and to a capacity of enjoying life themfelves, as well as of being ufeful to others.

"I have now in the hospital a boy about 12 years old, whofe cafe was fo truly deplorable, that I made the experiment merely to avoid the appearance of inhumanity by difcharging him as incurable without trying fomething. The curvature was in his back, and confifted of three or four vertebrae; but by means of the weaknefs thereby induced, the whole fet of dorsal ones had fo univerfally and gradually given way, that he was exceedingly deformed both behind and before: he was fo abfolutely incapable of motion, that he could neither turn himfelf nor fit up in his bed: his feet were pointed downwards, and his ankles fo ftiff, that, when he was held up under the arms, the extremities of his great toes touched the floor, nor could his feet be brought flat to the ground by any means or force whatever. In fhort, he was as perfectly and as totally helpiefs as can be fupposed; and at the fame time in an exceeding general bad ftate of health, from diforders of the thoracic and abdominal vifcera. In this ftate he had been more than a year. It is now about three months fince the cauftics were applied: he is become healthy, and free from moft of his general complaints: has the moft perfect ufe of his legs while he is in bed; can walk without the affiftance of any body, or any thing to hold by; and from his manner of executing this, will, I make no doubt, in a very fhort fpace, recover perfectly the ufe of his legs. To this I ought to add, that notwithstanding a confiderable degree of deformity does, and I fuppose will remain, yet the fpine in general is fo much ftrengthened, that he is fome inches taller than he was four months ago.

"The remedy for this moft dreadful difeafe confifts merely in procuring a large difcharge of matter, ³³² His method of cure. by fuppuration, from underneath the membrana adipofa on each fide of the curvature, and in maintaining fuch difcharge until the patient fhall have perfectly recovered the ufe of his legs. To accomplifh this purpofe, I have made ufe of different means, fuch as fetons, iffues made by incifion, and iffues made by cauftic; and although there be no very material difference, I do upon the whole prefer the laft. A feton is a painful and a nafty thing: befides which, it frequently wears through the fkin before the end for which it was made can be accomplifhed. Iffues made by incifion, if they be large enough for the intended purpofe, are apt to become inflamed, and to be very troublefome before they come to fuppuration; but openings made by cauftic are not in general liable to any of thefe inconveniences, at leaft not fo frequently, nor in the fame degree: they are neither fo troublefome to make or maintain. I make the efchars about this fize and fhape on each fide the curve, taking care to leave a fufficient portion of fkin between them. In a few days, when the efchar begins to loofen and feparate, I cut out all the middle, and put into



each.

Theory.

Theory.

each a large kidney-bean: when the bottoms of the fores are become clean by suppuration, I sprinkle, every third or fourth day, a small quantity of finely-powdered cantharides on them, by which the fores are prevented from contracting, the discharge increased, and possibly other benefit obtained. The issues I keep open until the cure is complete; that is, until the patient recovers perfectly the use of his legs, or even for some time longer: and I should think that it would be more prudent to heal only one of them first, keeping the other open for some time; that is, not only until the patient can walk, but until he can walk firmly, briskly, and without the assistance of a stick; until he can stand quite upright, and has recovered all the height which the habit, or rather the necessity, of stooping, occasioned by the distemper, had made him lose."

SECT. VIII. *Of the different Operations in Surgery, and in what Cases they are proper.*

THE most simple operations are those in which there are neither arteries to tie up, fractures to reduce, nor any divided parts to conjoin by future. They are chiefly phlebotomy or blood-letting; simple incisions into abscesses in order to discharge the matter; and drawing of teeth.——Phlebotomy is useful in all cases where there is a great tendency to inflammation, or where one particular part of the body has been accidentally so much weakened that it cannot bear the impetus of the fluids moving through it with their usual velocity. Hence it is useful in all large wounds, fractures, or contusions, because the impetus of the blood and other fluids, in such cases, is too great to be borne by the weakened and distracted vessels; and if they are entirely divided, it would keep them perpetually bleeding. Hence phlebotomy is also of use in restraining profuse hæmorrhages from any part of the body. On the other hand, it is exceedingly hurtful where the crasis of the fluids tends to a dissolution, or where the vital powers are so weakened that they cannot propel the humours with their usual degree of force. In cases of scurvy, therefore, bleeding is prejudicial; in mortifications, or in large suppurations; because thus the vital powers, which are already reduced, become still more weak, the scorbutic disposition is increased, or the pus cannot be formed as it ought to be. For the same reason, in the lues venerea, however it might seem to be indicated by the pain and swellings, it is entirely improper. The same may be said of all other eruptive disorders, even the itch: for though some have a notion of the good effects of bleeding in this disease, it is always evidently the worse for it; and it will constantly be found, that even this disease proceeds from such causes as weaken the vital powers, such as nastiness, damp, and poor low diet; while, on the other hand, those who keep themselves clean, and live on wholesome strengthening food, are seldom or never troubled with it.

Phlebotomy may be performed in many different parts of the body; and it is found to be more effectual when performed in the neighbourhood of an affected place than at a distance from it. Where the affection of the system is general, bleeding in the arm is most eligible; but if the head or throat are affected, bleeding in the jugular vein is preferable. In

swellings and inflammations of the throat, it will also be of service to open the sublingual veins: in suppurations of the meninges, bleeding in the ankle is recommended: and it has been found in some cases necessary to perform the operation even on the veins of the penis and eyes.

Cupping, with or without scarification, is a kind of partial phlebotomy. Dry-cupping brings a flux and leeches of all the humours towards that part on which the cupping-glass is applied; and hence is useful in bringing the milk towards the breasts of women, in hastening suppuration, &c. If scarification is used, it discharges the blood not only from the small cutaneous veins, but also from the arteries. Hence it is of service in local inflammations.—In the same cases also the application of leeches is useful.

Incision, or something equivalent to it, is always necessary in the case of abscesses, or large collections of matter which cannot otherwise be discharged: tho' large incisions are to be avoided as much as possible; both on account of their evident cruelty, and because they are apt to produce an absorption of matter, and occasion a hectic. In cases of white swellings and cancerous tumours, they ought always to be avoided as much as possible, unless with a view totally to extirpate the diseased parts. On the other hand, in cases of punctured nerves and tendons, incision is not only necessary, but frequently the only means of preserving the patient from death.

Under the head of incision we may likewise reckon the putting in of issues and setons, though the former are more commonly put in by caustic. They are useful in drawing off collections of matter, when situated in such places that they cannot be opened. They are also of use in the case of palsy of the lower extremities with curvature of the spines, as has been already explained, n^o 332. In apoplexies, palsies, and other disorders of the head, they are also frequently of eminent service.

Under the article MEDICINE, n^o 314. it is observed, that where the teeth are carious, the only remedy is to draw them out. However, we are not therefore to imagine, that in all cases of toothach, even when the pain is very severe, that we are to have recourse to this remedy. The teeth are never known to exfoliate, and grow up again, as other bones will do; and therefore the preservation of them is well worthy our attention. But when, by the gradual putrefaction of a tooth, the patient is kept in continual pain, and there is danger of a caries, by means of the affection of the tooth, taking place in the jaw-bone, tooth-drawing then becomes absolutely necessary, and is generally attended with little pain to the patient, as in such cases the teeth are generally loosened in their sockets. It must be remembered, however, that the upper teeth are much worse to draw than the under ones, being not only much faster in their sockets, but connected in such a manner with the nerves of the eyes, especially those called the eye-teeth, as makes the drawing of them very dangerous.

Of the more difficult operations in surgery, the first is future; which necessarily takes place in all cases where we desire the union of parts that would otherwise remain at too great a distance, or where we want to form an adhesion which would not take place naturally. Hence

333
In what
cases bleed-
ing is pro-
per.

334
Cupping

335
Incision.

336
Issues and
setons.

337
Tooth
drawing.

338
Of futures,

Theory. it is necessary in all wounds made in the fleshy parts, and attended with considerable gaping of the lips. It is also necessary in wounds of the abdominal viscera, where they are protruded; in wounds of the aspera arteria, of the œsophagus; in mortifications of the intestines, in order to make the edge of the intestine adhere to the wound; in the hare-lip, &c.

339
Ligation of
arteries.

Under this article likewise we may include the ligation of arteries, which must necessarily take place in all cases where these vessels are wounded, either accidentally or by design, as in the amputation of limbs; and to the same we may refer the operation for aneurisms to be afterwards described, and which seems to be the only method of treating these tumours with any probability of success.

340
Reduction
of fractures,
&c.

Reduction of fractured and dislocated bones ought always to be attempted in case of such accidents, unless where the bones are broken into such small pieces that there can be no hope either of their uniting or of preserving the limb.

341
Amputa-
tion.

Amputation is necessary in such cases as those already mentioned, namely, where, either by external accident, or from some internal cause, the limbs cannot by any means be preserved. Hence it is useful only in those diseases which are plainly destructive of life by the infectious matter absorbed, or where the parts are entirely mortified and useless.

342
Trepan-
ning.

Trepanning of the cranium ought to take place in all cases where there are symptoms of an oppressed brain, provided we have any indication of the place under which the mischief lies, as has already been explained, n° 131. An operation of a similar kind may also upon some occasions be necessary on other bones, in order to remove a part of their carious substance.

343
Of the pa-
ra-centesis.

In cases of dropsy, of hydrocele, empyema, and hydrothorax, the operation called *paracentesis*, or tapping, ought to take place, if the water can be dissipated by no other means. Some collections of water, however, there are, in which this operation is highly

improper, and indeed fatal; such as the hydrocephalus and hydrorachitis, spina bifida, or collection of aqueous fluid in the cavity of the spine. In this last case the spinal marrow is compressed, and all the lower parts of the body become paralytic. The evacuation of this water is certain death; and if any hope remains, it must be by making use of such internal remedies as are mentioned under the article *MEDICINE*, n° 370, for the hydrocephalus.

Theory.

The operation for the bubonocoele, or strangulated hernia, is not to be performed on patients until after every method of reducing the gut has been attempted in vain. It is very fatal, in this country, but much less so in France; but whether owing to any peculiarity in the climate of that country, or to the superior dexterity of the French surgeons, is unknown. An operation of the same nature is sometimes performed in case of a volvulus of the intestines: and it has even been recommended in case of indurated feces, or balls choaking up their cavity; though, as the signs of these are at least but equivocal, we have not heard of any operators so bold as to attempt them.

344
Operations
for the
hernia.

One of the most capital operations in surgery is that of lithotomy, or cutting for the stone. This has been practised from the early ages of medicine, but has received great improvements in modern times. Before it is attempted, all possible means should be used for dissolving the stone by the solvents proposed under the article *MEDICINE*, n° 486. However, the operation may be safely performed on persons of all ages; and though many have died under it, many have also survived, and been by it recovered from the most miserable state imaginable to perfect health.

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Of lithoto-
my, &c.

Besides these, there are several other operations in surgery which are connected with particular diseases, and without which these disorders cannot be cured; such as the operation for the fistula lachrymalis, for the cataract, for the fistula in ano, for the phymosis, paraphimosis, &c. all of which shall be described under their proper heads.

PART III. PRACTICE OF SURGERY.

Practice.

THIS consists in performing of the different operations in surgery, in such cases and with such intentions as are most proper; for which last the directions of a physician are often thought necessary; though, as before observed, it were much better that surgeons were themselves acquainted with the cases where manual operations are necessary, and when they are not.—We shall begin with these operations which are most simple and easily performed.

SECT. I. Of Blood-letting.

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General
rules ap-
plying to
phleboto-
my.

THERE are some general rules and observations which relate equally to this operation in whatever part of the body it is practised; these we shall in the first place enumerate with as much accuracy as possible, and shall afterwards proceed to treat particularly of blood-letting in the arm and other parts.

I. In this, as in every other operation, the situation of the patient, and of the operator likewise, ought to be precisely fixed. As the situation of a patient during the operation of blood-letting, has a considerable

influence on the effects produced by the evacuation upon the system, this circumstance therefore merits our particular attention. In some disorders, it is the object of this remedy, to evacuate a considerable quantity of blood without inducing fainting: When this is the case, and when from former experience it is known that the patient to be operated upon is liable during the evacuation to fall into a faintish state, a horizontal posture, either upon a bed or on a couch, ought to be preferred to every other; for every practitioner is now well acquainted with this fact, that fainting is not near so ready to occur in a horizontal as in an erect posture.

It now and then happens, however, that one ma-
terial advantage expected from the operation of blood-
letting, is the production of a state of deliquium; as, for instance, in cases of strangulated hernia, where a
general relaxation of the system is sometimes desirable.
In all such circumstances, instead of a horizontal
posture, the more erect the patient is kept, the more
readily will a state of fainting be induced: So that
the

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the particular object in view from the operation must at all times determine this matter.

While we thus, however, attend particularly to the posture of the body at large, the particular position of the limb or part to be operated upon must not be neglected. In every operation it is a matter of much importance to have the patient seated in a proper light, but in none is it more material than in blood-letting. The best general rule that can be given upon this point is, that the patient ought to be so placed, as that the principal light of the apartment shall fall directly upon the part to be operated upon, so that the vein to be opened may be made as apparent as possible.

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operator.

But, whatever may be the position of the part to be operated upon, and whether the patient is to be placed on a bed or on a chair, according to Mr Bell, the surgeon ought always to be seated. The operation may, no doubt, be done while the surgeon is standing; and it is most frequently indeed performed in this manner: But it can never be done either with such steadiness or neatness, as when the operator is firmly seated on a chair.

II. From the coats of veins being more flaccid than those of arteries, and from the blood not proceeding with such rapidity in the former as in the latter, an opening made in one of these will seldom discharge blood freely, unless the vein is either cut entirely across, which in general would be productive of disagreeable consequences, or that the blood be prevented from returning to the heart, by means of a ligature placed between the heart and that part of the vein in which the opening is to be made.

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The patient being properly seated, the next step, in every operation of this kind, must therefore be, by means of a proper bandage, so to compress the vein intended to be opened, as to prevent the blood from returning to the heart; and, for the same reason, an equal degree of pressure, it is obvious, ought to be applied to all the other veins of the part: for if this circumstance should not be attended to, the communication preserved by the collateral corresponding branches would render the pressure upon any one particular vein of very little importance. But, independent of its producing a more free discharge of blood than could be otherwise obtained, this pressure upon the veins, by inducing an accumulation of their contents, tends to bring them more evidently into view, and consequently renders it easier for the operator to to effect a proper opening than he would otherwise find it.

Although compression, however, to a certain extent, is necessary for this purpose of accumulating a quantity of blood in the veins, and for afterwards discharging it at an opening made by the lancet, it is at the same time perfectly evident, that any considerable degree of pressure, instead of forwarding these purposes, must obstruct them entirely: for if the pressure intended to be applied to the veins only, should accidentally be carried so far as to rest materially upon the arteries connected with them, all farther access of blood to the veins would be thereby cut off, so that no evacuation of importance could take place at any opening to be made in them. Whenever it is intended, therefore, to evacuate blood in this manner,

a good deal of nicety is requisite in applying this pressure upon the veins: it ought always to be carried so far as effectually to compress the veins of the part, but never to such a degree as to obstruct the circulation in the corresponding arteries. When we see that the pressure applied has the effect of raising the veins, and if at the same time the pulsation of the artery is distinctly felt in the inferior part of the member, we may then be certain that it is to a very proper degree, and that it ought not to be carried farther: for by the swelling of the veins we are sure that they are sufficiently compressed; and by the arteries continuing to beat, it is evident that a continued flow of blood may be expected.

III. The reflux of blood to the heart being in this manner prevented, the next question to be determined is, the best method of making an opening into the vein. Different instruments have been invented for this purpose; but there are two only which have been retained in use, and which are all, therefore, that here require to be mentioned. These are the lancet and the phlegm. This last, on being placed immediately on the part to be cut, is, by means of a spring, pushed suddenly into the vein, and produces an opening of the exact size of the instrument employed.

The phlegm, in many parts of Germany, has acquired some reputation, particularly in taking blood from the jugular vein: but there are various objections to the use of this instrument, which must undoubtedly prevent it from ever coming into general use; and these particularly are, that we are obliged, from the nature of the instrument, to regulate the deepness to which it is to go before it is applied. Now we know well, that in blood-letting this is a circumstance we are never by any means certain of: for we frequently, after the introduction of a lancet, find it necessary to go much deeper than was at first expected; so that when a phlegm is used, unless we employ one on every occasion of a length which cannot be frequently required, we must often meet with disappointments.

But the most material objection to this instrument is, that where there are arteries or other parts lying below the veins, and in any danger of being hurt by the operation of blood-letting, the risk is much greater with the phlegm than with the lancet. For when the lancet is used, after the vein is once opened, the orifice may be enlarged at pleasure without any additional risk, merely by carrying the instrument forward along the course of the vein in the same depth to which it was at first introduced: whereas with the phlegm, so soon as it enters the vein, it must for certain pass directly downwards to its full length; a circumstance which adds greatly to the risk of wounding the parts underneath.

Independent of this, too, by the use of the lancet, we have it much more in our power to command an orifice of a determined size than when the phlegm is used: So that, without hesitation, we may venture to pronounce the phlegm to be an instrument in no degree necessary.

The broad-shouldered lancet in ordinary use, is an instrument which ought to be laid entirely aside. For opening abscesses it is very well calculated; but for the operation of blood-letting, it ought never to be used. The capital objection to this kind of lancet is, that

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that the broadness of its shoulders produces always a wound in the external teguments of perhaps three times the size of the opening made in the vein; a circumstance which adds no advantage whatever to the operation; on the contrary, it produces much unnecessary pain in the first instance; it renders it frequently a very difficult matter to command a stoppage of the blood; and the wounds produced by it are commonly so extensive, as to render them very liable to terminate in partial suppurations; an occurrence which always proves painful and disagreeable to the patient.

The spear-pointed lancet, on the contrary, is an instrument in every respect well calculated for the purpose of venæsection. From the acuteness of its point, it enters the teguments and vein with very little pain; which, we may here observe, is with many patients a circumstance of no small importance. We are sure of making the opening in the vein equal, or nearly so, to the orifice in the external teguments; and the discharge of blood produced by an opening made with one of these lancets, is commonly put a stop to with great ease, immediately on removing the ligature upon the vein.

"For these reasons, therefore, (says Mr Bell), the spear-pointed lancet is highly preferable to every other. And although, with timid practitioners, the acute point of this instrument may appear to require more dexterity in using it than the broad-shouldered lancet; yet the difference in this respect is so inconsiderable, that a very little experience of its excellency must, with every practitioner who gives it a fair trial, soon counterbalance all such objections. Indeed, no surgeon ought to be trusted in letting blood with the one, whose steadiness and dexterity would be in any degree doubted with the other."

IV. The form of lancet being thus fixed upon, we come now to speak of the method of using it. The surgeon and patient being both properly seated, and the ligature having been applied for a short space of time in order to produce some degree of swelling in the veins, that vein is to be made choice of which, at the same time that it appears conspicuously enough, is found to roll less than the others on being pressed upon by the fingers. There are some veins which roll so much, from being loose and unconnected with the cellular substance of the part, that although they may rise sufficiently, yet are much worse to operate upon than others which lie at a much greater depth. That vein therefore is to be preferred, which not only rises so as to become perfectly evident, but which appears to be connected with some degree of firmness to the contiguous parts. It is scarcely thought necessary to observe here, that when a vein appears to be so immediately connected with a contiguous artery or tendon, as evidently to produce some risk of wounding these parts in the operation, another vein not liable to such hazard, if it can be procured, ought undoubtedly to be preferred.

Veins may lie directly above both arteries and tendons, and yet no manner of risk be incurred by opening them, provided the operator is sufficiently steady and attentive; but it does now and then happen, that veins are so nearly and intimately connected with these

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parts, as to render it hazardous even for the most dexterous surgeon to attempt this operation.

The vein being at last made choice of, the surgeon, if he is to use his right-hand in the operation, takes a firm hold of the member from whence the blood is to be drawn with his left, and, with the thumb of the same hand, he is now to make such a degree of pressure upon the vein, about an inch and half below the ligature, as not only to render the skin and teguments somewhat tense, but at the same time to interrupt for a little all communication between the under part of the vein and that portion of it lying between the ligature and the thumb placed as thus directed.

The lancet being bent to somewhat more than right angles, the operator now takes it between the finger and thumb of his right-hand; and leaving at least one half of the blade uncovered, he rests his hand on the middle finger, ring-finger, and little finger, all placed as conveniently as possible in the neighbourhood of the vein from whence the blood is to be taken; and having pushed the point of the instrument freely through the skin and teguments into the vein, he now carries it forward in an oblique direction, till the orifice is of the size he inclines to have it; taking care, during the time of pushing on the lancet, that its point be kept in as straight a direction as possible, for fear of dipping into the parts below.

The instrument is now to be withdrawn; and the surgeon, removing the thumb of his left hand, is to allow the vein to empty itself freely into the different cups previously provided for the purpose.

It is here of importance to observe, that during the time the blood is discharging, the member ought to ³⁵⁶ Of the posture of the limb. be kept in exactly the same posture it was in when the lancet was first introduced: otherwise the orifice in the skin is apt to slip over the opening in the vein; a circumstance which always proves inconvenient, and on some occasions produces a good deal of trouble by the blood from the vein insinuating itself into the surrounding cellular substance.

In taking hold of the lancet, we have directed the scales to form rather an oblique angle with the blade of the instrument. It will answer when they are even at right angles; but a farther separation proves always troublesome, by throwing the scales too much out upon the operator's hand. The length of instrument left out from between the finger and thumb is another circumstance requiring our attention; for unless a sufficient quantity of it is left uncovered, the operator cannot act with freedom. In lancets of an ordinary length, one half of the blade, or very nearly that quantity, ought always to be left out.

The entry of the lancet into the vein is the next circumstance we have desired to be attended to. By very little attention, the entrance of the instrument into the vein may be distinctly perceived: for so soon as its point has entered the cavity of the vessel, the resistance to its farther progress is evidently found to be much diminished; and immediately on the opening being in any degree enlarged, the blood begins to rush out; which is the clearest proof of the operation being so far complete. On being thus rendered sure that the lancet has got into the vein, we have also desired that it may be carried forward in an oblique

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direction,

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Spear-pointed
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direction, taking care to keep the point of the instrument in the same degree of elevation from the instant it has passed fairly through the coats of the vein; and to this part of the operation the most particular attention ought to be given. To the want of necessary caution in this matter, or rather to the improper regulations held forth upon it by every writer on this subject, much of the risk attending this operation ought to be attributed.

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The propriety of an oblique direction for the course of the orifice is very obvious: for when made altogether longitudinal, the sides of the wound are apt to fall immediately together, so as not to admit of a free discharge of blood; and, on the other hand, when the vein is cut entirely across, troublesome consequences commonly ensue from the wound being very difficult to heal. An orifice somewhat oblique with respect to the course of the vein, is therefore preferable to either. But the material circumstance to be kept in view, is the direction of the point of the lancet after it has got fairly into the vein.

The reason of this last precaution is, that the internal orifice of the vein may not be farther extended upwards than the external wound in the skin and other teguments, as ecchymoses, or effusions of blood into the cellular substance, have, with the broad-shouldered lancet, been found frequently to occur from a contrary management. But when the spear-pointed lancet is used, this is an occurrence which need never happen; as, from the narrow point of the instrument, it may with safety be carried on in the cavity of the vein as far as is necessary. The orifice produced by it in the vein must, when the operation is properly done, be always of very nearly the same extent as the external wound in the teguments: and, by the same management, we avoid that capital risk which it is evident must always occur from an implicit obedience to the direction alluded to; for one certain effect of raising the heel or back-part of the lancet, is, that the point of the instrument must in the same proportion be depressed; and the consequence of lowering the point of the lancet, already perhaps sliding along the under side of the vein, must at once appear to be very hazardous: for, in such circumstances, if the point of the instrument be depressed, which must undoubtedly happen if the back-part of it be elevated, it must for certain pass through the back-part of the vein; so that if either an artery, nerve, or tendon, lie contiguous, they must of necessity be wounded: and we are perfectly convinced, that this cause alone has frequently been the origin both of wounded arteries and of pricks in the nerves and tendons. So that as the hazard of the practice, whenever it is attentively considered, must at once appear evident; and as the supposed inconvenience, arising from a contrary mode of operating, is effectually prevented by the use of the spear-pointed lancet, all such risks therefore should be carefully avoided.

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of the ori-
fice.

With respect to the size of orifice in cases of blood-letting, this circumstance must at all times be determined by the nature of the disorder for which the evacuation is prescribed. When a sudden loss of a considerable quantity of blood is intended, either with a view to produce a state of fainting, or for any other

reason, a free large orifice is absolutely necessary; but in ordinary practice, no necessity occurs for this.

In using a spear-pointed lancet, an orifice of about an eighth part of an inch in length will in general answer every purpose: but when a lancet with broad shoulders is used, an opening of twice that size is little enough; for, with such an instrument, the orifice in the vein can seldom be above half the extent of the external opening.

After withdrawing the lancet from the orifice, we have directed the thumb of the left-hand to be removed from the place it was made to occupy. One material use of the thumb placed below the part where the lancet was directed to enter, is to keep the teguments and vein firm, so as to prevent the latter from rolling. But another advantage occurring from it is, that, by making a sufficient degree of pressure upon the vein, it thereby prevents any considerable quantity of blood from escaping between the time of removing the lancet, and the application of one of the cups for receiving the blood from the orifice in the vein. During this period, it frequently happens that a good deal of blood is discharged, to the great annoyance both of the patient, the operator, and bystanders; a circumstance which, with a little attention, may be always effectually prevented.

V. When the vein is properly cut, and the orifice is made sufficiently large, it rarely occurs that any difficulty is experienced in procuring all the blood that is wanted. But it now and then happens otherwise, either from the orifice of the skin and other parts having receded from the opening in the vein, or from the patient having become faintish; a situation always unfavourable to a free discharge of blood. When this last circumstance occurs, a stream of fresh air ought to be admitted to the apartment, wine or some other cordial should be administered, and the patient ought to be laid into a horizontal posture. By these means the faintness will in general be soon removed: but if still the blood should not flow freely, the member ought to be put into all the variety of positions that can probably assist in bringing the openings of the skin and other teguments to correspond with that of the vein; which will soon be known to have happened by the blood beginning instantly to flow. Throwing the muscles of the part into constant action, by giving the patient a cane or any other firm substance to turn frequently round in his hand when the operation is done in the arm, will often answer in producing a constant flow of blood from a vein, when every other means has failed: And, lastly, when the pulse in the inferior part of the member is felt very feeble, or especially if it cannot be distinguished at all, we may be thereby rendered certain that the ligature is too tight, and may in general have it in our power to produce an immediate flow of blood, by removing the compression thus improperly made upon the arteries of the part.

VI. A quantity of blood proportioned to the nature of the disorder being thus discharged, the pressure upon the superior part of the vein should be immediately removed; and this being done, if the spear-pointed lancet has been used, all farther loss of blood will in general stop immediately. The contrary of this, however, sometimes occurs, and blood continues

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Of stopp-
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to flow freely even after the ligature is removed. When this is the case, the operator ought to compress the vein both above and below the orifice, by means of the finger and thumb of one hand, so as to prevent any farther loss of blood : And this being done, the limb ought to be washed, and entirely cleared of any blood that may have fallen upon it ; and the orifice being also cleared of every particle of blood, the sides of it should be laid as exactly together as possible ; and a piece of court or any other adhesive plaster being so applied as to retain them, it will seldom happen that any kind of bandage is necessary : but when the blood has issued with uncommon violence during the operation, and has been difficult to command after the removal of the ligature, in such instances it will be prudent to apply a small compress of linen over the plaster, and to secure the whole with a linen roller properly applied round the member.

§ 1. Of Venaesection in the Arm.

In applying the ligature for the stoppage of the circulation, it ought to be placed about an inch or an inch and half above the joint of the elbow ; and in order to prevent the ends of it from interfering with the lancet, the knot should be made on the outside of the arm. In general, one knot might answer ; but a slip-knot being made above the first, renders it more secure, and it is very easily done.

In forming the choice of a vein from whence blood is to be taken, the general rules we have already laid down upon this point must be here particularly attended to. That vein which appears most conspicuous, at the same time that it rolls least under the skin, should in general be fixed upon ; but when an artery is found to lie immediately below, and quite contiguous to such a vein, the operator, if he is not perfectly satisfied with his own steadiness, ought rather to take some other. In general, however, the artery lies so low in this place, that the median basilic vein, under which it commonly runs, may be opened with perfect safety ; and as this vein in general appears more conspicuous than any of the others, probably from the continued pulsation of the artery below obstructing in some measure the passage of its contents, it is in this respect, therefore, more properly calculated for this operation than any of the others. Other circumstances occur, too, which render the median basilic preferable to the cephalic or median cephalic veins for the operation of blood-letting. The former, viz. the median basilic, is less deeply covered with cellular substance ; and by lying towards the inner part of the arm, it is more thinly covered with the tendinous expansion of the biceps muscle than either of the others. From these circumstances, the operation is always attended with less pain when done in this vein than in any of the others.

In blood-letting at this part of the arm, although the operation may be done with the right-hand either upon the right or left arm of the patient, yet it is much more neatly done by performing with the right-hand upon the right-arm, and with the left-hand upon the left-arm of the patient.

In very torpid people, it sometimes happens that all the larger veins lie so deep as not to be discovered by the eye ; but when they are sensibly felt by

the fingers, even although they cannot be seen, they may be always opened with freedom. In a few instances, however, they can neither be distinguished by the eye nor by the finger : in such a situation, as they may in general be met with about the wrist, or on the back-part of the hand, the ligature should be removed from the upper part of the arm ; and being applied about half-way between the elbow and wrist, the veins below will thereby be brought into view ; and wherever a vein can be evidently observed, there can be no danger in having recourse to the operation.

§ 2. Of Blood-letting in the jugular Vein.

THERE is only one ramification of this vein, viz. its principal posterior branch, which can easily be brought so much into view as to be with propriety opened ; and even this lies deeply covered with parts, not only with the skin and cellular substance, but with the fibres of the platysma myoides muscle ; so that a considerable degree of pressure becomes necessary in order to raise it to any height. With a view to produce this, the operator's thumb is commonly advised to be placed upon the vein, so as to compress it effectually about an inch or inch and half below where the opening is to be made. This, however, seldom proves sufficient for the purpose, as the blood, on being stopped in its progress through this branch, easily finds a passage to the other veins ; so that unless the principal vein on the other side of the neck is also compressed, the vein to be opened can never be fully distended. In order to effect this, a firm compress of linen should be applied on the largest vein on the opposite side of the neck ; and an ordinary garter, or any other proper ligature, being laid directly over it, should be tied with a firm knot below the opposite arm-pit ; taking king care to make such a degree of pressure, as to put an entire stop to the circulation in the vein, which in this way may be easily effected without producing any obstruction to the patient's breathing.

This being done, and the patient's head properly supported, the operator, with the thumb of his left-hand, is now to make a sufficient pressure upon the vein to be opened ; and with the lancet in his right-hand is to penetrate at once into the vein ; and, before withdrawing the instrument, an orifice should be made large enough for the intended evacuation. It may be proper to observe, that a more extensive opening ought always to be made here than is necessary in the arm, otherwise the quantity of blood is generally procured with difficulty : and besides, there is not the same necessity for caution on this point here that there is in the arm ; for it seldom or never happens, that any difficulty occurs, in this situation, in putting a stop to the blood after the pressure is removed from the veins, all that is commonly necessary for this purpose being a slip of adhesive plaster without any bandage whatever.

In order to bring the vein more clearly into view, so as afterwards to be able to open it with more exactness, it has been recommended, that the skin, cellular substance, and muscular fibres covering the vein, be divided before it is attempted to be pushed into it. There is not, however, any necessity for this precaution, as it rarely

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happens that any difficulty is experienced in procuring a free discharge of blood by opening the vein and teguments at once in the manner directed. And it is here, as in every instance where it is necessary to take blood by a lancet, if it is not done at once, the patient is much disappointed, and is sure to attribute the failure entirely to a fault in the operator.

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§ 3. Of Venesection in the Ankles and Feet.

WHEN blood is to be discharged from the veins of these parts, it will be readily understood, that the first step to be taken is a proper compression of the veins, so as to produce an accumulation of their contents. The ligature for this purpose being applied with a sufficient degree of tightness a little above the ankle-joint, all the branches of the vena saphena, both in the inside and outside of the foot, come at once into view; and as this vein lies every where very superficial, being in general covered with skin only, wherever a proper vein appears conspicuously it may with safety be opened.

With a view to encourage the discharge of blood, it has been a constant practice in blood-letting in these veins, to dip the feet into warm-water immediately on the orifice being made. But this is a very inaccurate method of proceeding, as the quantity of blood taken in this manner can never be ascertained with precision; for the blood being all mixed with the water, the operator can never be in any degree certain as to this point: and besides, there does not appear to be any necessity for this assistance; for when the compression of the superior part of the veins is made effectual, and the orifice is of a proper size, there is seldom more difficulty in obtaining a full discharge of blood from the veins of these parts than from any other veins of the body.

On removing the ligature, the discharge is generally stopped at once; so that a piece of adhesive plaster applied over the orifice, answers all the purpose of a bandage.

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§ 4. Of blood-letting in the Veins of the Forehead, Temples, and Occiput.

BEFORE proceeding to cut the veins, an handkerchief or neckcloth ought to be drawn tight round the neck; that, by compressing the jugular vein, those branches of it may become more turgid and conspicuous. The vein being opened, the patient must hold down his head, that the blood may not trickle from his forehead into his eyes or mouth, when the stream does not spin out with sufficient force. If the blood does not stop of itself after a due quantity is discharged, you must compress the orifice with your finger; and, after wiping the forehead and face, apply a compress or two, and then your bandage.

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§ 5. Of Blood-letting in the Veins called Ranulae, under the Tongue.

To bleed in these veins, a stricture being made upon the neck as before, you then elevate the apex of the tongue with your left-hand, while with the lancet in your right you circumspectly open first one and then the other on each side, because the aperture of one only will hardly ever discharge blood enough to give any considerable relief. When you judge a sufficient

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quantity of blood has run out of the mouth into your vessel, remove the ligature from the neck; upon which the flux usually stops of itself: but if it should still continue, let the patient take a little vinegar or Frontinac wine in his mouth; or else you may apply a bit of vitriol or alum, or a compress dipped in some styptic liquor, till the hæmorrhage ceases; which can never be dangerous even without such topicals.

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§ 6. Of Venesection in the Penis.

BLEEDING in the vena dorsalis penis usually surpasses the benefit of all remedies whatever in abating inflammatory disorders of this member. This large vein, which runs along the back or upper side of the penis, being generally pretty much distended, and conspicuous in an inflammation of this part, may be incised about the middle or back part of the penis; and kept bleeding till the member becomes flaccid, and a sufficient quantity of blood be discharged proportionable to the urgency of the symptoms. This done, you must apply a compress, and the bandage proper for the penis. But you must carefully endeavour to avoid injuring the arteries or nerves which enter the penis near this vein; as also not to make your bandage too strict; for by these means the inflammation and lymph-toms may turn out worse than before.

When it is found necessary to discharge blood in this manner from the penis, the veins can be easily brought into view, by producing an accumulation of their contents in the same manner as in other parts of the body, through the intervention of a ligature: but in the tongue, in the hæmorrhoidal veins about the anus, and other parts where compression cannot be applied, all that the surgeon can do, is to make an orifice of a proper size in that part of the vein which shows itself most evidently; and if a sufficient discharge of blood is not thus produced, as there is no other method of effecting it, immersing the parts in warm water may in such circumstances be a very necessary measure.

§ 7. Of Venesection in the Eyes.

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THERE are several ways of performing this operation, of which we shall here only relate the chief. First, the patient is to be seated conveniently on the bed-side or on a chair, with his head held in a proper posture by an assistant; which done, the surgeon makes a transverse incision with a lancet upon the turgid small veins in the corners of the eye, so as to open them or cut them quite asunder. Some use a small pair of scissors, instead of a lancet, to divide the vessels; but in using either of them, the eye-lids must be held apart from each other by the fingers of one hand, while the vessels are incised by those of the other. Some, again, elevate the small turgid veins with a crooked needle before they divide them, the eye-lids being in the mean time held asunder by an assistant. But it would be still better to have these crooked needles made thin and double-edged, so that they may divide the vessels of themselves in the elevation, without the use of lancet or scissors. The small veins being thus incised or divided, their discharge of blood should be promoted by fomentations of warm water frequently applied to the eye by means of a sponge or soft linen rags.

Among other methods that have been proposed for scarifying

scarifying the blood-vessels of the eye, the beards of rough barley were at one period much extolled, and are still employed by some individuals. By drawing them over the surface of the eye, in a direction contrary to the sharp spiculae with which they are furnished, a considerable discharge of blood is thereby produced: But the pain attending this operation is exquisite; and as it does not possess any superior advantage to the method with the lancet, it is now falling into general disuse.

§ 8. Of Arteriotomy.

WHATEVER particular advantages may in theory have been expected from arteriotomy, and however some of its supporters may have recommended it, not only as being in many instances preferable to venesection, but as an operation perfectly safe even in vessels of considerable size; yet the most strenuous friends to the practice have shrunk from any real attempt of this kind on the larger arteries. Instances have no doubt occurred of large arteries having been opened without any danger ensuing; but these are so exceedingly rare, that no practitioner of experience will, from that consideration, be induced coolly to proceed to open any artery of importance. The smaller branches of arteries may indeed be opened with great safety when they are not deeply covered, and especially when they lie contiguous to bones; as in such situations, so soon as the quantity of blood intended to be taken is discharged, all further loss of blood may be very easily prevented by compression: but in any of the larger arteries, the attempt must be always attended with so much hazard, and the advantages to be expected from it in preference to venesection are apparently so trifling, as must in all probability prevent it from ever being carried into execution.

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Few arteries can be opened with propriety.

There are very few arteries, therefore, which with any propriety can be opened: the different branches of the temporal are the only arteries indeed from whence blood in ordinary practice is ever taken; but if a fanciful practitioner should at any time incline to take blood in this manner from a different part, it may be done with great safety from one of the arteries running on each side of the fingers. About the middle of the last phalanx, this artery is sufficiently large for discharging a considerable quantity of blood: in most cases it lies very superficial; and in this situation there can seldom much difficulty occur in putting a stop to the evacuation. In performing this operation on any of the temporal branches, if the artery lies superficial, it may be done with one push of the lancet, in the same manner as was directed for venesection; but when the artery lies deeply covered with cellular substance, it is always necessary to lay it fairly open to view, before making the orifice with the lancet: for in all the smaller arteries, when they are cut entirely across, there is little chance of being able to procure any considerable quantity of blood from them; as, when divided in this manner, they are sure to retract considerably within the surrounding parts, which commonly puts a stop to all farther evacuation.

Some degree of nicety is also necessary in making the opening into the artery of a proper oblique direction, neither quite across nor directly longitudinal; for a longitudinal opening never bleeds so freely, ei-

ther in an artery or in a vein, as when its direction is somewhat oblique.

If the opening has been properly made, and if the artery is of any tolerable size, it will at once discharge very freely without any compression; but when the evacuation does not go on so well as could be wished, the discharge may be always assisted by compressing the artery immediately above the orifice, between it and the corresponding veins. The quantity of blood being thus discharged, it will commonly happen, that a very slight compression on these smaller arteries will suffice for putting a stop to the evacuation: and whatever pressure is found necessary, may be here applied in the same manner as was directed in venesection; first, by clearing the orifice entirely of blood; and having covered it properly with a piece of adhesive plaster, if that should not be found to answer, a compress of linen should be applied over it, the whole being then to be secured with a roller.

It happens, however, in some instances, that this does not succeed, the orifice continuing to burst out from time to time, so as to be productive of much distress and inconvenience.

In this situation there are three different methods ³⁷⁰ by which we may with tolerable certainty put a stop ^{Method of} to the farther discharge of blood. 1st, If the artery ^{the blood.} is small, as all the branches of the temporal arteries commonly are, the cutting it entirely across, exactly at the orifice made with the lancet, by allowing it to retract within the surrounding parts, generally puts an immediate stop to the discharge. 2^d, When that is not consented to, we have it always in our power to secure the bleeding vessel with a ligature, as we would do an artery accidentally divided in any part of the body. And, lastly, if neither of these methods is agreed to by the patient, we can, by means of a constant regular pressure, obliterate the cavity of the artery at the place where the operation has been performed, by producing the accretion of its sides. Different bandages have been contrived for compressing the temporal artery; but none of them answer the purpose so easily and so effectually as the one figured in the Plate.

As some time, however, is required to obliterate the cavity of the artery, this method is accordingly more tedious; but to timid patients it generally proves more acceptable than either of the other two.

§ 9. Of Topical Blood-letting.

WHEN, either from the severity of a local fixed pain, or from any other cause, it is wished to evacuate blood directly from the small vessels of the part affected, instead of opening any of the larger arteries or veins, the following are the different modes proposed for effecting it, viz. by means of leeches; by slight scarifications with the shoulder or edge of a lancet; and, lastly, by means of an instrument termed a *scarificator*, in which any number of lancets, from one to twenty or upwards, may be placed, and are fixed in such a manner, that, when the instrument is applied to the part affected, the whole number of lancets contained in it are, by means of a strong spring, pushed suddenly into it, to the depth at which the instrument has been previously regulated. This being done, as the smaller blood-vessels only by this operation are

³⁷¹
Scarificator described.

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ever intended to be cut, and as these do not commonly discharge freely, some means or other become necessary for promoting the evacuation.

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Of cupping-
glasses.

Various methods have been proposed for this purpose. Glasses fitted to the form of the affected parts, with a small hole in the bottom of each, were long ago contrived; and these being placed upon the scarified parts, a degree of suction was produced by a person's mouth sufficient for nearly exhausting the air contained in the glass: and this accordingly was a sure enough method of increasing the evacuation of blood to a certain extent. But as this was attended with a good deal of trouble, and besides did not on every occasion prove altogether effectual, an exhausting syringe was at last adapted to the glass: which did indeed answer as a very certain method of extracting the air contained in it; but the application of this instrument for any length of time is very troublesome, and it is difficult to preserve the syringe always airtight.

The application of heat to the *cupping-glasses*, as they are termed, has been found to rarify the air contained in them to a degree sufficient for producing a very considerable suction. And as the instrument in this simple form answers the purpose in view with very little trouble to the operator, and as it is at all times easily obtained, the use of the syringe has therefore been laid aside.

There are different methods adopted for thus applying heat to the cavity of the glass. By supporting the mouth of it for a few seconds above the flame of a taper, the air may be sufficiently rarified; but if the flame is not kept exactly in the middle, but is allowed to touch either the sides or bottom of the glass, it is very apt to make it crack. A more certain, as well as an easier, method of applying the heat, is to dip a piece of soft bibulous paper in spirit of wine; and having set it on fire, to put it into the bottom of the glass, and, on its being nearly extinguished, to apply the mouth of the instrument directly upon the scarified part. This degree of heat, which may be always regulated by the size of the piece of paper, and which it is evident ought to be always in proportion to the size of the glass, if long enough applied, proves always sufficient for rarifying the air very effectually, and at the same time, if done with any manner of caution, never injures the glass in the least.

The glass having been thus applied, if the scarifications have been properly made, they instantly begin to discharge freely: and so soon as the instrument is nearly full of blood, it should be taken away; which may be always easily done by raising one side of it, so as to give access to the external air. When more blood is wished to be taken, the parts should be bathed with warm water; and being made perfectly dry, another glass, exactly of the size of the former, should be instantly applied in the very same manner: and thus, if the scarificator has been made to push to a sufficient depth, so as to have cut all the cutaneous vessels of the part, almost any necessary quantity of blood may be obtained. It sometimes happens, however, that the full quantity intended to be discharged cannot be got at one place. In such a case, the scarificator must be again applied on a part as contiguous to the other as possible; and this being done, the ap-

plication of the glasses must also be renewed as before.

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When it is wished to discharge the quantity of blood as quickly as possible, two or more glasses may be applied at once on contiguous parts previously scarified; and, on some occasions, the quantity of blood is more quickly obtained by the cupping-glasses being applied for a few seconds upon the parts to be afterwards scarified. The suction produced by the glasses may possibly have some influence in bringing the more deeply seated vessels into nearer contact with the skin, so that more of them will be cut by the scarificator.

A sufficient quantity of blood being procured, the wounds made by the different lancets should be all perfectly cleared of blood; and a bit of soft linen or charpie, dipped in a little milk or cream, applied over the whole, is the only dressing that is necessary. When dry linen is applied, it not only creates more uneasiness to the patient, but renders the wounds more apt to fester than when it has been previously wetted in the manner directed.

Although this operation is by no means difficult in the execution, yet a good deal of practice is necessary to perform it in a neat and successful manner; but, with a little attention, any operator may soon become so expert, as to be able to take any quantity of blood that it can ever be necessary to evacuate.

Dry cupping consists in the application of the cupping-glasses directly to the parts affected, without the use of the scarificator. By this means a tumour is produced upon the part; and where any advantage is to be expected from a determination of blood to a particular spot, it may probably be more easily accomplished by this means than by any other.

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Dry cupping.

When the part from which it is intended to produce a local evacuation of this kind is so situated, that a scarificator and cupping-glasses can be applied, this method is greatly preferable to every other; but it now and then happens, that parts are so situated as not to admit of their application. Thus, in inflammatory affections of the eye, of the nose, and of other parts of the face, the scarificator cannot be properly applied directly to the parts affected. In such instances, leeches are commonly had recourse to, as they can be placed upon almost any spot from whence we would wish to discharge blood.

In the application of these animals, the most effectual method of making them fix upon a particular spot, is to confine them to the part by means of a small wine-glass. Allowing them to creep upon a dry cloth, or upon a dry board, for a few minutes before application, makes them fix more readily; and moistening the parts on which they are intended to fix, either with milk, cream, or blood, tends also to cause them adhere much more speedily than they otherwise would do. So soon as the leeches have separated, the ordinary method of promoting the discharge of blood, is to cover the parts with linen cloths wet in warm water. In some situations, this may probably be as effectual a method as any other; but wherever the cupping-glasses can be applied over the wounds, they answer the purpose much more effectually; wherever the figure of the part, therefore, will admit of their application, they ought undoubtedly to be employed.

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Of the application of leeches.

§ 1. Of opening Abscesses.

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Incision
preferable
to caustic.

THERE are two ways of opening an abscess; either by incision or caustic; but incision is preferable in most cases. In small abscesses, there is seldom a necessity for greater dilatation than a little orifice made with the point of a lancet; and in large ones, where there is not a great quantity of skin discoloured and become thin, an incision to their utmost extent will usually answer the purpose; or if there be much thin discoloured skin, a circular or oval piece of it must be cut away: which operation, if done dexterously with a knife, is much less painful than by caustic, and at once lays open a great space of the abscess, which may be dressed down to the bottom, and the matter of it be freely discharged: whereas, after a caustic, though we make incisions through the eschar, yet the matter will be under some confinement; and we cannot have the advantage of dressing properly till the separation of the slough, which often requires a considerable time, so that the cure must be necessarily delayed: besides that the pain of burning continuing two or three hours, which a caustic usually requires in doing its office, draws such a suction upon the skin round the eschar, as sometimes to indispose it very much for healing afterwards. In the use of caustics, it is but too much a practice to lay a small one on the most prominent part of a large tumour, which not giving sufficient vent to the matter, and perhaps the orifice soon after growing narrow, leads on to the necessity of employing tents; which two circumstances more frequently make fistulas after an abscess, than any malignity in the nature of the abscess itself. The event would more certainly be the same after a small incision: but surgeons, not depending so much on small openings by incision as by caustic, do, when they use the knife, generally dilate sufficiently; whereas, in the other way, a little opening in the most depending part of the tumour usually satisfies them.

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Advantages
of using
caustic in
some cases.

From this account of the method of opening abscesses, it does not appear often necessary to apply caustics; yet they have their advantages in some respects, and are seldom so terrible to patients as the knife, though in fact they are frequently more painful to bear. They are of most use in cases where the skin is thin and inflamed, and we have reason to think the malignity of the abscess is of that nature as to prevent a quickness of incising; in which circumstance, if an incision only were made through the skin, little sinuses would often form underneath, and the lips of it, lying loose and flabby, would become callous, and retard the cure, though the malignity of the wound were corrected. Of this kind are venereal buboes; which notwithstanding they often do well by mere incision, yet, when the skin is in the state we have supposed, the caustic is always preferable: but this method should be confined to venereal buboes; for those which follow a fever or the small-pox, for the most part are curable by incision only. There are many scrophulous tumours, where the reasoning is the same as in the venereal; and even in great swellings, if the patient will not submit to cutting, and the surgeon is apprehensive of any danger in wounding a large vessel, which is, often done with the knife, but

is avoided by caustic, it may on such an occasion be made use of; however, in scrophulous swellings of the neck and face, unless they are very large, caustics are not advisable, since in that part of the body, with length of time, they heal after incision.

When an abscess is ready burst, we are to be guided by the probe where to dilate, observing the same rules with regard to the degree of dilatation as in the other case. The usual method of dilating, is with the probe-scissars; and indeed, in all abscesses, the generality of surgeons use the scissars, after having first made a puncture with a lancet: but as the knife operates much more quickly, and with less violence to the parts, than scissars, which squeeze at the same time that they wound, it will be sparing the patient a great deal of pain to use the knife, wherever it is practicable; which it is in almost all cases, except some fistulas *in ano*, where the scissars are more convenient. The manner of opening with a knife, is by sliding it on a director, the groove of which prevents its being misguided. If the orifice of the abscess be so small as not to admit the director or the blade of the scissars, it must be enlarged by a piece of sponge-tent; which is made by dipping a dry bit of sponge in melted wax, and immediately squeezing as much out of it again as possible, between two pieces of tile or marble; the effect of which is, that the loose sponge being compressed into a small compass, if any of it be introduced into an abscess, the heat of the part melts down the remaining wax that holds it together, and the sponge sucking up the moisture of the abscess, expands, and in expanding opens the orifice wider, and by degrees, so as to give very little pain.

The usual method of dressing an abscess, the first time, is with dry lint only; or, if there be no flux of dressing of blood, with soft digestives spread on lint. If there be no danger of the upper part of the wound reuniting too soon, the dossils must be laid in loose. But if the abscess be deep, and the wound narrow, as is the case sometimes of abscesses *in ano*, the lint must be crammed in pretty tightly, that we may have afterwards the advantage of dressing down to the bottom without the use of tents, which, by resisting the growth of the little granulations of flesh, in process of time harden them, and in that manner produce a fistula: so that, instead of being used for the cure of an abscess, they never should be employed but where we mean to retard the healing of the external wound, except in some little narrow abscesses, where, if they be not crammed in too large, they become as dossils, admitting of incarnation at the bottom; but care should be taken not to inordinate them much deeper than the skin in this case, and that they be repeated twice a-day to give vent to the matter they confine. But tents do moist good in little deep abscesses, whence any extraneous body is to be evacuated, such as small splinters of bones, &c.

The use of vulnerary injections into abscesses has been thought to bear so near resemblance to the use of tents, that they both fell into disrepute almost at the same time.

Over the dossils of lint may be laid a large pledgit of tow spread with basilicon, which will lie softer than a defensive plaster; for this, though designed to defend the circumference of wounds against inflammation.

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Of dilating
the wound:
in abscesses.

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Of the
time, is with dry lint only; or, if there be no flux of dressing of blood, with soft digestives spread on lint. If there be no danger of the upper part of the wound reuniting too soon, the dossils must be laid in loose. But if the abscess be deep, and the wound narrow, as is the case sometimes of abscesses *in ano*, the lint must be crammed in pretty tightly, that we may have afterwards the advantage of dressing down to the bottom without the use of tents, which, by resisting the growth of the little granulations of flesh, in process of time harden them, and in that manner produce a fistula: so that, instead of being used for the cure of an abscess, they never should be employed but where we mean to retard the healing of the external wound, except in some little narrow abscesses, where, if they be not crammed in too large, they become as dossils, admitting of incarnation at the bottom; but care should be taken not to inordinate them much deeper than the skin in this case, and that they be repeated twice a-day to give vent to the matter they confine. But tents do moist good in little deep abscesses, whence any extraneous body is to be evacuated, such as small splinters of bones, &c.

tion or a fluxion of humours, is often the very cause of them: so that the dressings of large wounds should never be kept on by these plasters, where there is danger of such accidents. In this manner, the dressings may be continued till the cavity is incarned; and then it may be cicatrised with dry lint or some of the cicatrising ointments, observing to keep the fungus down, as directed before.

In the course of dressing, it will be proper to have regard to the situation of the abscess, and as much as possible to make the patient favour the discharge by his ordinary posture: and to this end also, the discharge must be assisted by compress and bandage: the compress may be made of rags or plaster; though the latter is sometimes preferable, as it remains immovable on the part it is applied to. The frequency of dressing will depend on the quantity of discharge: once in 24 hours is ordinarily sufficient; but sometimes twice, or perhaps three times, is necessary.

379 § 2. *Of making the Incision in cases of punctured Nerves and Tendons.*

As, in such cases, all the contiguous parts are supposed to be much swelled and in a state of high inflammation, it is impossible to get proper access either to the nerve or tendon, but by means of a large and extensive incision; and as this cannot be effected without some risk of opening at least some large branches of arteries, the first step to be taken in this operation is, to secure the parts against the effects of such an occurrence, by the application of the tourniquet on the superior part of the member. This precaution is necessary, not only for guarding against the loss of blood which would ensue from a division of any of the large arteries, but for preventing interruption during the operation, which would otherwise occur from a constant discharge of blood from the smaller vessels. The tourniquet indeed is more particularly requisite with a view to the prevention of this last inconvenience, than for any other reason; for although it is proper by means of it to guard against the effects to be expected from a division of any of the large arteries, yet, with proper caution, such an occurrence may in most cases be very easily avoided.

The tourniquet then being properly applied, a transverse incision should be made with a common scalpel upon the parts chiefly affected; and it ought to run in a direction exactly across the original orifice in the vein.

In no operation whatever is it more necessary than in this, to act with freedom in laying the parts sufficiently open by the external incision. A small incision puts the patient to nearly the same degree of pain as a larger cut; and it has this material inconvenience, that the surgeon cannot go on with the future steps of the operation with so much ease and expedition as when an extensive opening is made at first.

The external teguments being thus freely divided, the operator is now to proceed in a gradual manner, making one slight incision after another, taking care, if possible, to avoid wounding either the larger arteries or veins: and he is to go on in this way to endeavour to detect the wounded nerve; or if there is no possibility of doing so, even by great caution and nicety

in wiping away with a sponge every particle of blood as he goes along, he must still continue to proceed in this slow gradual manner, till he has divided every part between the skin and periosteum; the tendons, larger arteries and veins, excepted.

At this time the tourniquet should be loosened; and in all probability the patient will be found to express much satisfaction at what has been done: for if the part is thus divided which originally had been pricked by the lancet, and from whence all the subsequent distress proceeded, an immediate relief will now be obtained; but, on the contrary, if the pain still continues violent, we are thereby rendered almost certain of the mischief lying altogether in one or other of the tendons. An accurate examination, therefore, must now be made, by clearing the parts effectually with a sponge; and that tendon lying most contiguous to the vein in which the orifice was made, will in all probability be found either wounded, or in an evident state of inflammation: but at all events, whether any such appearance are detected or not, no hesitation whatever should occur as to the propriety of dividing that tendon which lies most contiguous to the vein; or if two or even three tendinous extremities should happen to lie in the way, and to be all therefore equally liable to suspicion, they ought all undoubtedly to be cut entirely across. This being properly effected, it will seldom occur that much relief is not immediately derived from it: and at any rate, this being done, every attempt will have been made from which we could expect any benefit to arise.

The parts having been thus freely divided, the tourniquet must now be made as slack as possible; and whatever arteries have been wounded, must be properly secured. The parts are then to be covered with soft easy dressings, and to be afterwards treated in the same manner as a wound from any other cause.

§ 3. *Of Issues and Setons.*

BOTH these are sometimes made by the knife; tho' the former are more frequently, and indeed more conveniently, put in by caustic. When incision is used, nothing more is necessary than with a lancet to make a small wound through the skin and cellular membranes. Into this is thrust a pea rubbed over with basilicon or some other ointment, which must be kept from slipping out of the wound by means of a proper bandage. By this extraneous body the wound is kept from healing, at the same time that, as the pea swells by the absorption of the juices of the body, the orifice is gradually enlarged, and the quantity of matter discharged from it is soon increased. This method, however, has an inconvenience, namely, that by thrusting the pea into a newly incised wound, the inflammation consequent upon even this small division of the solids is so great as to give a very considerable degree of pain.—The method of making issues by caustic is therefore preferred. The best caustic for this purpose is the *causticum commune* or *lapis infernalis* of the dispensatories, prepared from soap lees. A small bit of this is to be put upon the skin, the surrounding parts of which are to be defended from its action by a bit of adhesive plaster spread on leather. In a few hours a deep eschar is formed, part of which being im-

Practice. immediately cut out, and the opening filled with peafe, the rest soon separates, and is kept running with very little difficulty.

Setons are made in any part of the body by taking up the skin and subjacent cellular membrane between the fingers, then piercing through the fold with a lancet, and drawing through a soft cotton cord dipped in ointment. By this extraneous body the wound is kept in a constant state of suppuration, and the cord is every day drawn a little farther through, in order to discharge the matter, and prevent putrefaction.

SECT. III. Of Tooth-drawing.

TOOTH-drawing, according to Cicero, (*De Natura Deorum*, lib. 3. cap. 22.) was first invented by Æsculapius; in whose temple the ancients hung up a pair of leaden pincers, to signify that it would be dangerous and improper to extract any teeth but such as might be removed with leaden forceps, that is, such as are loose, and almost ready to fall out: for they do not consult their own welfare who imprudently remove their teeth, without absolute necessity, whilst they are sound and entire. For evulsion of the teeth is not only a dangerous and painful operation, but has even sometimes hazarded the patient's life: at least they impede the speech, and impair the act of mastication by this means; more especially in adults, in which we can have no hopes of others growing up in their room. However, it is sometimes absolutely necessary to draw teeth, 1. In infants, for removing those deciduous or lacteal teeth, which, being loosened by the fingers, may be extracted with a thread, or a pair of crow's-bill forceps; for when these teeth are left too long in the sockets, they may displace and turn the new ones awry. 2. It will be proper to extract those teeth in infants which grow out of the palate, or some other improper part of the mouth, which both hinder their speech and sucking. 3. Extraction is often the only method of relieving the toothach, which is very intense, proceeding from a caries in the teeth, and incapable of being eased by any medicines. 4. Those teeth ought to be drawn which, by their irregular figure and position, wound and lacerate the tongue, lips, and cheeks. 5. It is often absolutely necessary to draw a tooth for curing a fistula or ulceration of the gums next the teeth. The method of drawing them is as follows: If the tooth to be drawn is in the lower jaw, the patient must be seated on a low seat or on the floor; but when in the upper jaw, he must be seated on a high stool: after which, the surgeon takes his instrument best adapted to the case, and therewith draws out the tooth, as if extracting a nail out of a piece of wood, drawing the upper teeth downward, and the lower teeth upward; yet there is a particular sleight to be used, to avoid breaking the teeth. We shall conclude this section with observing, that though it is often absolutely necessary to remove or extract the teeth, yet you ought not to perform the operation while the patient's gums and parts adjacent remain inflamed and tumified.

SECT. IV. Of Ulcers.

WHEN a wound or abscess degenerates into so bad a state as to resist the method of cure described in treating of wounds, n^o 64, &c. and loses that complexion which

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belongs to a healing wound, it is called an *ulcer*; and as the name is generally borrowed from the ill habit of the sore, it is a custom to apply it to all sores that have any degree of malignity, though they be immediately formed without any previous abscess or wound; such are the venereal ulcers of the tonsils, &c.

Ulcers are distinguished by their particular disorders, though it seldom happens that the affections are not complicated; and when we lay down rules for the management of one species of ulcer, it is generally requisite to apply them to almost all others. However, the characters of most eminence are, the callous ulcer, the sinuous ulcer, and the ulcer with caries of the adjacent bone: though there be abundance more known to surgeons, such as the putrid, the corrosive, the varicose, &c.; but as they have acquired their names from some particular affection, we shall speak of the treatment of them under the general head of ulcers.

It will be often in vain to pursue the best means of cure by topical application, unless we are assisted by internal remedies: for as many ulcers are the effects of a particular indispotion of body, it will be difficult to bring them into order, while the cause of them remains with any violence; though they are sometimes in a great degree the discharge of the indispotion itself, as in the plague, small-pox, &c. But we see it generally necessary in the pox, the scurvy, obstructions of the menes, dropsies, and many other distempers, to give internals of great efficacy; and indeed, there are hardly any constitutions where ulcers are not assisted by some physical regimen. Those that are cancerous and scrophulous seem to gain the least advantage from physic: for if in their beginnings they have sometimes been very much relieved, or cured, by salivation, or any other evacuation, they are also often irritated and made worse by them; so that there is nothing very certain in the effects of violent medicines in these distempers.

1. When an ulcer becomes foul, and discharges a nasty thin ichor, the edges of it, in process of time, tuck in, and, growing skinned and hard, give it the name of a *callous ulcer*; which, as long as the edges continue in that state, must necessarily be prevented from healing. But we are not immediately to destroy the lips of it, in expectation of a sudden cure; for while the malignity of the ulcer remains which was the occasion of the callosity, the new lips will be subject to a relapse of the same kind, however often the external surface of them be destroyed: so that, in this case, we are to endeavour to bring the body of the ulcer into a disposition to recover by other methods. It sometimes happens to poor laborious people, who have not been able to afford themselves rest, that lying a-bed will in a short time give a diversion to the humours of the part, and the callous edges, softening, will without any great assistance shoot out a cicatrix, when the ulcer is grown clean and filled with good flesh. The effect of a salivation is generally the same; and even an issue does not sometimes dispose a neighbouring ulcer to heal. But though callosities be frequently softened by these means, yet when the surface of the ulcer begins to yield thick matter, and little granulations of red flesh shoot up, it will be proper to quicken nature by destroying the edges of it, if they remain hard. The manner of doing this, is by touch-

ing them a few days with the lunar caustic, or *lapis infernalis*; and some choose to cut them off with a knife: but this last method is very painful, and not more efficacious; though, when the lips do not tuck down close to the ulcer, but hang loose over it, as in some venereal buboes, where the matter lies a great way under the edges of the skin, the easiest method is cutting them off with the scissars.

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Of producing good matter.

To digest the ulcer, or to procure good matter from it when in a putrid state, there are an infinity of ointments invented; but the balsamico-inflavum alone, or softened down sometimes with turpentine, and sometimes mixed up with different proportions of red precipitate, seems to serve the purpose of bringing an ulcer on to cicatrization as well as any of the others. When the ulcer is incarnated, the cure may be finished as in other wounds; or if it do not cicatrize kindly, it may be washed with aq. calcis, or aq. phag. or dressed with a pledgit dipt. it tinct. myrrhae: and if excoriations are spread round the ulcer, they may be anointed with sperm. cet. ointment, or any other soft ointment.

The red precipitate has of late years acquired the credit it deserves for the cure of ulcers; but, by falling into general use, is very often unskillfully applied: when mixed with the balsicon, or, what is nearer, a cerate of wax and oil, it is most certainly a digestive, since it hardly ever fails to make the ulcer yield a thick matter in 24 hours, which discharged a thin one before the application of it.

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Of destroying fungous flesh.

If the ulcer should be of such a nature as to produce a spongy flesh, sprouting very high above the surface, it will be necessary to destroy it by some of the escharotics, or the knife. This fungus differs very much from that belonging to healing wounds, being more eminent and lax, and generally in one mass; whereas the other is in little distinct protuberances. It approaches often towards a cancerous complexion, and when it rises upon some glands does actually degenerate sometimes into a cancer. When these excrescences have arisen in venereal ulcers, escharotics should be applied. Those in use, are the vitriol, the lunar caustic, the lapis infernalis, and more generally the red precipitate powder.

It is but seldom that these inveterate funguses appear on an ulcer; but it is very usual for those of a milder kind to rise, which may often be made to subside by pressure and the use of mild escharotics: however, if the aspect of the fore be white and smooth, as happens in ulcers accompanied with a dropsy, and often in young women with obstructions, it will answer no purpose to waste the excrescences until the constitution is repaired, when most probably they will sink without any assistance. In ulcers also, where the subjacent bone is carious, great quantities of loose flabby flesh will grow up above the level of the skin: but as the caries is the cause of the disorder, it will be in vain to expect a cure of the excrescence until the rotten part of the bone be removed; and every attempt with escharotics will be only a repetition of pain to the patient, without any advantage.

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Of the posture of the body, &c.

When the pain and inflammation are excessive, bleeding and other evacuations will often be serviceable; and above all things, rest and a horizontal position; which last circumstance is of so great impor-

tance to the cure of ulcers of the legs, that unless the patient will conform to it strictly, the skill of the surgeon will often avail nothing: for as the indispotion of these sores is in some measure owing to the gravitation of the humours downwards, it will be much more beneficial to lie along than sit upright, though the leg be laid on a chair; since even in this posture they will defend with more force than if the body was reclined.

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Of ulcers of the legs with varices.

1. In ulcers of the legs, accompanied with varices or dilations of the veins, the method of treatment will depend upon the other circumstances of the fore; for the varix can only be assisted by the application of bandage, which must be continued a considerable time after the cure. The neatest bandage is the laced stocking, which is particularly serviceable in this case; though also, if the legs be oedematous, or if, after the healing of the ulcers, they swell when the patient quits his bed, it may be worn with safety and advantage. There are instances of one vein only being varicous; which, when it happens, may be destroyed by tying it above and below the dilatation, as in an aneurism; but this operation should only be practised where the varix is large and painful.

Ulcers of many years standing are very difficult of cure; and in old people the cure is often dangerous, frequently exciting an asthma, a diarrhoea, or a fever, which destroys the patient, unless the fore break out again: so that it is not altogether advisable to attempt the absolute cure in such cases; but only the reduction of them into better order, and less compass, which, if they be not malignant, is generally done with rest and proper care. The cure of those in young people may be undertaken with more safety; and in all cases of stubborn ulcers, the bark, very copiously given, will be found of the utmost service.

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Drying up of ulcers sometimes dangerous.

2. When an ulcer or abscess has any sinuses or channels opening and discharging themselves into the fore, they are called *sinuous ulcers*. These sinuses, if they continue to drain a great while, grow hard in the surface of their cavity; and then are termed *fistulae*, and the ulcer a *fistulous ulcer*; also, if matter be discharged from any cavity, as those of the joints, abdomen, &c. the opening is called a *sinuous ulcer* or a *fistula*.

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Of sinuous ulcers.

The treatment of these ulcers depends upon a variety of circumstances. If the matter of the sinus be thick, strict bandage and compress will sometimes bring the opposite sides of the sinus to a reunion: if the sinus grow turgid in any part, and the skin thinner, showing a disposition to break, the matter must be made to push more against that part, by plugging it up with a tent; and then a counter opening must be made, which proves often sufficient for the whole abscess, if it be not afterwards too much tended, which locks up the matter and prevents the healing; or too little, which will have the same effect: for dressing quite superficially, does sometimes prove as mischievous as tents, and for nearly the same reason; since suffering the external wound to contract into a narrow orifice before the internal one be incarnated, does almost as effectually lock up the matter as a tent. To preserve, then, a medium in these cases, a hollow tent of lead or silver may be kept in the orifice, which, at the same time that it keeps it open, gives vent to the matter. The abscess where the counter opening is made

Practice. made most frequently, are those of compound fractures, and the breast: but the latter do oftener well without dilatation than the former; though it must be performed in both, if practicable, the whole length of the abscess, when after some trial the matter does not lessen in quantity, and the sides of it grow thinner; and if the sinuses be fistulous, there is no expectation of cure without dilatation. There are also a great many serophulous abscesses of the neck, that sometimes communicate by sinuses running under large indurations; in which instances, counter openings are advisable, and generally answer without the necessity of dilating the whole length; and indeed there are few abscesses in this distemper which should be opened beyond the thinness of the skin. When abscesses of the joints discharge themselves, there is no other method of treating the fistula, but by keeping it open, with the cautions already laid down, till the cartilages of the extremities of the bones being corroded, the two bones shoot into one another, and form an ankylosis of the joint, which is the most usual cure of ulcers in that part.

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Of gunshot wounds, of sero-fistulous abscesses in the neck.

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Of gunshot wounds degenerating into sinuous ulcers. Gunshot wounds often become sinuous ulcers, and then are to be considered in the same light as those already described: though surgeons have been always inclined to conceive there is something more mysterious in these wounds than any others: but their terrible nature is owing to the violent contusion and laceration of the parts, and often to the admission of extraneous bodies into them, as the bullet, splinters, bits of cloth, &c. and were any other force to do the same thing, the effect would be exactly the same as when done by firearms. The treatment of these wounds consists in removing the extraneous body as soon as possible; to which end the patient must be put into the same posture as when he received the wound: if it cannot be extracted by cutting upon it, which should always be practised when the situation of the blood-vessels, &c. does not forbid, it must be left to nature to work out, and the wound dressed superficially: for we must not expect that if it be kept open with tents, the bullet, &c. will return that way; and there is hardly any case where tents are more pernicious than here, because of the violent tension and disposition to gangrene which presently ensue. For dissolving of bullets, it has been recommended to inject mercury into the places where they are lodged; but this has never been known to answer any good purpose.

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Of carious ulcers. 3. When an ulcer with loose rotten flesh discharges more than the size of it should yield, and the discharge is oily and stinking, in all probability the bone is carious; which may easily be distinguished by running the probe through the flesh: and if so, it is called a *carious ulcer*. The cure of these ulcers depends principally upon the removal of the rotten part of the bone, without which it will be impossible to heal; as we see sometimes even in little sores of the lower jaw, which taking their rise from a rotten tooth, will not admit of cure till the tooth be drawn. Those caries which happen from the matter of abscesses lying too long upon the bone, are most likely to recover: those of the pox very often do well, because that distemper fixes ordinarily upon the middle and outside of the densest bones, which admit of exfoliation; but those produced by the evil, where the whole extremities of

spongy parts of the bone are affected, are exceedingly dangerous: though all enlarged bones be not necessarily carious; and there are ulcers sometimes on the skin that covers them, which do not communicate with the bone, and consequently do well without exfoliation: nay, it sometimes happens, though the case be rare, that, in young subjects particularly, the bones will be carious to such a degree, as to admit a probe almost through the whole substance of them; and yet afterwards admit of a cure, without any notable exfoliation.

The method of treating an ulcer with caries, is by applying a caustic of the size of the scale of the bone that is to be exfoliated; and after having laid it bare, to wait till such time as the carious part can without violence be separated, and then heal the wound. In order to quicken the exfoliation, there have been several applications devised; but that which has been most used in all ages, is the actual cautery, with which surgeons burn the naked bone every day, or every other day, to dry up, as the say, the moisture, and by that means procure the separation; but as this practice is never of great service, and always cruel and painful, it is now pretty much exploded. Indeed, from considering the appearance of a wound, when a scale of bone is taken out of it, there is hardly any question to be made, but that burning retards rather than hastens the separation; for as every scale of a carious bone is slung off by new flesh generated between it and the sound bone, whatever would prevent the growth of these granulations would also in a degree prevent the exfoliation; which must certainly be the effect of a red-hot iron applied so close to it: though the circumstances of carious bones, and their disposition to separate, are so different from one another, that it is hardly to be gathered from experience, whether they will sooner exfoliate with or without the assistance of fire; for sometimes, in both methods, an exfoliation is not procured in a twelvemonth, and at other times it happens in three weeks or a month: however, if it be only uncertain whether the actual cautery be beneficial or not, the cruelty that attends the use of it should entirely banish it out of practice. It is often likewise, in these cases, employed to keep down the fungous lips that spread upon the bone: but it is much more painful than the escharotic medicines; though there will be no need of either, if a regular compress be kept on the dressings; or at worst, if a flat piece of the prepared sponge, of the size of the ulcer, be rolled on with a tight bandage, it will swell on every side, and dilate the ulcer without any pain.

Some caries of the bones are so very shallow, that they crumble insensibly away, and the wound fills and perfumes up; but when the bone will neither exfoliate nor admit of granulations, it will be proper to scrape it with a ruginé, or perforate it in many points with a convenient instrument down to the quick. In serophulous cases, the bones of the corpus and tarsus are often affected; but their sponginess is the reason that they are seldom cured: so that when these, or indeed the extremities of any of the bones, are carious through their substance, it is advisable to amputate; though there are instances in the evil, but more especially in critical abscesses, where, after long dressing down, the

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The actual cautery, as no reason in these ulcers.

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Of scraping and perforating the bone, amputation, &c.

splinters, and sometimes the whole substance, of the small bones, have worked away, and, a healthy habit of body coming on, the ulcer has healed; but these are so rare, that no great dependence is to be laid on such an event. The dressings of carious bones, if they are stinking, may be doffed dipped in the tincture of myrrh; otherwise those of dry lint are easiest, and keep down the edges of the ulcer better than any other gentle applications.

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Of burns.

Burns are generally esteemed a distinct kind of ulcers, and have been treated with a greater variety of applications than any other species of sore. When burns are very superficial, not raising suddenly any vesication, spirits of wine are said to be the quickest relief; but whether they be more serviceable than embrocations with linseed oil, is uncertain, though they are used very much by some persons whose trade subjects them often to this misfortune. If the burn excoerates, it is easiest to roll the part up gently with bandages dipped in sweet oil, or a mixture of unguent. flor. sambu. with the oil. When the excoriations are very tender, dropping warm milk upon them every dressing is very comfortable; or if the patient can bear to have flannels wrung out of it, applied hot, it may be still better. If the burn have formed eschars, they may be dressed with basilicon, though generally oil alone is easier; and, in these sores, whatever is the easiest medicine will be the best digestive. There is great care necessary to keep down the fungus of burns, and heal the wounds smooth: to which end, the edges should be dressed with lint dipped in aqua vitriol. and dried afterwards; or they may be touched with the vitriol stone, and the dressings be repeated twice a-day. There is also a greater danger of contractions from burns after the cure than from other wounds: to obviate which, embrocations of neat-foot oil, and bandage with pasteboards to keep the part extended, are absolutely necessary where they can be applied.

SECT. V. Of Sutures.

§ 1. The Interrupted Suture.

THE method of making the bloody-suture is as follows. The wound being emptied of the grumous blood, and your assistant having brought the lips of it together that they may lie quite even, you carefully carry your needle from without, inwards to the bottom, and so on from within, outwards; using the caution of making the puncture far enough from the edge of the wound, which will not only facilitate the passing the ligature, but will also prevent it from eating through the skin and flesh; this distance may be three or four tenths of an inch: as many more stitches as you shall make, will be only repetitions of the same process. The threads being all passed, you begin tying those in the middle of the wound; though, if the lips are held carefully together all the while, as they should be, it will be of no great consequence which is done first. The most useful kind of knot in large wounds is a single one first; over this a little linen compress, on which is to be made another single knot; and then a slip-knot, which may be loosened upon any inflammation: but in small wounds, there is no danger from the double knot alone, without any compress to tie it

upon; and this is most generally practised. If a violent inflammation should succeed, loosening the ligature only will not suffice; it must be cut through and drawn away, and the wound be treated afterwards without any suture. When the wound is small, the less it is disturbed by dressing the better; but in large ones, there will sometimes be a considerable discharge; and if the threads be not cautiously carried through the bottom of it, abscesses will frequently ensue from the matter being pent up underneath, and not finding issue. If no accident happen, you must, after the lips are firmly agglutinated, take away the ligatures, and dress the orifices which they leave.

It must be remembered, that during the cure the future must be always assisted by the application of bandage, if possible, which is frequently of the greatest importance; and that sort of bandage with two heads, and a slit in the middle, which is by much the best, will in most cases be found practicable.

§ 2. Suture of Tendons.

WOUNDS of the tendons are not only known to heal again, but even to admit of sewing up like those of the fleshy parts, though they do not reunite in so short a time.

As the wound of the skin will be nearly transverse, it should not be raised to expose more of the tendon, but rather sewed up with it, which will conduce to the strength of the suture. The knot of the ligature is to be made as in other wounds, and the dressings are to be the same: there is a sort of thin crooked needle that cuts on its concave and convex sides, which is very handy in the suture of large tendons, and to be preferred to the straight one. During the cure, the dressings must be superficial, and the parts kept steady with pasteboard and bandage: the small tendons reunite in three weeks, but the tendo Achillis requires six at least.

§ 3. Quilled Suture.

IN deep wounds, attended with much retraction, it is always a necessary precaution, to assist the operation of the ligatures by means of bandages, so applied as to afford as much support as possible to the divided parts: But, even with every assistance of this nature, it now and then happens, that the divided parts cannot be kept together, retraction occurs to a greater or lesser degree, and the ligatures of course cut afunder the soft parts they were at first made to surround.

With a view to prevent this receding of the teguments and other parts, it was long ago proposed to add to the interrupted suture what was supposed would afford an additional support, viz. quills, or pieces of plaster rolled up into the form of quills; one of which being placed on each side of the wound, the double of the ligature is made to include the one, and the knot to prels directly upon the other, instead of being made immediately on the edges of the sore, as was directed for interrupted sutures.

It is at once evident, however, that the ligatures must here make the same degree of pressure on the parts through which they pass as they do in the interrupted suture; and this being the case, it is equally obvious, that

Practice. that the interposition of these substances cannot be of any use. This future is accordingly now very rarely practised, and it is probable that it will be soon laid entirely aside.

§ 4. *The Glover's Suture.*

This future is termed the *glover's*, from being the one in common use among that set of people. As it is exceedingly simple, and very universally known, it does not here merit much description: we shall, therefore, just shortly observe, that it consists in a series of stitches all connected with one another, and continued in an oblique spiral direction along the course of the divided parts intended by it to be kept together.

This future has hitherto been universally employed for reuniting such parts of the intestines as have been divided by wounds: but, according to Mr Bell, the same end may be more perfectly attained, and probably with less danger, by means of the interrupted future; so that as this future has almost never been applied to any other purpose, it will likewise, in all probability, soon fall into disuse.

§ 5. *Twisted Suture.*

By the term *twisted future*, is meant that species of ligature by which parts, either naturally or artificially separated, are united together, by means of strong threads properly twisted round pins or needles pushed through the edges of the divided parts.

This future is commonly employed for the purpose of uniting the parts in cases of hare-lip; and this indeed is almost the only use to which it has been hitherto applied: But we may here remark, that it may with great advantage be put in practice in a variety of other cases; particularly in all artificial or accidental divisions either of the lips or cheeks; and in every wound in other parts that does not run deep, and in which futures are necessary, this future is preferable to the interrupted or any other.

In very deep wounds, for instance in all wounds extending to a greater depth than an inch and half, the interrupted future is the only one that is admissible; for in all such deep cuts, the pins necessary in the twisted future cannot with propriety be employed, as they cannot be introduced to such a depth, and afterwards so twisted with ligatures as to reunite the divided parts, but with great pain to the patient. In such wounds, therefore, we must of necessity have recourse to the interrupted future. But it may be here remarked, that wounds of this depth, requiring the aid of futures, are very rarely met with: so that, in by much the greatest proportion of wounds where futures are advisable, the twisted future will be found practicable; and whenever it is so, it ought certainly to be preferred to every other, as being obviously better calculated, even than the interrupted future, for the retention of divided parts. The pins made use of for twisting the threads upon ought to be made of a flat form, so as not to cut the parts through which they pass so readily as the ligatures employed in the interrupted future. And thus one great objection to the latter is very effectually obviated: for every practitioner must be sensible of this being the most faulty part of the interrupted future, that when muscular parts are divided so as to produce much retraction,

the ligatures employed for retaining them almost constantly cut them through before a reunion is accomplished; whereas the flatness of the pins used in the twisted future, and upon which, it may be remarked, the whole pressure produced by the ligatures is made to rest, proves in general a very effectual preventative against all such occurrences.

The pins used in this operation have commonly been made of silver; and in order to make them pass with greater ease, steel points have been added to them. As gold pins, however, are capable of receiving a sufficient degree of sharpness, which renders the intervention of steel points quite unnecessary; and as gold is fully more cleanly than silver, from its not acquiring so readily that kind of crust which immersion in fluids is apt to produce upon the other; pins of this metal are therefore preferable.

The manner of performing this operation is as follows. The divided parts intended to be reunited, must, by the hands of an assistant, be brought nearly into contact; leaving just as much space between the edges of the fore as to allow the surgeon to see that the pins are carried to a proper depth. This being done, one of the pins must be introduced through both sides of the wound, by entering it on one side externally, pushing it forwards and inwards to within a little of the bottom of the wound, and afterwards carrying it outwardly through the opposite side, to the same distance from the edge of the fore that it was made to enter at on the other.

The distance at which the needle ought to enter from the edge of the fore, must be determined by the depth of the wound, and by the degree of retraction produced in the divided parts. In general, however, it is a proper regulation, in deep wounds, to carry the pins nearly to the same distance from the side of the fore as they are made to penetrate in depth: And it may be also remarked, that whatever the deepness of the wound may be, the pins ought to pass within a very little of its bottom; otherwise the parts which lie deep will run a risk of not being united, a circumstance which must always give rise to troublesome collections of matter.

In passing the pins through the different sides of the wound, if the skin and other teguments are not more firm than ordinary, it may commonly be done by the fingers alone, and particularly if the pins are made with small heads or knobs for the fingers to press upon; but when, from firmness of parts and other circumstances, much difficulty is expected to the entrance of the pins, the instrument termed *Porteguille* very effectually removes this inconvenience.

The first pin being passed in this manner very near to one end of the fore, and the parts being still supported by an assistant, the surgeon, by means of a firm waxed ligature, passed three or four times round and across the pin, so as nearly to describe the figure of 8, is to draw the parts through which it has passed into immediate and close contact: and the thread being now secured with a loose knot, another pin must be introduced in the same manner at a proper distance from the former; and the thread with which the other was fixed being loosed, and in the same manner carried round this pin, others must be introduced at proper distances along the whole course of the wound

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⁴⁰² Gold pins recommended for this future.

⁴⁰³ Manner of performing the operation.

⁴⁰¹ The twisted future may be used in a variety of other cases besides the hare-lip.

and the same ligature ought to be of a sufficient length for securing the whole.

The number of pins to be used must be determined entirely by the extent of the wound. Whenever this future, however, is practised, whether the wound be large or of very small extent, a pin ought to be introduced very near to each end of it, otherwise the extremities of the fore are apt to separate so as not to be afterwards easily reunited. In large wounds, if the pins are introduced at the distance of three quarters of an inch from one another, it will in general be found sufficient; but in cuts of smaller extent, a greater number of pins become necessary in proportion to the dimensions of the fores.

Thus in a wound of an inch and half in length, three pins are absolutely requisite; one near to each end, and another in the middle of the fore: whereas five pins will always be found fully sufficient for a wound of three inches and a half in extent, allowing one to be within a quarter of an inch of each extremity of the wound, and the others to be placed along the course of the fore at the distance of three quarters of an inch from one another.

The pins being all introduced and secured in the manner directed, nothing remains to be done, but to apply a piece of lint wet with mucilage all along the course of the wound, with a view to exclude, as effectually as possible, every access to the external air.

In order to prevent the ends of the pins from pressing upon and hurting the skin below, it is usual to apply a small bolster of linen or charpie under each of them; but as this always does mischief, by tending to press upon the pins, so as to force them to act upon the soft parts through which they have passed, every thing of this kind ought to be omitted. When, however, the patient happens to complain of being hurt by the ends of the pins, this may be easily prevented, by introducing between them and the skin pieces of thin linen spread with any adhesive plaster.

In order to give every chance of success to this operation, it has been commonly advised, immediately after the pins are secured, to apply the uniting bandage over the whole, so as to afford as much support as possible to the contiguous parts. The least reflection, however, renders it evident, that every degree of pressure made in this manner must do mischief; for the bandage being made to rest immediately upon the pins, a considerable degree of pain and consequent inflammation must of course be produced by it: And in fact this is so much the case, that in every instance in which we have seen this bandage applied, it either did harm, by exciting inflammation in consequence of too much pressure upon the pins; or, if that effect was not produced, no advantage was received from it, from the bandage not being applied with such tightness as to afford any support whatever to the parts below.

The next point to be determined, is the time the pins should be allowed to remain. When they remain long, they generally do harm, by the unnecessary irritation and consequent retraction of parts with which they are always attended; and again, if they are not continued for a sufficient length of time, that degree of adhesion is not produced between the divided parts that is necessary for their future retention; so that the

effect of the operation comes to be in a great measure, if not entirely, lost.

In wounds of no great depth, for instance of three quarters of an inch or so, a sufficient degree of adhesion always takes place in the space of five days; and six, or at most seven days, will generally be found sufficient for wounds of the greatest depth. But with respect to this circumstance, it must always be understood, that the patient's state of health must have a considerable influence on the time necessary for producing adhesion between divided parts. In specifying the time necessary for this purpose, the operation is supposed to have been done on a constitution in a state of perfect health. When the patient labours under scurvy, or any disorder which affects the general system, it is impossible to ascertain this circumstance with precision: in such cases we must be determined by the nature and state of the disease present at the time.

So soon as the pins are withdrawn, the uniting bandage may be then applied with great advantage, in order to serve as a support to the parts newly united; but as slips of leather spread with ordinary glue, when applied to each side of the cicatrix, may, by means of ligatures properly connected with them, be made to answer this purpose in a more effectual manner, this mode of supporting the parts ought of course to be preferred.

SECT. VI. Of the Ligature of Arteries.

A surgeon being called to a person losing much blood from the division of any of the larger vessels, the first step to be taken is, by means of strong compression, to effect a temporary stoppage of the discharge, till, by the application of ligatures, a more effectual remedy is obtained.

When accidents of this nature occur in any of the extremities, and where pressure can be made with ease on the superior parts of arteries, for such cases we are in possession of a remedy, which, when skilfully applied, never fails of producing an immediate stop to all farther loss of blood. What is here meant is the tourniquet.

Till the invention of this instrument, no operation of importance could be undertaken on any of the extremities but with great hazard to the patient; and large wounds must have frequently proved mortal from the want of this assistance, which otherwise might not have been in any degree hazardous.

As the invention of the tourniquet is claimed by different people, and even by different nations, we shall not here pretend to say from whence it originally came: but whoever had the merit of it, the first instrument of this kind with which the world was made acquainted was exceedingly simple; so much indeed, that we now reflect with astonishment at the discovery having been reserved to such a very late period. A small cushion being placed upon the course of the principal artery of a limb, a circular rope or bandage was made to pass twice round it; and a small wooden handle being then introduced between one of the folds of the bandage, for the purpose of twisting it, the cushion by these means was pressed with so much force upon the artery, as to put an effectual stop to the course of the blood through the under part of the limb.

Mr

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Pressure on
the united
parts to be
avoided.

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Of the time
the pins
ought to re-
main.

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Of support-
ing the
parts when
the pins
are with-
drawn.

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Of the tour-
niquet.

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Description
of the in-
strument.

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Practice.

409.
Improvements by
Mr Pott.

Mr Petit, an eminent surgeon of Paris, was the first who proposed a considerable improvement on this instrument, by connecting the circular bandage with a screw, which was so contrived as to produce the pressure chiefly on the principal arteries, without materially affecting the rest of the limb. It had this advantage over the other instrument, that the operator himself could manage it, without being under the necessity of employing an assistant: but it was liable to one great inconvenience, from the very circumstance which by the inventor was considered as an improvement. This instrument of Mr Petit being made to act upon the principal arteries only, the smaller vessels communicating with these, by not being properly compressed, discharge blood freely from the infant they are cut; and as this proves a very troublesome circumstance in the course of operations, different improvements have of late been made upon it.

By means of this instrument in its now improved state, the blood in any limb is very easily and effectually commanded; and as it grasps the whole member equally, all the collateral branches, as well as the principal arteries, are equally compressed by it. It has this material advantage, too, over every other instrument of this kind, that, when properly applied, a single turn, or even half a turn, of the screw, is sufficient for producing either a flow of blood, or for putting a total stop to it. The manner of using it is as follows.

Let a cushion of three inches in length by one inch and half in diameter, be prepared of a linen roller, and be made tolerably firm, but yet not so hard as to render pressure produced by it very painful. This being placed upon the course of the principal artery of the limb, is to be firmly secured in that situation by one or two turns of a circular roller, of the same breadth with the cushion itself.

The instrument, with the strap connected with it, being now placed upon the limb, with the handle of the screw on the opposite side of the member to the cushion upon the artery, the strap is to be carried round the limb directly over the cushion, and to be firmly connected on the other side to the buckle. In thus connecting the strap and buckle together, particular attention is necessary in doing it with great firmness, so as that the screw may afterwards operate with as much advantage as possible in producing a sufficient degree of pressure. When proper attention is paid to this circumstance, a single turn of the screw proves sufficient for putting an entire stop to the circulation of blood in the limb: but when the strap has not originally been made very tight, several turns of the screw become necessary; an occurrence which may be always very easily prevented, and which, when not attended to, frequently proves very embarrassing in the course of an operation.

Various methods have been invented for securing arteries by means of ligatures. The practice lately in ordinary use was, by means of a curved needle, to pass a ligature of sufficient strength round the mouth of the bleeding vessel, including a quarter of an inch all round of the surrounding parts, and afterwards to form a knot of a proper tightness upon the vessel and other parts comprehended in the noose. But this method has been found to give so much pain, that the

best practitioners have thought proper to reject it, and to tie up the blood-vessels by themselves.

In order to detect the arteries to be tied, the tourniquet, with which they are secured, must be slackened a little by a turn or two of the screw; and the moment the largest artery of the fore is discovered, the surgeon fixes his eye upon it, and immediately restrains the blood again by means of the tourniquet. An assistant now forms a noose on the ligature to be made use of; and this noose being placed immediately over the end of the artery, so as to include it with certainty, the operator then pushes the sharp point of the tenaculum through the sides of the vessel, and at the same time pulls so much of it out, over the surface of the surrounding parts, as he thinks is sufficient to be included in the knot which the assistant is now to make. In forming this ligature, the surgeon's knot, as it is termed, which consists in passing the thread twice through the first noose, is certainly preferable to every other, from its being less liable to yield or slip. And as some additional security is obtained by forming a second knot above the first, this precaution ought never to be omitted. It is easily done; and on security in this point the patient's life may in a great measure depend.

The degree of strength of the ligature must always be proportioned to the size of the vessels; but this is a circumstance to be at all times determined by the judgment of the practitioner, as must also the force to be employed in forming the knots. To what was already said upon this point, we shall just add, that a very small force is fully sufficient for securing even the largest arteries; and that after such a force has been applied as evidently restrains the farther loss of blood, a very trifling additional compression is all that is in any degree necessary.

The operator ought to be provided with needles of various sizes, and of different forms. The needles in ordinary use are, for many purposes, quite too much crooked; for, in general, they are more easily managed when their curvatures are not so considerable.

The same kinds of needles as are found necessary for the interrupted suture, answer equally well for the ligature of arteries.

The needles in common use are made triangular, with three different edges, one on each side, and a third on the concave part of the needle. There is no real necessity, however, for more than two; indeed the needle enters fully more easily with two than with three edges; and as the third edge on the concave side renders them more liable to injure arteries and other parts in the course of their introduction, this addition ought therefore to be omitted.

A needle of this shape, armed with a ligature of size proportioned to itself and to the vessel to be taken up, is to be introduced at the distance of a sixth or eighth part of an inch from the artery, and pushed to a depth sufficient for retaining it, at the same time that it is carried fully one-half round the blood-vessel. It must now be drawn out; and being again pushed forward till it has completely encircled the mouth of the artery, it is then to be pulled out, and a knot to be tied of a sufficient firmness, as was already directed when the tenaculum is used.

SECT. VII. *Of the Treatment of Aneurisms.*

In every case of aneurism, the use of pressure has been indiscriminately recommended, not only in the incipient period of the disease, but even in its more advanced stages.

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Of the effects of pressure in aneurisms.

In the diffused or false aneurism, pressure has been universally advised, not only with a view to dissipate the swelling already induced, but in order to produce a reunion of the wound in the artery; however, as pressure in such cases cannot be applied to the artery alone, without at the same time affecting the refluxent veins; and as this circumstance, by producing an increased resistance to the arterial pulsations, must undoubtedly force an additional quantity of blood to the orifice in the artery; therefore no advantage is to be expected from it; but on the contrary, there is reason to suppose it has been on many occasions productive of mischief.

But although pressure ought never to be attempted in any period of the diffused aneurism, yet in some stages of the other species of the disease, it may be often had recourse to with advantage.

In the early stages of encysted aneurism, while the blood can be yet pressed entirely out of the sac into the artery, it often happens, by the use of a bandage of soft and somewhat elastic materials, properly fitted to the part, that much may be done in preventing the swelling from receiving any degree of increase; and on some occasions, by the continued support thus given to the weakened artery, complete cures have been at last obtained. In all such cases, therefore, particularly in every instance of the varicose aneurism, much advantage may be expected from moderate pressure.

But although pressure to a certain degree has frequently, in cases of encysted aneurism, proved very useful, it ought never to be carried to any great length; for tight bandages in all such affections, by producing an immoderate degree of reaction in the containing parts to which they are applied, instead of answering the purpose for which they were intended, have evidently the contrary effect. Moderate compression, therefore, is more eligible than a great degree of it; and indeed the greatest length to which pressure in such cases ought to go, should be to serve as an easy support to the parts affected, and no farther.

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Of performing the operation for an aneurism.

The first step in this operation ought to be to obtain a full command of the circulation in the inferior part of the member by means of the tourniquet applied above. This being done, the patient should be so placed, that the diseased limb, on being stretched on a table, is found to be of a proper height for the surgeon; who, as the operation is generally tedious, ought to be seated. The limb being in this situation properly secured by an assistant, the operator is now with a scalpel to make an incision through the skin and cellular substance along the whole course of the tumour; and as freedom in the remaining parts of the operation is here a matter of much importance, it is even of use to carry this external incision half an inch or so both above and below the farthest extremities of the swelling.

This being done, the ordinary method is to proceed

in a very slow cautious manner, dissecting away one layer of the membrane after another, till the artery itself is laid bare. In this manner the operation is always rendered exceedingly tedious, as the thickness of parts with which the artery is found covered, is often really astonishing, by one layer of a membranous substance having been formed after another, from the coagulable lymph of the blood contained in the tumour. In reality, however, there is no necessity for this degree of caution, as the operation may, in the following manner, be equally well performed in a much shorter space of time, and with much less pain to the patient.

So soon as the external incision has been made in the manner directed, so as to divide the skin and cellular substance, all the effused blood ought to be wiped off by means of a sponge; and the softest part of the tumour being discovered, an opening ought there to be made into it with a lancet, large enough for admitting a finger of the operator's left hand. This being done, and the finger introduced into the cavity of the tumour, it is now to be laid open from one extremity to the other, by running a blunt-pointed bistoury along the finger from below upwards, and afterwards from above downwards, so as to lay the whole cavity fairly open.

The cavity of the tumour being thus laid freely open, all the coagulated blood is now to be taken out. For this purpose a number of instruments, particularly scoops, have been invented by different operators; but no instrument answers this intention so effectually, and with so much ease to the patient, as the fingers of the operator; who having in this manner removed all the coagulated blood, together with a number of tough membranous filaments commonly found here, the cavity of the tumour is now to be rendered quite dry, and free from the blood which, on the first opening of the swelling, is discharged into it from the veins in the inferior part of the member; and this being effectually accomplished, the tourniquet must be made perfectly slack and easy, in order to discover, not only the artery itself, but the opening into it, from whence the blood collected in the tumour has been all along discharged. This being done, the next point to be determined, is the manner of securing this opening into the artery, so as to prevent in future any farther effusion of blood. Various means have been proposed for accomplishing this; but the effects of all of them may be comprehended under the three following heads.

I. The effects of ligature upon a large artery have on some occasions proved fatal to the inferior part of the member, it was long ago proposed, that so soon as the opening into the artery has been discovered, instead of applying a ligature round it, which for certain is to obliterate its cavity entirely, a piece of agaric, vitriol, alum, or any other astringent substance, should be applied to the orifice, in order, if possible, to produce a reunion of its sides.

II. Upon the same principle with the preceding, Mr. Lam-
viz. that of still preserving the circulation in the artery, it was several years ago proposed by an eminent surgeon of Newcastle, Mr. Lambert, that the orifice in the artery should be secured by means of the twisted suture. A small needle being pushed through the
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Means of preventing an hæmorrhage.

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Mr. Lambert's proposal of stitching the wound in the artery

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edges of the wound, they are then directed to be drawn together by a thread properly twisted round the needle, as was formerly directed when treating of fistules.

Strong objections, however, occur to both of these methods. In the first place, no astringent application with which we are acquainted is possessed of such powers as to deserve much confidence; for although different articles of this kind have on various occasions proved a means of putting a temporary stop to hæmorrhages, yet there are very few instances properly authenticated of their having produced any permanent advantage. In almost every instance in which they have been used, the hæmorrhage has recurred again and again, so as to prove very distressing, not only to the patient, but to the practitioner in attendance; so that, from this want of success, little or no attention is now paid to remedies of this kind in ordinary practice.

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Objections
to Mr Lam-
bert's me-
thod.

With regard to Mr Lambert's method of stitching the orifice in the artery, it is certainly a very ingenious proposal; and would in all probability, at least in most instances, prove an effectual stop to all farther discharge of blood: but as we have yet only one instance of its success, little can yet be said about it. Two material objections, however, seem to occur to this practice. One is, that in the operation for the aneurism, in almost every instance, a very few only excepted, the artery lies at the back-part of the tumour; so that when all the collected blood is removed, there is such a depth of wound, that it must be always a very difficult matter, and on many occasions quite impracticable, to perform this nice operation upon the artery with that attention and exactness which, in order to ensure success, it certainly requires. It has now and then happened, indeed, that in this operation the artery has been found to be on the anterior part of the tumour; and in such a situation the wound in it would no doubt prove accessible enough. This, however, is a very rare occurrence, as in almost every instance of diffused aneurism, the artery lies at the very bottom of the tumour, by the blood being collected between it and the common teguments; and accordingly, in several instances of this disorder, in which, after the tumour was laid freely open, the artery has been found to lie so deep, as would have rendered it quite impossible to perform this operation.

But there is another very material objection which *à priori* evidently occurs to the practice recommended by Mr Lambert. By introducing a needle through the sides of the orifice, and drawing these together by a ligature, the cavity of the artery must undoubtedly be at that point much diminished. Indeed Mr Lambert, in his account of the case in which this operation was performed, acknowledges that the diameter of the artery was thereby diminished. Now the passage of the blood being thus contracted at one point, the impulse upon that particular part must be very considerable: So that the very remedy employed for the cure of one species of aneurism, will in all probability prove a very powerful agent in inducing another; for the blood being thus obstructed in its usual course, there will be no small danger incurred of a dilatation being produced immediately above this preternatural stricture.

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III. Neither of the methods we have yet been considering being found eligible for securing the orifice in the artery, we shall now proceed to describe the ordinary manner of performing this operation; which consists in obliterating the arterial cavity entirely by means of ligatures.

The artery being laid bare in the manner directed, and all the coagulated blood being carefully removed from the cavity of the tumour, on the tourniquet being now slackened so as to bring the orifice in the artery into view, a small probe is to be introduced at the opening, in order to raise the artery from the neighbouring parts, so as that the surgeon may be enabled with certainty to pass a ligature round it, without comprehending the contiguous nerves, which in general run very near to the large blood-vessels of a limb. By this precaution the nerves may be always avoided; and by doing so, a great deal of mischief might be prevented, which otherwise in all probability might supervene. When the disorder is situated either in the ham, or in the usual part of blood-letting in the arm, bending the joints of the knee or of the elbow, as it relaxes the artery a little, renders this part of the operation more easily effected than when the limbs are kept fully stretched out.

The artery being thus gently separated from the contiguous parts, a firm, broad, waxed ligature must be passed round it, about the eighth part of an inch or so above the orifice, and another must in the same manner be introduced at the same distance below it. Much harm, in all probability, has been done by passing the ligature so far distant from the orifice as is commonly practised; for the risk of losing the benefit of anastomosing branches will be always increased in proportion to the extent of artery included between the ligatures.

The easiest method of introducing the ligatures is by means of a blunt-curved needle. An ordinary sharp needle is commonly made use of for this purpose; but it does not answer the intention so well as the one here recommended: by the sharpness of its points it is apt to injure the contiguous parts; and when the common crooked needle is used with a sharp edge on its concave side, there must even be some risk of its wounding the under part of the artery, as in this situation it cannot be introduced without making this part of the needle pass quite in contact with the coats of the artery. The blunt needle is not liable to either of these objections; and besides is more easily introduced than any of the ordinary aneurismal needles.

The ligatures being both passed in the manner directed, the upper one is now to be tied with a firm-⁴¹⁹ness sufficient for compressing the sides of the artery, the ligature. The directions formerly given for forming the knot upon bleeding-vessels in other parts, will apply with equal propriety here: the ends of the ligature ought by all means to be twice passed through the first noose, and this should again be farther secured by a single knot made above it. By many writers on this subject, a small bolster of linen is ordered to be inserted between the artery and the knot, in order to prevent the artery from being cut by it. This, however, is a very unnecessary precaution; for if the whole artery is not surrounded with the bolster, it will be just as

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much exposed to be cut by the ligature at any other part as where the knot is fixed: and, besides, as we have already remarked, there is no occasion whatever for making the ligature so tight on arteries as to run any risk of dividing them; a much less degree of pressure than is either commonly applied, or than could have any influence in hurting them, being fully sufficient for compressing them in the most effectual manner.

The upper ligature being thus finished, before the knot is passed upon the other below the orifice, the tourniquet ought to be untwisted, in order to see whether any blood is now discharged by the wound in the artery or not. If blood flows in any considerable quantity, it affords a prospect of success, as it clearly shows, that the anastomosing branches from the superior part of the artery are considerable enough for carrying on at least a tolerable degree of circulation in the under part of the member. At the same time, however, although blood should not be discharged at this time by the orifice, we are by no means, from this circumstance alone, to despair of success; for it frequently happens, that the operation succeeds in a very effectual manner, although no blood whatever is discharged on the trial now recommended.

But whether any blood should be discharged by this trial or not, we are not to rest satisfied with one ligature; for unless the ligature below the orifice be also tied, there is always a risk, on the return of circulation to the under part of the artery, of blood passing out at the orifice. This precaution, therefore, should never be omitted; it is easily done, and it renders the patient quite secure against all farther evacuation of blood by the orifice. After the knots have been put upon the ligatures, these should be cut of such a length, that their ends may lie fully out over the edges of the wound; so that when necessary they may be more easily withdrawn.

By way of greater security in this operation, it has been advised to insert other two ligatures quite contiguous to the former, and to leave them untied; so that if any of the others misgive, its place may be immediately supplied.

There is not, however, any necessity for this precaution: for if the first ligatures are properly applied, there can be no doubt of their answering the purpose; and in case either one or both of them should happen to fail, they can be very easily renewed. In the mean time, too, the patient is rendered safe against any sudden loss of blood, by the tourniquet being left loose upon the upper part of the member; which it ought by all means to be for several days after the operation, so that, in the event of blood bursting from the wound, it may be secured by means of it, much more readily than if it depended on the tying of a ligature.

The ligatures being both finished in the manner directed, the tourniquet is now to be made quite loose; and if no blood is discharged at the orifice in the artery, we may then rest satisfied that the operation is so far properly completed.

The wound is now to be lightly covered with soft lint, with a pledget of any emollient ointment over the whole; and a compress of linen being applied over the dressings, all the bandage in any degree requisite, is, two or three turns of a roller above, and as many be-

low the centre of the wound, making it press with no more tightness than is absolutely necessary for retaining the applications we have just now mentioned.

The patient being now put into bed, the member should be laid in a relaxed posture upon a pillow, and ought to be so placed as to create the least possible uneasiness from the posture in which it is laid.

As the operation for the aneurism is always tedious, and produces much pain and irritation, a full dose of laudanum should be given immediately on the patient being got into bed. In order to diminish sensibility, during some of the more capital operations, different trials have been made of opiates given an hour or so before the operation. On some occasions, this proved evidently very useful; but in others it seemed to have the contrary effect; particularly in weak nervous constitutions, in which with any dose, however small, they appeared to be rendered more irritable and more susceptible of pain, than if no opiate had been given. Immediately after this operation, however, an opiate ought to be exhibited, to be repeated occasionally according to the degrees of pain and restlessness.

In some few cases of aneurism it has happened, that the pulse in the under part of the member has been discovered immediately after the operation. This, however, is a very rare occurrence: For as this disorder is seldom met with in any other part than at the joint between the elbow as a consequence of blood-letting, and as it rarely happens that the brachial artery divides till it passes an inch or two below that place, the trunk of this artery is therefore most frequently wounded; and when, accordingly, the ligature in this operation is made to obliterate the passage of almost the whole blood that went to the under part of the arm, there cannot be the least reason to expect any pulsation at the wrist, till in a gradual manner the anastomosing branches of the artery have become so much enlarged, as to transmit such a quantity of blood to the inferior part of the member as is sufficient for acting as a stimulus to the larger branches of the artery.

Immediately after the operation, the patient complains of an unusual numbness or want of feeling in the whole member; and as it generally for a few hours becomes cold, it is therefore right to keep it properly covered with warm soft flannel; and in order to serve as a gentle stimulus to the parts below, moderate frictions appear to be of use. In the space of ten or twelve hours from the operation, although the numbness still continues, the heat of the parts generally begins to return; and it frequently happens, in the course of a few hours more, that all the inferior part of the member becomes even preternaturally warm.

Immediately after this operation, the want of feeling in the parts is often very great; and in proportion as the circulation in the under part of the member becomes more considerable, the degree of feeling also augments. If we could suppose the nerves of the parts below to be always included in the ligature with the artery, that numbness which succeeds immediately to the operation might be easily accounted for; but it has been also known to happen when nothing but the artery was secured by the ligature.

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Of dressing
the wound.

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In the mean time the patient being properly attended to as to regimen, by giving him cordials and nourishing diet when low and reduced, and confining him to a low diet if his constitution is plethoric, the limb being still kept in an easy relaxed posture, towards the end of the fourth or fifth day, sometimes much sooner, a very weak feeble pulse is discovered in the under part of the member, which becoming stronger in a gradual manner, the patient in the same proportion recovers the use and feeling of the parts.

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Of taking away the ligatures.

So soon as there is an appearance of matter having formed freely about the fore, which will seldom happen before the fifth or sixth day, an emollient poultice should be applied over it for a few hours, in order to soften the dressings, which may be then removed. At this time, too, the ligatures might be taken away; but as their continuance for a day or two longer can do no harm, it is better to allow them to remain till the second or third dressing, when they either drop off themselves, or may be taken away with perfect safety. The dressings, which should always be of the softest materials, being renewed every second or third day according to the quantity of matter produced, the fore is in general found to heal very easily; and although the patient may for a considerable time complain of great numbness and want of strength in the whole course of the diseased limb, yet in most instances a very free use of it is at last obtained.

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In what cases a mortification will happen.

It will be readily supposed, that the termination of this operation, as we have here described it, is the most favourable that can possibly happen. In some instances, the success attending it is far from being so complete: Instead of a return of circulation, and of the feeling and use of the parts, they remain cold and insensible, and no marks of returning life are perceived. From a mere want of blood, therefore, mortification at last commences; and as nature is here deprived of one of her principal agents for the removal or separation of gangrenous parts, viz. the efforts of the sanguiferous system, whenever the parts in such circumstances begin to mortify, nothing can prevent their progress to the ultimate stage of that malady.

Whenever mortification ensues, therefore, as a consequence of this operation, if the patient survives the immediate effects of it till a separation occurs between the healthy and diseased parts, amputation of the member will then be the only resource.

SECT. VIII. Of Fractures and Dislocations.

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Of the bandages most proper for fractures.

The best and most useful bandage for a simple fracture of the leg or thigh, is what is commonly known by the name of the *eighteen-tailed bandage*; or rather one made on the same principle, but with a little difference in the disposition of the pieces. The common method is to make it so, that the parts which are to surround the limb make a right angle with that which runs lengthwise under it; instead of which, if they are tacked on so as to make an acute angle, they will fold over each other in an oblique direction, and thereby sit more neatly and more securely, as the parts will thereby have more connection with, and more dependence on, each other.

The parts of the general apparatus for a simple

fracture, which come next in order, are the splints. Practice.

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Of the splints.

These are generally made of pasteboard, wood, or some resisting kind of stuff, and are ordered to be applied lengthwise on the broken limb; in some cases three, in others four, for the more steady and quiet detention of the fracture. That splints properly made and judiciously applied are very serviceable, is beyond all doubt; but their utility depends much on their size, and the manner in which they are applied. In general practice, they are made of such length as not to reach either upward or downward, so far as the roller extends; nor to comprehend either the upper or the lower joint of the broken bone, and to exceed the fracture either way not many inches: They do not, for example, in the broken leg, comprehend either the joint of the knee or the joint of the ankle, and act only on the fracture.

In this manner of application, and of this size, they are in fact neither more nor less than compresses, and compresses made of very bad materials. All the good that ever is, or that can be, done by them, when of such length, and so applied, might certainly be done in a better manner by a more proper kind of compress; and every disadvantage which a hard resisting compress, injudiciously applied, is capable of producing, is probable to result from them thus used.

The true and proper use of splints is to preserve steadiness in the whole limb, without compressing the fracture at all. By the former, they become very assistant to the curative intention; by the latter, they are very capable of causing pain and other inconveniences; at the same time that they cannot, in the nature of things, contribute to the steadiness of the limb.

In order to be of any real use at all, splints should, in the case of a broken leg, reach above the knee and below the ankle; should be only two in number; and should be so guarded with tow, rag, or cotton, that they should press only on the joints, and not at all on the fracture. By this they become really serviceable; but a short splint, which extends only a little above and a little below the fracture, and does not take in the two joints, is an absurdity. By pressing on both joints, they keep not only them but the foot steady; by pressing on the fracture only, they cannot retain it in its place, if the foot be in the smallest degree displaced; but they may, and frequently do, occasion mischief, by rudely pressing the parts covering the fracture against the edges and inequalities of it.

In the case of a fractured os femoris, if the limb be laid in an extended posture, one splint should certainly reach from the hip to the outer ankle, and another (somewhat shorter) should extend from the groin to the inner ankle. In the case of a broken tibia and fibula, there never can be occasion for more than two splints; one of which should extend from above the knee to below the ankle on one side, and the other splint should do the same on the other side.

The most essential article in the treatment of a fracture is the position of the limb. Upon the judiciousness of the or injudicious execution of this, depends the ease of limbs.

the patient during his confinement, and the free use and natural appearance of his limb afterward.

“If I meant to describe (says Mr Pott), or if I approved (pardon the phrase), the common method of

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placing the broken leg and thigh in a straight manner, this would be the place to mention the many very ingenious contrivances and pieces of machinery which practitioners, both ancient and modern, have invented for the purpose of keeping the whole limb straight and steady; that is, of keeping all the muscles surrounding the fractured bone constantly upon the stretch, and at the same time of preventing any inequality in the union of it, and any shortening of the limb in consequence of such inequality. But as it is my intention to inculcate another, and as it appears to me a better disposition of the limb, in which such boxes, cradles, and pieces of machinery are not wanted, nor can be used, it is needless for me to say any thing about them.

"According to this plan, the fractured leg and thigh should be deposited on the pillow in the very posture in which the extension was made and the fracture set; that is, with the knee bent.

"In the case of the fractured os humeri, the only position in which it can, with any tolerable convenience to the patient, be placed, is with the elbow bent; that very position which necessarily relaxes and removes all the resistance of the surrounding muscles. Daily experiences evince the utility of this, by our very seldom meeting with lameness or deformity after it, notwithstanding the prevailing apprehension of exuberant callus.

"The deformity frequently consequent to the fracture of the bones of the cubit, particularly that of the radius only, will generally, if not always, be found to be in proportion as the muscles concerned in the pronation and supination of the hand happen to be put more or less into a state of action or tension by the position of the limb.

"In the thigh the case is still more obvious, as the muscles are more numerous and stronger. The straight posture puts the majority of them into action: by which action, that part of the broken bone which is next to the knee is pulled upward, and by passing more or less underneath that part which is next to the hip, makes an inequality or rising in the broken part, and produces a shortness of the limb.

"In the fracture of both bones of the leg, the case is still the same: a straight position puts the muscles upon endeavouring to act; a moderate flexion of the knee relaxes them, and takes off such propensity.

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Of the fractured cubit.

"The disposition, therefore, of the broken cubit ought to be that which, by putting the hand into a middle state between pronation and supination, and by bending the fingers moderately, keeps the radius superior to the ulna; or, in other words, the palm of the hand should be applied to the breast, the thumb should be superior, the little finger inferior; and the hand should be kept in this posture constantly by means of two splints, which should reach from the joint of the elbow on each side, and should be extended below the fingers: or the same purpose may be still better answered by a simple neat contrivance of the very ingenious Mr Gooch of Norfolk; of which he has given a draught, and which is preferable to a common splint, by its admitting the fingers to be more easily bent.

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Of the os femoris,

"The position of the fractured os femoris should be on its outside, resting on the great trochanter; the pa-

tient's whole body should be inclined to the same side; the knee should be in a middle state, between perfect flexion and extension, or half-bent; the leg and foot, lying on their outside also, should be well supported by smooth pillows, and should be rather higher in their level than the thigh: one very broad splint of deal, hollowed out, and well covered with wool, rag, or tow, should be placed under the thigh, from above the trochanter quite below the knee; and another somewhat shorter should extend from the groin below the knee on the inside, or rather in this posture on the upper side. The bandage should be of the eighteen-tail kind; and when the bone has been set, and the thigh well placed on the pillow, it should not, without necessity (which necessity in this method will seldom occur) be ever moved from it again until the fracture is united: and this union will always be accomplished in more or less time, in proportion as the limb shall have been more or less disturbed.

"In the fracture of the fibula only, the position is ⁴²⁷ Of the fractured fibula. not of much consequence; because, by the tibia remaining entire, the figure of the leg is preserved, and extension quite unnecessary: but still even here the laying the leg on its side, instead of on the calf, is attended with one very good consequence, viz. that the confinement of the knee, in a moderately bent position, does not render it so incapable of flexion and use afterward, as the straight or extended position of it does; and consequently that the patient will be much sooner able to walk, whose leg has been kept in the former posture, than he whose leg has been confined in the latter.

"In the fracture of both tibia and fibula, the knee ⁴³² Of the fractured tibia and fibula. should be moderately bent; the thigh, body, and leg, in the same position as in the broken thigh. If common splints be used, one should be placed underneath the leg, extending from above the knee to below the ankle, the foot being properly supported by pillows, bolsters, &c. and another splint of the same length should be placed on the upper side, comprehending both joints in the same manner; which disposition of splints ought always to be observed, as to their length, if the leg be laid extended in the common way; only changing the nominal position of them, as the posture of the leg is changed, and calling what is inferior in one case exterior in the other, and what is superior in one in the other interior."

Reduction of, or setting a compound fracture, is ⁴³³ Reduction of a compound fracture. the same as in the simple; that is, the intention in both is the same, viz. by means of a proper degree of extension, to obtain as apt a position of the ends of the fracture, with regard to each other, as the nature of the case will admit; and thereby to produce as perfect and as speedy union as possible.

The dressing necessary in a compound fracture is of ⁴³⁶ Dressings two kinds, viz. that for the wound, and that for the necessary in limb. By the former, we mean to maintain a proper compound fractures. opening for the easy and free discharge of gleet, sloughs, matter, extraneous bodies, or fragments of bone; and this in such manner, and by such means, as shall give the least possible pain or fatigue, shall neither irritate by its qualities, nor oppress by its quantity; nor by any means contribute to the detention or lodgment of what ought to be discharged. By the latter, our aim should be the prevention or removal

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val of inflammation, in order, if the habit be good, and all other circumstances fortunate, that the wound may be healed by what the surgeons call the *first intention*; that is, without suppuration or abscess; or, that not being practicable, that gangrene and mortification, or even very large suppuration, may be prevented, and such a moderate and kindly degree of it established as may best serve the purpose of a cure. The first, therefore, or the dressing for the wound, can consist of nothing better, or indeed so good, as soft dry lint, laid on so lightly as just to absorb the sanies, but neither to distend the wound, nor be the smallest impediment or obstruction to the discharge of matter. This lint should be kept clear of the edges, and the whole of it should be covered with a pledget spread with a soft easy digestive. The times of dressing must be determined by the nature of the case; if the discharge be small or moderate, once in 24 hours will be sufficient; but if it be large, more frequent dressing will be necessary, as well to prevent offence as to remedy the inconveniences arising from a great discharge of an irritating sharp sanies.

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Of preventing violent pain, inflammation, &c.

The method of treating the limb, with a view to the prevention of such accidents and symptoms as pain, inflammation, and laceration of parts are likely to produce, is different with different practitioners; some using from the very first relaxing greasy applications, others applying medicines of a very different nature. Both these may be right conditionally, that is, according to different circumstances in the case; but they cannot be equally so in the same circumstances.

436
Of applying relaxing cataplasms, &c.

Many practitioners are accustomed to envelope compound fractures in a soft warm relaxing cataplasm from the very first, whether the limb be in a tense swollen state or not. This seems to be injudicious. When from neglect, from length of time passed without assistance, from misconduct or drunkenness in the patient, from awkwardness and unhandiness in the assistants, or from any other cause, a tension has taken possession of the limb, and it is become tumid, swollen, and painful, a warm cataplasm is certainly the best and most proper application that can be made; and that for very obvious reasons: the state of the parts under these circumstances is such, that immediate union is impossible, and nothing but a free and plentiful suppuration can dissipate or remove impending mischief: every thing, therefore, which can tend toward relaxing the tense, swollen, and irritable state of the parts concerned, must necessarily be right; the one thing aimed at (plentiful suppuration) cannot be accomplished without it. But when the parts are not in this state, the intention seems to be very different. To relax swollen parts, and to appease pain and irritation by such relaxation, is one thing; to prevent inflammatory distension and tumefaction is certainly another; and they ought to be aimed at by very different means. In the former, a large suppuration is a necessary circumstance of relief, and the great means of cure; in the latter it is not, and a very moderate degree of it is all that is required. The warm cataplasms, therefore, although it be the best application that can be made use of in the one case, is certainly not so proper in the other, as applications of a more discutient kind, such as mixtures of spirit, vini, vinegar and water, with crude sal-ammoniac, spirit. Min-

dereri, acet. litharg. and medicines of this class, in whatever form the surgeon may choose. By these, in good habits, in fortunately-circumstanced cases, and with the assistance of what should never be neglected, I mean phlebotomy and the general antiphlogistic regimen, inflammation may sometimes be kept off, and a cure accomplished, without large collections or discharges of matter, or that considerable degree of suppuration which, though necessary in some cases, and almost unavoidable in others, are, and must be, rather promoted and encouraged, than retarded or prevented, by warm relaxing applications of the poultice-kind.

Compound fractures in general require to be dressed every day; and the wounded parts not admitting the smallest degree of motion without great pain, perfect quietude becomes as necessary as frequent dressing. The common bandage, therefore (the roller), has always in this case been laid aside, and what is called the *eighteen-tailed bandage* substituted, very judiciously, in its place.

437
Bandage and splints for compound fractures.

Splints, that is, such short ones as are most commonly made use of in simple fractures, are by all forbidden in the compound; and that for the same reason which ought to have prevented them from having ever been used in the former, viz. because the probable good to be derived from them can be but little, and the probable mischief is obvious and considerable.

But although short splints are, for many reasons, palpably improper in both cases, yet those which reach from joint to joint comprehend them both; and, applied on each side of the leg only, are very useful both in the simple and in the compound fracture, as they may, thus applied, be made to keep the limb more constantly steady and quiet than it can be kept without them.

With regard to luxations, many engines have been invented in order to make as strong an extension as possible; but by attending to the principles laid down n° 238, it will be found that these extraordinary degrees of force can never be necessary. To give very particular directions concerning the reduction of luxations in all cases, would not only be very tedious, but in a great measure unnecessary; as, by comparing the joint supposed to be luxated with the sound one, every intelligent operator must know whether it is so or not; and, it being remembered always to keep the muscles of the part in as relaxed a state as possible, the business of the surgeon is, 1. To restore the luxated bone to its place, first by extension, and then by reduction with his hands. 2. To preserve and retain what is so replaced, in their natural position. And lastly, 3. To prevent and cure the several symptoms which usually attend. The reduction is used to be commodiously performed by placing the patient on a stool, table, bed, or the ground, as the surgeon shall think most suitable to the case. It is however to be observed here, that those luxations are most readily reduced on a stool, which happen in the jaw, clavicle, arm, or hand; on a table, such as happen in the vertebrae or thighs; on a bed, such as happen in the legs or feet; and lastly, those dislocations are most commodiously reduced on the floor which happen on the shoulder or vertebrae of the neck.

439
Of luxations.

The extension is to be made much after the same manner as in fractures; viz. the outer or lower part the extension.

439
Of making extension.

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of the dislocated limb is to be extended by an assistant, till the head of the disordered bone be found to correspond exactly with the sinus from whence it was luxated. This may be done by the hands: but, if they are not so convenient, the extension seldom fails of being so well made by a napkin, as to render the machinery delineated in such an ample manner by Oribasius, Parey, Andreas a Cruce, Scultetus, and others, generally unnecessary; since they can effect scarce any thing more, unless it be to terrify and discourage the patient in the extension, by their formidable show.

440 Of replacing the bone. To replace the luxated bone again in its natural seat, the surgeon must regulate the assistant's extension, by ordering it to be strong enough, and in a right direction; in the mean time he is to compress the articulation gently with his hands and fingers, till he find the elapsd bone recover its right place.

441 Signs of a luxation completely reduced. An accurate reduction of a luxation is known to have been effected by the same signs which attend the reduction of fractures. It is a good sign, 1. If the bone be heard to snap or crack in its reduction. 2. When the disordered limb is found to be of the same length with the sound one. 3. When the pains grow less. Or lastly, 4. When the limb can perform its usual motion.

In those cases where the luxation is accompanied with a fracture, the reduction must be put off till that is first set and joined; for the extension cannot be safely attempted till the fracture be well joined by a firm callus.

442 Of retaining the bones in their places. After the bones have been pushed into their places from whence they were forced out, the next business is carefully to retain them there. But bones that are entire are much easier retained than those that have been broken: for the latter cannot be contained in their right posture without strict bandage and rest; whereas there is in the first case seldom much occasion for bandage, or any great rest: for thus, in fresh dislocations of the jaw, bones of the fingers, hands, cubitus, and humerus, the bone may be immediately reduced without further bandage or rest; because they are generally held firm enough by their proper ligaments and muscles. It seems rather more necessary to bend, extend, and gently move the limb sometimes, than to endanger its becoming stiff and immovable by a long inactivity. But when the luxation happens in the lower extremities, it seems better to let the patient rest a few days in his bed, moving the limb gently as soon as he finds it capable, and afterwards he may rise and walk cautiously with it.

443 Of bandages, &c. for luxated joints. On the other hand, when the ligaments have been much stretched by a violent and long-continued distention, or have been rendered infirm by any other means, it seems altogether necessary to make use of some proper bandage, and to recommend rest to the patient, till the ligaments have regained their former strength. But here it must be also carefully observed, to let the disordered articulation sometimes have a little gentle motion, by an easy flexion and extension of the limb, to prevent any stiffness or other bad consequence from such a continued rest. In the mean time, it may not be improper to moisten the bandages and bathe the part with sp. vin. aq. hungar, or some other warm and strengthening spirit, by which means the liga-

ments are used to become very firm and strong. The bandages themselves should be neither too tight nor too loose. As for the application of plasters, which has been such a prevailing custom in these cases, it seems rather to be prejudicial than otherwise.

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SECT. IX. Of the Reduction of Hernia.

THE cure of a rupture is either perfect (called also *radical*), or imperfect, which is called *palliative*.

This distinction, which is just and true, and founded both on reason and experience, has frequently been misunderstood by the generality of mankind, and has therefore been the cause of much undeserved censure on the practitioners of surgery.

The truth is, that though the events are extremely different, yet the chirurgical means which are made use of in either case are exactly the same, viz. reduction of the protruded parts, and retention of them, when so reduced, by proper bandage. These sometimes, and in some circumstances, produce a perfect cure; at other times, and under other circumstances, prove only a palliative one: and this uncertainty of event being dependent on causes which a surgeon can neither foresee nor direct with any tolerable degree of certainty, should warn him against being too forward in making a promise.

The different treatment which ruptures may require being dependent on different circumstances attending the disease, we shall divide them into four classes; under which may be comprehended, not only all the kinds of hernias, but every particularity also with which they may happen to be distinguished.

1. Under the first, we reckon those which are capable of easy and immediate reduction, and are not attended by any troublesome or bad symptoms. 2. Under the second, those which have been so long down, that the contained parts are either so altered in form, or have contracted such adhesions and connections, as to be absolutely incapable of being reduced at all. 3. Under the third, we comprehend those in which such stricture has been made on the protruded parts, as to bring on pain, and produce such an obstruction in the intestinal canal, as to render immediate reduction necessary, but at the same time difficult. 4. And under the fourth, we shall place those in which the return of the parts by the mere hand is absolutely impracticable, and in which the patient's life can be saved only by a chirurgical operation.

I. The first is very frequently met with in infants, and sometimes in adults, and is too often neglected in both.

In the former, as the descent seldom happens but when the infant strains to cry, and the gut is either easily put up or returns as soon as the child becomes quiet, it often is either totally unattended to, or an attempt made to restrain it only by a bandage made of cloth or dimity; and which, being ineffectual for such purpose, lays the foundation of future trouble and mischief.

This is in great measure owing to a common opinion, that a young infant cannot wear a steel truss; a generally prevailing error, and which ought to be corrected. There is no age at which such truss may not be worn, or ought not to be applied: it is, when well made, and properly put on, not only perfectly safe and easy, but the only kind of bandage that can be depended

444 Uncertain events attending hernia.

445 Different classes of them.

446 Of the ruptures of infants.

447 A steel truss worn at any age.

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depended upon; and as a radical cure depends greatly on the thinness of the hernial sac, and its being capable of being so compressed as possibly to unite, and thereby entirely close the passage from the belly, it must therefore appear, that the fewer times the parts have made a descent, and the smaller and finer the elongation of the peritoneum is, the greater the probability of such cure must be.

The same method of acting must, for the same reasons, be good in every age in which a radical cure may reasonably be expected; that is, the prolapsed parts cannot be too soon returned, nor too carefully prevented from falling down again; every new descent rendering a cure both more distant and more uncertain.

448
Treatment of the patient after the hernia is reduced.

As soon as the parts are returned, the truss should be immediately put on, and worn without remission; care being taken, especially if the patient be an infant, to keep the parts on which it presses constantly washed, to prevent galling.

It can hardly be necessary to say, that the surgeon should be careful to see that the truss fits, as his success and reputation depend on such care. A truss which does not press enough is worse than none at all, as it occasions loss of time, and deceives the patient or his friends; and one which presses too much, or on an improper part, gives pain and trouble, by producing an inflammation and swelling of the spermatic cord, and sometimes of the testicle.

449
Of the ruptures of adults.

In adults, whose ruptures are of long standing, and accustomed to frequent descent, the hernial sac is generally firm and thick, and the aperture in the tendon of the abdominal muscle large. The freedom and ease with which the parts return into the belly, when the patient is in a supine posture, and the little pain which attends a rupture of this kind, often render the persons who labour under it careless; but all such should be informed, that they are in constant danger of such alteration in their complaint, as may put them into great hazard, and perhaps destroy them. The passage from the belly being open, the quantity of intestine in the hernial sac is always liable to be increased, and, when down, to be bound by a stricture. An inflammation of that portion of the gut which is down, or such obstruction in it as may distend and enlarge it, may at all times produce such complaints as may put the life of the patient into imminent danger; and therefore, notwithstanding this kind of hernia may have been borne for a great length of time, without having proved either troublesome or hazardous, yet as it is always possible to become so, and that very suddenly, it can never be prudent or safe to neglect it.

Even though the rupture should be of the omental kind (which, considered abstractedly, is not subject to that degree or kind of danger to which the intestinal is liable), yet it may be secondarily, or by accident, the cause of all the same mischief; for while it keeps the mouth of the hernial sac open, it renders the descent of a piece of intestine always possible, and consequently always likely to produce the mischief which may proceed from thence.

They who labour under a hernia thus circumstanced, that is, whose ruptures have been generally down while they have been in an erect posture, and which have either gone up of themselves or have been easily

put up in a supine one, should be particularly careful to have their truss well made and properly fitted; for the mouth of the sac, and the opening in the tendon, being both large and lax, and the parts having been used to descend through them, if the pad of the truss be not placed right, and there be not a due degree of elasticity in the spring, a piece of intestine will in some posture slip down behind it, and render the truss productive of that very kind of mischief which it ought to prevent.

II. In the second class we ranked those cases in which the parts constituting the hernia are found irreducible, but not in a state of inflammation, nor producing any troublesome or dangerous kind of symptoms.

This incapacity of reduction may be owing to several causes, but most frequently arises either from the largeness of the quantity of the contents, from an alteration made in their form and texture, or from connections and adhesions which they have contracted with each other, or with their containing bag.

Ruptures are sometimes rendered difficult to be reduced, by that portion of the intestinal canal which is called the *cæcum*, or the beginning of the colon, being contained in the hernial sac. When a hernia of this kind (*viz.* one containing a part of the intestinal tube) has been long neglected, and suffered to remain in the scrotum without any bandage at all to support its weight, the hernial sac being constantly dragged down, and kept in a state of distention, necessarily becomes thick, hard, and tough: by this means the diameter of its neck is lessened, and the return of the intestine back from the scrotum into the belly rendered more and more difficult, as the parts through which it is to pass become harder and less capable of yielding. This will indeed, in time, prove an obstruction sufficient to hinder any part of the intestine, or even of the omentum, from being returned; but the more the difficulty is, which proceeds from the mere figure and size of the portion of gut, the greater will be the obstruction when added to that arising from the just-mentioned cause.

An alteration produced by time, and constant, though gentle pressure, in the form and consistence or texture of the omentum, is also no infrequent cause why neglected omental ruptures become irreducible.

The cellular membrane, in all parts of the body, however loose and light its natural texture may be, is capable of becoming hard, firm, and compact, by constant pressure. Of this there are so many and so well known instances, that it is quite unnecessary to produce any.

The omentum, from its texture, is liable to the same consequence. When a portion of it has been suffered to remain for a great length of time in the scrotum, without having ever been returned into the belly, it often happens, that although that part of it which is in the lower part of the hernial sac preserves its natural soft, adipose, expansive state, yet all that part which passes through what is called the *neck of the sac*, is, by constant pressure, formed into a hard, firm, incompressible, carnosous kind of body, incapable of being expanded, and taking the form of the passage in which it is confined, exactly filling that passage, and rendering it impossible to push up the loose part which fills the scrotum.

The

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Why some ruptures cannot be reduced.

The same reason for incapacity of reduction is also sometimes met with in ruptures of the intestinal kind, from an alteration produced on that part of the mesentery which has been suffered to lie quiet for a great length of time in the neck of an old hernial sac.

The other impediment to the return of old ruptures, is connection and adhesion of the parts, either with each other, or with the bag containing them. This is common to both the intestinal and omental hernia, and is produced by slight inflammations of the parts, which have been permitted to lie long in contact with each other, or perhaps, in many cases, from the mere contact only. These adhesions are more or less firm in different cases; but even the slightest will almost always be found an invincible objection to the reduction of the adherent parts by the hand only.

Many, or perhaps most, of these irreducible ruptures, become so by mere time and neglect, and might at first have been returned; but when they are got into this state, they are capable of no relief from surgery but the application of a suspensory bag, to take off or lessen the inconvenience arising from the weight of the scrotum.

451
Directions to people who have irreducible ruptures.

People in this situation should be particularly careful not to make any attempts beyond their strength, nor aim at feats of agility; they should take care to suspend the loaded scrotum, and to keep it out of the way of all harm from pressure, bruise, &c. When the tumour is very large, a soft quilted bolster should be worn at the bottom of the suspensory to prevent excoriation, and the scrotum should be frequently washed for the same reason; a loss of skin in this part, and in such circumstances, being sometimes of the utmost importance. They ought also to be particularly attentive to the office of the intestinal canal, to see that they do not, by any irregularity of diet, disorder it, and keep themselves from being constipated, for reasons too obvious to need relating. By these means, and with these cautions, many people have passed their lives for many years free from disuse or complaint, with very large irreducible ruptures.

On the other hand, it is fit that mankind should be apprised, that the quiet inoffensive state of this kind of hernia is by no means to be depended upon; many things may happen to it, by which it may be so altered, as to become hazardous and even fatal: an inflammation of that part of the gut which is down, any obstruction to the passage of the aliment or feces through it, a stricture made by the abdominal tendon, either on what has been long down or on a new portion which may at any time be added to it, are always capable of so altering the state of the case, as to put the life of the patient into danger.

Indeed the hazard arising from a stricture made on a piece of intestine contained in the sac of an old irreducible hernia, is, in one respect, greater than that attending one that has been found at times reducible; since, from the nature of the case, it will hardly admit of any attempt toward relief but the operation; and that, in these circumstances, must necessarily be accompanied with additional difficulty.

Among the ruptures which have been thought not reducible, and treated as such, there have been some which, upon more judicious and more patient attempts, have been found capable of reduction.

When this is suspected to be the case, the proper method is by absolute rest, in a supine posture, for a considerable length of time, and by great abstinence and the use of evacuates, so to lessen the size of the parts in the hernial sac, as to render them capable of passing back again into the belly.

This method has now and then succeeded, and in some cases is worth the trying; but, previous to the attempt, there should be some circumstances which makes success probable; and there should also be good reason to believe, that the habit and age of the patient will bear the necessary confinement and evacuation; otherwise, even though he should get rid of his rupture, he may be much worried by the experiment.

If such attempt succeeds, a truss should be immediately put on, and worn constantly without remission; for in these people, the largeness of the abdominal aperture, the thickness of the hernial sac, and the relaxation of the mesentery, make a new descent always to be apprehended and guarded against.

An omental rupture, which has been so long in the scrotum as to have become irreducible, is very seldom attended with any bad symptoms, considered abstractedly; but it is constantly capable of being the occasion of an intestinal hernia and all its consequences; neither is that all; for the omentum, either so altered in form and texture, or so connected as to be incapable of reduction, may by accident inflame, and either become gangrenous or suppurate, and be the occasion of a great deal of trouble.

453
III. Under the third division, we reckon those ruptures of the intestine which are reducible, but whose reduction is difficult, and which are attended with pain, trouble, and hazard.

Difficulty of reduction may be owing to several causes. The size of the piece of omentum, or the inflamed state of it; the quantity of intestine and mesentery, an inflammation of the gut, or its distention by feces or wind; or the smallness of the aperture of the tendon through which the hernia passes. But to whatever cause it be owing, if the prolapsed body cannot be immediately replaced, and the patient suffers pain, or is prevented thereby from going to stool, is called an *incarcerated hernia*, a *strangulated hernia*, or a *hernia with stricture*.

Every symptom which attends an incarcerated rupture depends on this stricture, and is justly accountable for from it. The tumour, the pain, the tension of the belly, the nausea, the vomiting, and the suppression of stools, are so many effects produced by it, and removable only by removing it. In order to effect a reduction, the patient should be laid in a supine posture, with his trunk certainly as low, if not lower, than his thighs; the thigh on the diseased side should be so elevated as to contribute as much as possible to the relaxation of the abdominal aperture; and then the surgeon, grasping the lower part of the tumour gently with his hand, in such a manner as to keep the testicle from ascending, and the intestine from descending, must endeavour to procure the return of the latter through the ring, as it is vulgarly called, by gentle continued pressure toward that opening. If the case be a bubonocoele, there will be no occasion for endeavouring to grasp the tumour, but, by continued moderate pressure on it with the fingers, to endeavour the return of the piece of gut.

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This may serve for a general description of the method of performing this operation; but the exact manner of executing it is one of those manœuvres which can be learnt only by observation and practice, and of which no verbal description can convey an adequate and perfect idea: knowledge of the structure and situation of the parts will instruct any one how to go about it; and a little practice will soon make him adroit.

455
Of the posture of the body.

The posture of the body, and the disposition of the lower limbs, may be made very assiduous in this operation when the difficulty is considerable: the nearer the posture approaches to what is commonly called standing on the head, the better, as it causes the whole packet of small intestines to hang, as it were, by the strangulated portion, and may thereby disengage it. A little time and pains spent in this manner will frequently be attended with success, and obtain a return of the part; but if it should not, and the handling of it (which should always be gentle) becomes painful and very fatiguing to the patient, we are advised to desist a few hours, and try the effect of other means, viz. phlebotomy, glysters, &c. But when all these have failed, there is then no other resource than in a surgical operation; and perhaps there is not in the practice of surgery a point which requires more judgement, firmness, or delicacy, than to determine the precise time beyond which this operation should not be deferred, and for a surgeon to conduct himself so as to induce a patient to submit to it early enough for his preservation. The time in which a piece of gut will become gangrenous from stricture, or get into a state approaching to that of a gangrene, is extremely uncertain, and depends on circumstances which no man can foresee. There have been several instances of ruptures, attended by pressing symptoms of stricture, which have been safely returned by the hand only, at the end of several days; or the operation having been performed at the same distance of time, the parts have been found sound and unharmed: on the other hand, there are many instances producible, of the intestine having been with great difficulty replaced, or of its returning of its own accord, from being mortified, or (the operation having been submitted to) of its having been found in such state by the operator at the end of not many hours.

456
Operation not to be very much dreaded.

The two principal circumstances which have most contributed to the infrequency of performing this operation, are, a dread of great hazard from the operation itself, considered abstractedly; and a fear of bringing a disgrace upon it, by having performed it too late. The first of these is vastly greater than it ought to be, and is most frequently the cause of the latter: so that if the one can justly be lessened, the other will not be so likely to happen.

457
Of the time when it should be performed.

Mr Pott is of opinion, that the operation ought always to be performed as soon as possible, after it appears that all rational attempts, by large and free bleeding, the warm bath, glysters, &c. are found to be ineffectual, or that the symptoms rather increase than decrease while such means are made use of, and that the handling necessary for reduction becomes more and more painful: for if it be delayed until the inflammation has attained a certain height, though the parts, upon being laid open, are not found

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quite gangrenous, that is no proof that the want of success must be set to the account of the operation merely. That state of inflammation, either of the intestine or of the hernial sac, which is just not gangrenous, is no state of safety, nor are we sure that removing the stricture will at this time appease the symptoms or abate the hazard; far from it: such an alteration may have already been made in the intestine that a mortification will ensue, though it be set free and returned into the belly. A ligature need not be continued around any part of a living animal, until it becomes quite gangrenous, in order to produce its destruction; there is a certain point of time in which the circulation is so prevented, that the same event will follow, though the ligature be then removed. It is indeed a nice, and no very easy matter, to find this precise time; but this difficulty and uncertainty are the strongest reasons for anticipating rather than waiting for it: for when, in the present case, such time arrives, or is nearly arrived, the risk of the operation becomes complicated with that arising from the diseased state of the parts within; and the chance of success is thereby much lessened.

When the operation shall be thought necessary, the manner of performing it is as follows.

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Manner of performing it.

The pubes and groin having been clean shaved, the patient must be laid on his back on a table of convenient height, with his legs hanging easily over the end of it; then with a straight dissecting knife an incision must be made through the skin and membrana adiposa, beginning just above the place where the intestine passes out from the belly, and continuing it quite down to the lower part of the scrotum. Upon dividing the adipose membrane, there generally appear a few small distinct tendinous kind of bands, which lie close upon the hernial sac, which must be divided also as well as the sac: the same knife with which the incision through the skin was made will execute this; which should be done with a steady hand and great caution, it being of very different degrees of thickness in different cases. In the bubonocoele, or that which is confined to the groin, the sac is most frequently thin, consequently more easily divided, and requires greater attention in the operator. In the ocheocoele, or scrotal hernia, if it be recent, the sac is usually thin also; if ancient, it is sometimes of considerable thickness: but whatever be the state of it, if the operator has any doubt, let him, as soon as he has made a small puncture in what appears to him to be the hernial sac, endeavour to introduce a probe into it: this will give him the necessary satisfaction; for if he has not pierced the sac, the probe will be stopped by the cells of the common membrane; and if he has, it will pass in without any obstruction. The place to make the incision in the hernial sac is about an inch and half below the stricture; and the opening need not be larger than just to admit the end of the operator's fore-finger; which, considering the great dilatibility of these membranes, will be a very small one. The fore-finger introduced into this aperture is the best of all directors; and upon that a narrow-bladed curved knife, with a bold probe point, will be the only instrument necessary to finish the operation. With this knife on the finger (the point of the former being

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always

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always short of the extremity of the latter) the sac must be divided quite up to the opening in the tendon, and down to the bottom of the serotum.

Upon the first division of the sac, a fluid generally rushes out; which fluid is different in quantity, colour, and consistence, according to the date, size, and some other circumstances attending the rupture.

This fluid has sometimes been mentioned as a defence against an accident from the knife in the first division of the hernial sac, as if it kept the intestine at such a distance as thereby to lessen the hazard of its being wounded: but this is a very fallacious circumstance, and never to be trusted: the security of this operation depends entirely on a competent knowledge of the parts, a steady hand, and an attentive eye.

Different operators, especially among the French, have proposed a number of different instruments for the safe performance of this incision; as the bistouri cachée, the bistouri herniare, the winged director, the blunt scissars, &c. &c. all which are calculated for the defence and preservation of the intestine in the division of the sac and tendon: but whoever will make use of the two knives just mentioned, will find, that he will never stand in need of any other instrument, and that he will with them be able to perform the operation with more ease to himself, with less hazard to his patient, and with more (A) apparent dexterity, than with any other whatever.

"The sac being laid open, the intestine generally pushes out immediately (unless it is confined by being enveloped in the omentum), and appears to be much more in quantity than it seemed to be while it was confined within the serotum.

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Of dividing
the tendon.

This is the time to try whether, by gently drawing out a little more of the gut, its bulk cannot be so reduced as to enable the surgeon to return it back into the belly without dividing the tendon. In the case of the protrusion of a very small piece of intestine, it has been found practicable; the difficulty of returning a large portion arising principally from the quantity of mesentery engaged in the stricture: and indeed, tho' it may now and then happen that a small piece of gut may be returnable without a division of the tendon, yet if it cannot be very easily accomplished, it had better not be attempted, since, in the state in which this part must necessarily be, to require the operation thus far, any degree of force used to it will most probably be more prejudicial and hazardous than the rest of it, if performed properly with a knife.

An attention to the natural structure, figure, and direction of the parts, will give us the best informa-

tion how to make the division of the stricture to the best purpose and with the least hazard.

The tendon of the obliquus descendens muscle runs in an oblique direction from above downward; and the natural opening which is always found in it, and through which the hernia passes, is made by a kind of separation of the fibres from each other: the direction of this opening is the same as that of the tendon, that is, obliquely downward from the os ilion to the os pubis: the knife, therefore, should be so managed, as rather to continue this separation than to make any transverse section: its edge should be applied to the superior and posterior part of the oval, and carried upward and obliquely backward, until a sufficient opening is made to serve the purpose. By this means, the fibres of the tendon will be rather separated from each other than cut; and, in all probability, the risk arising from the incision will be lessened.

It is generally advised to make the division of the stricture free and large, as well to admit the easy return of the parts, as to prevent the inconvenience which it is supposed will be more likely to attend a small wound in a tendinous body than a large one.

The first intention, the easy return of the intestine, should certainly be fulfilled; and therefore the incision ought always to be large enough for that purpose, and to afford an opportunity of passing the end of the finger round on the inside in case of any adhesion: but as too large an opening may be attended with very ill consequence, it ought also to be guarded against. In the majority of cases, a small incision will be found sufficient for the purpose of reduction; and where the parts are free from adhesion, and the safe return of them is the only object of attention, a small division, made in the manner already directed, is not liable to any more pain or trouble than a large one, and may therefore be safely trusted.

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Of the state
of the in-
testines.

The sac and stricture being laid open and divided, the contained parts come into view; and, according to the different circumstances of the rupture and of the patient, will be found in different states, and require different treatment.

These states are reducible to three general heads: that is, the contained parts will be found either in a sound, healthy, loose, unconnected state, and fit for immediate reduction; or in a sound state, but, from some particular circumstances, incapable of being immediately replaced; or in an unsound diseased state, and requiring to be treated accordingly.

If the rupture consists of a piece of intestine only, and that neither mortified nor adherent, the sooner it

is

(A) They who are not accustomed to perform operations of such consequence as this is, are apt, from timidity, to be too sparing in making their external incision; by which means, they add considerably to their own embarrassment, and to the fatigue of the patient. A free division of the hernial sac and serotum downwards, gives room for the more easy admission of the finger into the stricture in order to divide it, and affords an opportunity of handling the intestine or omentum more gently as well as more properly in order to return them into the belly; both which necessary parts of the operation are much impeded by a small incision.

As therefore no possible advantage can arise from a small wound, but on the contrary it may be attended with great inconvenience both to the patient and surgeon, Mr Pott advises, when such an opening is made in the hernial sac, as will admit the operator's fore-finger, and upon it his knife, that he immediately divide the sac and serotum down to the bottom. It is true, that, upon such division, the quantity of intestine will seem to be increased; and an ignorant bystander may be alarmed at this fallacious appearance, which is produced merely by the confined compressed gut being set free, and not by the addition of any more. The advantage which will arise to the operator, and consequently to the patient, from such division, is real and great; it will enable the former to finish his work with freedom, and spare the latter a great deal of pain.

Practice. is returned, the better; and the more gently it is handled for reduction, the better also.

If the intestine be accompanied with a portion of omentum, the latter (if in a proper state) should be returned first.

In returning the intestine, care should be taken to endeavour to put in that part first which came out last, otherwise the gut will be doubled on itself, and the difficulty and trouble be thereby much increased; and in making the reduction, the fingers should be applied to that part of the intestine which is connected with the mesentery, rather than its convex part, as it will both serve the purpose better, and be less likely to do mischief.

While the reduction is making, the leg and thigh on the ruptured side should be kept elevated; as such position of the limb will much facilitate the return of the parts.

Long confinement in the scrotum will in some people produce slight adhesions by slender filaments, which are generally very easily separated by the finger, or divided by a knife or scissars, whether the adhesions be of the parts of the intestine *inter se*, or to the hernial sac. If the adhesion be of the former kind, and such as proves very difficult to separate, it will be better to return the gut into the belly as it is, than to run the risk of producing an inflammation by using force: if it be of the latter, that is, if the connection be with the sac, there can be no hazard in wounding that; and therefore it may be made free with.

SECT. X. *Of the Fistula in Ano.*

The *fistula in ano* is an abscess running upon or into the intestine rectum.

If the surgeon have the first management of the abscess, and there appear an external inflammation upon the one side of the buttock only; after having waited for the proper maturity, let him with a knife make an incision the whole length of it; and in all probability, even though the bladder be affected, the largeness of the wound, and the proper application of doסים lightly pressed in, will prevent the putrefaction of the intestine, and make the cavity fill up like impothumations of other parts.—If the sinus be continued to the other buttock, almost surrounding the intestine, the whole course of it must be dilated in like manner; since, in such spongy cavities, a generation of flesh cannot be procured but by large openings; whence also, if the skin is very thin, lying loose and flabby over the sinus, it is absolutely necessary to cut it quite away, or the patient will be apt to sink under the discharge, which is sometimes excessive.

Here we have considered the impothumation as possessing a great part of the buttock; but it more frequently happens, that the matter points with a small extent of inflammation on the skin, and the direction of the sinus is even with the gut: in this case, having made a puncture, you may with a probe learn if it has penetrated into the intestine, by pressing your finger up it, and feeling the probe introduced through the wound into its cavity; though, for the most part, it may be known by a discharge of matter from the anus. When this is the state of the fistula, there is no hesitation to be made; but immediately putting one blade of the scissars up the gut, and the other up the

wound, snip the whole length of it. This process is as advisable when the intestine is not perforated, if the sinus is narrow, and runs upon or very near it; for if the abscess be tented, which is the only way of dressing it while the external orifice is small, it will almost certainly grow callous: so that the surest means of cure will be opening the gut, that proper applications may be laid to the bottom of the wound. However, it should be well attended to, that some sinuses pretty near the intestine neither run into nor upon it; in which case, they must be opened, according to the course of their penetration. There are abundance of instances, where the intestine is so much ulcerated, as to give free issue to the matter of the abscess by the anus: but there are none where there is not, by the thinness and discoloration of the skin, or an induration to be perceived through the skin, some mark of its direction; which, if discovered, may be opened into with a lancet, and then it becomes the same case as if the matter had fairly pointed.

If the sinuses into and about the gut are not complicated with an induration, and you can follow their course, the mere opening with scissars, or a knife guided on a director, will sometimes suffice; but it is generally safer to cut the piece of flesh surrounded by these incisions quite away, and, when it is callous, absolutely necessary, or the callosities must be wasted afterwards by escharotic medicines, which is a tedious and cruel method of cure.

When the fistula is of a long standing, and we have choice of time for opening it, a dose of rhubarb the day before the operation will be very convenient, as it not only will empty the bowels, but also prove an astringent for a while, and prevent the mischief of removing the dressings in order to go to stool.

It sometimes happens, that the orifices are so small, as not to admit the entrance of the scissars; in which case, sponge-tents must be employed for their dilatation.

In performing these operations on the anus, no instruments are so handy as the knife and scissars; almost all the others which have been invented to facilitate the work are not only difficult to manage, but more painful to the patient: however, in those instances where the fistula is very narrow, and opens into the intestines just within the verge of the anus, the syringotomy may be used with advantage; but where the opening into the gut is high, it cannot be employed without giving great pain.

The worst species of fistula is that communicating with the urethra, and sometimes (though the prostate gland) with the bladder itself. This generally takes its rise from a former gonorrhoea, and appears externally first in *parino*: afterwards, increasing more towards the anus, and even sometimes into the groin, it bursts out in various orifices, through the skin, which soon becomes callous and rotten; and the urine passing partly through these orifices, will often excite as much pain, and of the same kind, as a stone in the bladder.

This species of fistula taking its rise from strictures of the urethra, is only manageable by the bougie: for so long as the urethra is obstructed, the cure of the fistula will be imperfect; but if the canal be opened by this application, it is amazing what obstinate indurations and foul sinuses will in consequence disappear;

though there are some so callous and rotten, as to demand the knife and skillful dressings, notwithstanding the urethra should be dilated by the use of bougies.

SECT. XI. *Bronchotomy, the Extirpation of the Tonfils, &c.*

§ 1. *Of Bronchotomy.*

THE operation of bronchotomy is an incision made in the aspera arteria, to make way for the air into the lungs, when respiration is obstructed by any tumour compressing the larynx, or some other disorder of the glottis and aspera arteria, without any apparent tumour.

The manner of doing it, is by making a longitudinal incision through the skin, three quarters of an inch long, opposite to the third and fourth ring of the trachea, if you have the choice of place; and when you cannot make it so high, the rule will be to wound a little below the tumour: it is always advised to pinch up the skin for this process, which, however, may be left to the discretion of the surgeon. When the skin is cut through, you must make a small transverse incision into the wind-pipe, and immediately introduce a silver crooked canula near half an inch long, with a couple of little rings at the top of it, through which a ribband may be passed round the neck, to keep it fixed in the wound.

The method of dressing will be easily understood; since, after the patient can breathe by the natural passage, if you withdraw the hollow tent, the wound will become a simple one, and, notwithstanding its penetration through a cartilage into a large cavity, require a superficial application only.

§ 2. *Extirpation of the Tonfils, and large Piles.*

THE tonfils sometimes grow so large and scirrhus as to become incurable, and even to threaten suffocation, if not extirpated. The manner of doing this operation formerly, was by cutting them off: but the almost constant consequence of this wound was a violent hæmorrhagy which sometimes proved mortal; on which account it is rejected in favour of the ligature, which is not only void of danger, but also seldom fails of cure.

If the basis of the tonsil is smaller than the upper part, you may pass the ligature by tying it to the end of a probe, bent into the form of an arch, and set into a handle; which being carried beyond the gland, and round it, is to be brought back again: this done, you may easily tie it by the means of an instrument of Mr Cheselden's contrivance, which holds one end of the string on the side of the tonsil next the throat, while you make the knot by pulling the other with the right-hand quite out of the mouth, as will be easily understood by the draught in the copper-plate. Should it happen that the tonsils are conical, so that the ligature will necessarily slip over its extremity when we attempt to tie; in this case, he has recommended an instrument like a crooked needle, set in a handle, with an eye near the point, threaded with a ligature, which is to be thrust through the bottom of the gland, and being laid hold of with a hook, the instrument is to be withdrawn; then, pulling the double ligature forwards, it must be divided, and one part

be tied above, and the other below the tumour; the knots are to be always double, and the ligature to be cut off pretty near them. If after four or five days they slip, or seem to have mortified the tonsil only in part, you must repeat the whole operation; and if it fail a second time, you must even repeat it again.

This kind of extirpation is more practised in large piles that are esteemed incurable. When the piles are within the intestine, you must place your patient over a fomentation in a closetool, and have a crooked needle with a double ligature ready to pass through them, when by straining they are pushed out of the anus (for sometimes the intestine will return suddenly), and tie above and below as in the instance of the tonsil. Sometimes the piles are of that shape as to admit a single ligature to be tied round them without the help of a needle, which is less painful. If there are several, you must only tie one or two at a time; for the pain of the ligature is excessive, and would be intolerable if many were tied at once: however, every five or six days, the operation may be repeated till all are extirpated, and the parts must be kept supple by some emollient ointments.—When the piles are small, they may safely and with much less pain be cut off.

The uvula is subject to so great a degree of relaxation sometimes, that it almost chokes the patient: the readiest cure is cutting off all but half an inch of it; which may be done at one snip with a pair of scissors (particularly curved for that purpose), laying hold of it with a forceps, lest it should slip away.

§ 3. *Of the Polypus.*

THE polypus of the nose is said to be an excrescence of flesh, spreading its branches amongst the laminae of the os ethmoides, and through the whole cavity of one or both nostrils. It happens very often to both sides of the nose at once: and in that case is very troublesome, almost suffocating the patient, at least making respiration very difficult. The intent of the operation is the removal of this obstacle.

Polypi arise from the membrane spread upon the laminae spongiosae, pretty nearly in the same manner as the hydatids of the abdomen, in one kind of dropsy, do from the surface of the liver; or as ganglions from the tendons, borrowing their coats from a production of its fibres and vessels. If they appear soft, and of the colour of the serum of the blood, in all likelihood they are formed of such a sort of water contained in cysts, which, upon breaking the membrane, leaves so little hold for the instrument, that but a small part of it can be extracted afterwards. This polypus is to be left to harden, before the operation be undertaken, which in process of time it generally will do. In the next degree of consistence, they retain pretty nearly the same colour, and are often partly watery, and partly of a viscid texture, which, though not tenacious enough to admit of drawing them out by the roots, may at several attempts be taken away by bits. The next degree of consistence, is that which is neither so soft as to be squeezed to pieces, nor so hard and brittle as to crumble, or adhere to the membrane with that force as not to admit of separation: this is the most favourable one. The last is hard and scirrhus, adhering

Practice. so tight as to tear rather than separate in the extraction, and sometimes even tends to degenerate into a cancer. This polypus is very difficult of cure.

The polypus sometimes dilates to that degree, as not only to extend beyond the os palati, and hang over the œsophagus and trachea; but also spreading into the sinus maxillaris, so exactly fills up every interstice of the nose, as to obstruct the lower orifice of the *ductus ad nasum*, and prevent the descent of the tears, which necessarily must return through the puncta lachrymalia: and sometimes they grow so enormously large, as even to alter the shape of the bones of the face.

When the polypus appears in the throat, it is always advisable to extract it that way; it being found, by experience, more ready to loosen when pulled in that direction, than by the nose. To this end, it would be right, before undertaking the operation, to let your patient lie on his back two or three hours, which will bring it still further down; for the body of the polypus does not universally adhere, and will by its weight stretch out the fibres by which it is connected to the nose; nay, there are instances, where by a little effort, such as hawking, they have dropt quite off.

The method of extracting it is by a pair of forceps, with a slit at their extremities for the better hold; which must be introduced into the nostril about an inch and a half, to make more sure of it towards the roots; then twisting them a little from one side to the other, you must continue in that action, while you pull very gradually the body of the polyps. If it break, you must repeat the extraction as long as any remains, unless it is attended with a violent hæmorrhagy, which is an accident that sometimes follows upon the operation, and seldom fails when the excrescence is scirrhus. However, the surgeon is not to be alarmed at the appearance of an immoderate effusion the moment after the separation: for, generally speaking, the vessels collapse very soon again; but if they do not, dry lint, or lint dipt in some styptic, will readily stop it.

After the extirpation, it has been usual, in order to prevent a relapse, to dress with escharotic powders, and even to burn with the actual cautery; but neither the one or the other can be of great service in this case, and both are painful and dangerous. If ever the use of corrosive medicines is advisable, it should be for destroying the remainder of a polypus which cannot all be taken away; and then the escharotics may be better conveyed to the part by a long tent, than a seton passed through the nose and mouth, which is difficult to do without hurting the patient, and very nasty to bear.

§ 4. Of the Hare-lip.

THIS is a fissure in the upper lip, with want of substance; and is a natural defect, the patient being always born with it, at least that species of hare-lip which requires the following operation. The cure is to be performed by the twisteduture. There are many lips where the loss of substance is so great, that the edges of the fissure cannot be brought together, or at best where they can but just touch; in which case the attempt should be forborn: it

is likewise forbidden in infants, and with reason if they suck; but otherwise it may be undertaken with great safety, and even with more probability of success than in others that are older. It is not uncommon for the roof of the mouth to be fissured likewise; but this is no objection to the operation, if the skin of the lip is loose enough to admit of reunion: and it may be remarked, that the fissure of the palate, in length of years, closes surprisingly in some cases.

The manner of performing the operation is this. You first with a knife separate the lip from the upper jaw, by dividing the frænulum between it and the gums; and if the dentes incisivi project, as is usual in infants, they must be cut out with the same knife: then with a thin pair of straight scissors take off the callous edges of the fissure the whole length of it; observing the rule of making the new wound in straight lines, because the sides of it can never be made to correspond without this caution. The two lips of the wound being brought exactly together, pass a couple of pins, one pretty near the top, and the other as near the bottom, through the middle of both edges of it, and secure them in that situation by twisting a piece of waxed thread cross and round the pins seven or eight times; you must then cut off the points, and lay a small bolster of plaster underneath them, to prevent their scratching; but when the lower part only of the hare-lip can be brought into contact, it will not be proper to use more than one pin.

The practice of bolstering the cheeks forward does little or no service to the wound, and is very uneasy to the patient. The manner of dressing will be, to remove the applications, which are quite superficial, as often only as is necessary for cleanliness. The method is to dress the three first days, and afterwards to do it every day, or every other day: it is not at all requisite to dress between the jaw and lip where the frænulum was wounded, there being no danger that an inconvenient adhesion should ensue. In about eight or nine days the parts are usually united, and in children much sooner; when you must gently cut the threads, and draw out the pins, applying upon the orifices a piece of plaster and dry lint. It will be proper, in order to withdraw the pins more easily, to daub the ligatures and pins with warm water, and also moisten them with sweet oil, two or three days before you remove them; which will wash off the coagulated blood, that would otherwise fasten them so hard to the ligature as to make the extraction painful.

§ 5. Of the Wry Neck.

THE operation of cutting the wry neck is very uncommon, and is never to be practised but when the disorder is owing to a contraction of the mastoideus muscle only; as it can answer no purpose to fet that muscle free by dividing it (which is all that is to be done) if the others in the neck are in the same state; and more especially if it has been of long standing from infancy, because the growth of the vertebrae will have been determined in that direction, and make it impossible to fet the head upright.

When the case is fair, the operation is this. Having laid your patient on a table, make a transverse incision through the skin and fat something broader than

than the muscle, and not above half an inch from the clavicle; then passing the probed razor with care underneath the muscle, draw it out and cut the muscle. The great vessels of the neck lie underneath; but when we are aware of their situation, the danger of wounding them may be avoided. After the incision is made, the wound is to be crammed with dry lint, and always dressed so as to prevent the extremities of the muscle from reuniting; to which end, they are to be separated from each other as much as possible by the assistance of a supporting bandage for the head during the whole time of the cure, which will generally be about a month.

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§ 6. Of the Phymosis.

THE *phymosis* signifies no more than such a straitness of the prepuce that the glans cannot be denuded; which if it becomes troublesome, so as to prevent the egress of the urine, or conceal under it chancres or foul ulcers, quite out of the reach of application, is to be cut open. It sometimes happens that children are born imperforate; in which case, a small puncture, dressed afterwards with a tent, effects a cure. But this operation is chiefly practised in venereal cases, in order to expose chancres either on the glans or within-side the prepuce itself: And here, if the prepuce is not very callous and thick, a mere incision will answer; which may be made either with the scissars, or by slipping a knife between the skin and glans to the very extremity, and cutting it up. The last method is more easy than that of the scissars: but it is safer to make the wound on the side of the prepuce than upon the upper part, for sometimes the great vessels on the dorsum penis afford a terrible hæmorrhage; though as the prepuce remains better shaped after an incision made in the upper part, the upper incision is to be preferred by those who understand how to take up the vessels. In children, it sometimes happens that the prepuce becomes very much contracted; and in that case, it is accidentally subject to slight inflammations, which bring on some symptoms of the stone; but the disorder is always removed by the cure of the phymosis.

If the prepuce be very large and indurated, the opening alone will not suffice: it is more advisable to take away the callosity by circumcision, which must be performed with a knife; and if the artery bled much, it must be taken up with a small needle and ligature.

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§ 7. Of the Paraphymosis.

THE *paraphymosis* is a disease of the penis, where the prepuce is fallen back from the glans, and cannot be brought forwards to cover it. There are many whose penis is naturally thus formed, but without any inconvenience; so that since the time of the Romans (some of whom thought it indecent to have the glans bare), it has not been usual to perform any operation upon that account; but we read the several processes of it described very particularly by Celsus, who does not speak of it as an uncommon thing. Most of the instances of this distemper are owing to a venereal cause; but there are some where the prepuce is naturally very tight, which take their rise from a sudden contraction of it, and immediate enlargement of the

glans preventing its return. Sometimes it happens that the surgeon succeeds in the reduction immediately, by compressing the extremity of the penis at the same time he is endeavouring to advance the prepuce; if he does not, let him keep it suspended, and attempt again, after having fomented and used some emollient applications: but if, from the contraction below the corona glandis, there is so great a stricture as to threaten a gangrene, or even, if the penis is much enlarged by water in the membrana reticularis, forming tumours called *crystallines*, three or four small incisions must be made with the point of a lancet into the stricture and crystallines, according to the direction of the penis; which, in the first case, will set free the obstruction, and in the other evacuate the water. The manner of dressing afterwards must be with fomentations, digestives, and the theriaca Londinensis over the pledgits.

§ 8. Puncture of the Perineum.

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THIS operation is performed, when the bladder is under such a suppression of urine as cannot be relieved by any gentler methods, nor, by reason of the obstruction in its neck or the urethra, will admit of the introduction of a catheter. The manner of doing it, as described by most writers, is by pushing a common trocar from the place where the external wound in the old way of cutting is made, into the cavity of the bladder, and so procuring the issue of the water through the canula: but others, refining upon this practice, have ordered an incision to be carried on from the same part into the bladder, and then to insinuate the canula. But both the methods are to be rejected in favour of an opening a little above the os pubis: for besides that it is not easy to guide the instrument through the prostate gland into the bladder, the necessity of continuing it, in a part already very much inflamed and thickened, seldom fails to do mischief, and even to produce a mortification.

There is another method still more easy both to the patient and the operator; which consists only in emptying the bladder with a common trocar, and stopping the canula with a little cork, which is afterwards to be taken out as often as the patient has occasion to urinate. The canula is to be continued in the bladder till such time as the person finds he can void his urine by the natural passage.

In this operation the abdomen ought to be perforated about two inches above the os pubis; and if the patient be fat, the trocar should penetrate two inches, otherwise an inch and a half will be sufficient.

§ 9. Of searching for the Stone, or passing a Catheter into the Bladder for drawing off Urine in case of a Retention.

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THE patient being laid on a horizontal table, with his thighs elevated and a little extended, pass the sound with the concave part towards you, until it meets with some resistance in *perineo*, a little above the anus: then turning it without much force, push it gently on into the bladder; and if it meets with an obstruction at the neck, raise its extremity upwards, by inclining the handle of it towards you; or if it do not then slip in, withdraw it a quarter of an inch, and, introducing your fore-finger into the rectum, lift it up, and it will seldom

Præfice. seldom fail to enter. There is some art in turning the found in the proper place of the urethra, which surgeons not versed in this operation cannot so well execute; therefore they may pass the instrument with the concave side always towards the abdomen of the patient, observing the same rule at the entrance into the bladder as in the other method. The cause of this obstacle, besides the rugæ of the urethra, and the resistance of the verumontanum, is sometimes a small projection of the orifice of the bladder in the urethra, like that of the os tincæ in the vagina, which occasions the end of the found to slip a little beyond it.

SECT. XII. *Of Lithotomy.*

473 **Lithotomy** reckoned exceedingly dangerous by the ancients. THE removal of the stone from the urinary bladder, by the operation called lithotomy, has been ever classed amongst the most dangerous operations in surgery, and, till lately, was attempted but by very few, who were distinguished by the title of *lithotomists*. And this appears probably to have been the case in the time of Hippocrates, if any thing may be concluded from the oath ascribed to him; in which he declares, "He will not cut such as have the stone, but leave that operation to those who make it their peculiar practice."

473 **Celsus's method.**

474 **Of the high operation.**

475 **Of the lateral operation.**

476 **Of the new method.**

The most ancient method of cutting for the stone with which we are acquainted, is described with great accuracy and elegance by Celsus, who makes an incision in *perineo* immediately upon the stone, though not in the same direction with that which is now made in what is called the *lateral operation*. He says, "A lunated incision is to be made near the anus down to the neck of the bladder, so as the horns of the incision may point towards the coxæ; and from the bottom of the wound thus made, where it is narrower, a second incision must be made transversely; by which the neck of the bladder is to be opened, and a passage made for the urine, and the stone exposed; and moreover, this wound is to be larger than the size of the stone," for reasons which he gives. The operation described by Celsus is, in contradistinction to a more modern one invented by Johannes de Romanis, in which a greater number of instruments were employed, called *apparatus minor*.

Petrus Francus, finding a stone too large to be taken away through an opening in *perineo*, boldly made an incision through the integuments and muscles, above the ossa pubis, into the bladder, and happily extracted it. This method has since been revived, and practised by some others, under the title of the *high operation*.

Modern practitioners have adopted that which is called the *lateral operation*. Frère Jacques was, without doubt, the first person who gave the hint: and though he was extremely ignorant, yet, from the knowledge of the parts concerned in the operation, many eminent surgeons were convinced of the great probability there was of its being made a very excellent method, by correcting his errors; among whom was professor Rau in Holland, and Mr Cheselden in England.

Heister seems to prefer Celsus's method (as he understands it) in lads under 14 years of age, and chiefly on account of fewer instruments being employed in this than in other methods.

The new method, or *apparatus magnus*, seems to be projected merely from the observation made of the

great dilatability of the cervix vesicæ, and parts adjacent, when the stone is extracted in women. Therefore, as by cutting under the scrotum, close to the raphe on the left side, in *perineo*, through the integuments and muscles, as low down as the upper part of the anus, then carrying the knife deeper to divide the urethra, the parts divided by these openings are brought nearly into the state of the urethra in women, those who perform this operation must depend on the dilatation of the parts in one as well as the other for the passage of the stone, when it is extracted by this method.

When it is determined that the operation shall be performed, the manner of preparing the patient depends on various circumstances. For example, if he is plethoric, a few ounces of blood should be taken away; and, at proper distances of time, the bowels must be emptied; the patient's diet should be chiefly milk and vegetables, or other light food; which regimen should be observed for some days before the operation. The opening medicines should be principally manna, or such other lenients as will best answer the purpose: if the pain should be violent, bleeding becomes as necessary sometimes as in plethorics; but opium must be employed to abate the excess of pain: nevertheless it may be advisable to try first the effect of keeping the patient on the bed with his hips raised, in order, if possible, to roll the stone from the neck of the bladder: he should not, on any account, be permitted to sit up or use motion during the preparation for this operation.

It has been frequently remarked, on a diaphoresis coming on after operations in general, that the pain abated, and other disagreeable symptoms went off. "This (says Mr Bromfield), induced me to make use of the warm bath at proper distances of time, according to the strength of the patients, as a part of the preparatory plan for this operation, and it always succeeded to my utmost expectations: for from the skin being well cleaned and softened by the warm water, an anodyne seldom failed to produce a gentle perspiration after the operation was performed, and generally prevented the usual symptomatic fever consequent to operations."

"If the patient is an adult, the perineum should be shaved and well cleaned. An hour or two before the operation is to be performed, a clyster should be given to empty the rectum; and a few minutes before he is to be cut, he should make as much water as he can."

"The patient being laid on a table covered with blankets, pillows, &c. and properly secured by ligatures and assistants, I pass the staff into the bladder, and incline the handle towards the abdomen, and obliquely to the right groin, so as to feel the groove of the staff in the perineum on the left side of the raphe, which will be in the membranous part of the urethra. I then fix it, and deliver it to my assistant, and desire him to press it gently in order to advance the fulcus of the staff in the direction in which I had given it to him; another assistant supports the scrotum. I then seat myself on a chair of a convenient height, and begin my incision of the external integuments about half an inch below the commissure of the ossa pubis on the left side of the raphe, and pursue it by a quick stroke, obliquely

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477 **Mr Bromfield's method of operating.**

obliquely outwards and downwards, between the anus and obtuse process of the ischium, ending somewhat lower than the basis of that process. As soon as the integuments are thus divided, I introduce the fore and middle fingers of my left hand; with the last I keep back the lip of the wound next the raphe, and with the index press down the rectum. I then make a second incision, almost in the same direction with the first, but rather nearer to the raphe and anus, and sufficiently deep to divide the transversalis penis, and as much of the levator ani and ligamentous membrane as will make the prostate gland perceptible by my finger. I then with the index of my left-hand feel for the sulcus of the staff, which serves as a conductor to my knife for opening the membranous part of the urethra, and afterwards for dividing part of the prostate: the rectum is likewise by my fingers kept out of the way of the knife in the next part of the operation, which I effect in the following manner. Hitherto I held the blade of my knife like a pen, between the fore-finger and thumb, and resting on the middle finger of my right-hand, with the back of the blade uppermost; but now I take it between the fore-finger and thumb of my right, with the handle towards the palm of my hand on the inside, the back of the blade facing the inside of the index of the right hand: I then turn the back of this hand that holds the knife downwards, and convey the knife to the membranous part of the urethra, by gliding the under fingers of my right-hand on the index of my left-hand, which serves as a conductor of the knife to the gland. As soon as I perceive that, I feel for the groove of the staff with the index of my left-hand, with which I convey the convex edge of the knife into the membranous part of the urethra, as much laterally as is possible, and as nigh to the prostate. When I am clearly in the sulcus of the staff, I turn the back of my knife as much downwards as I can to avoid wounding the rectum, as I then push the blade of the knife along the groove of the staff into the body of the gland, sliding the knife on the convexity of its edge, till it has divided near half the length of that gland; and if I wish to cut a little more of it, I incline the handle of my knife a little downwards, and towards the left ischium. The point of the knife will then drop into the groove of the staff; and by drawing the knife in this situation towards me, I shall certainly make good the wound of the prostate, so as near two-thirds of it may be divided in the operation. This last stroke of my knife is what is generally called *cutting from within outwards*. I then introduce the beak of the common gorgeret into the groove of the staff, and press it on till it gets into the bladder, which is soon discovered by the flux of the urine. I order my assistant to withdraw the found, and I then turn the convex part of the gorgeret towards the wound made in the prostate, and glide the fore-finger of my left-hand in the concave part of the gorgeret till it enters the bladder: by this means I easily and gradually dilate the neck of the bladder; which being done sufficiently, I withdraw my finger, and introduce the forceps. If I do not readily feel the stone with my forceps shut, I give a gentle stroke with them on the part of the bladder near its neck, which is in contact with the rectum; by which means the stone will often

drop down: if not, I rest one cheek of the forceps on the part I had before given the stroke, and, by raising the other, open the forceps: the inferior blade then becomes the axis, on which I turn the upper branch, first to one side, and then to the other, making them gradually approach each other; by which means I generally can lay hold on the stone. When I attempt to extract it, I do it very gently, till I find resistance from the adjacent parts. I then endeavour to prevent the forceps from pressing too much on the stone, by placing the thumb of my left hand as near the joint of the forceps as I can, which, unless the stone is very soft, will prevent its breaking. If any vessel of consequence should be wounded, I take it up by the needle and ligature or tenaculum; if small, I only apply a piece of dry lint to the mouth of the bleeding vessel.

"In case the bladder has not been duly emptied before the operation, great care should be taken in extracting the stone, especially if small; for there not being time for the bladder to contract itself duly, it naturally will fall into wrinkles; these will be liable to be laid hold on together with the stone, which might prove fatal. If the stone is very large, I make use of a screw I have contrived, which may be passed through a hole in one of the branches of the forceps, in which is a female screw: by turning the male screw, you may determine to the greatest exactness the degree of pressure you would choose to make to secure the stone in the forceps.

"Though I have given this rule to prevent the breaking of a stone, yet I think the hazard is greater, in respect to the patient's life, where the stone is large and hard and the incision small, if it should not break, than if it should by the resistance of parts undivided. But still in this case there is danger from some fragments remaining behind (which will probably become nuclei for the formation of other stones), as well as from the forceps being so frequently introduced as may be necessary to their extraction. But I think that when the stone is very large, the best way will be, to bring it forward with your forceps, then secure them by your screw from making too great compression: you may then make your incision on the stone laterally through the prostate gland; which is certainly preferable to risking the laceration and confusion of the parts, by extracting so large a body through an opening naturally so small. I highly disapprove of turning the stone from one side to the other when in the forceps, by way of dilating the neck of the bladder; as the points of the stone, particularly if it should prove of the mulberry form, will probably lacerate the parts, and occasion large sloughs, and frequently cause a mortification. Andreas a Cruce is so apprehensive of the ill consequences of extracting a large stone through the neck of the bladder, that he has contrived forceps with large teeth in order to break the stone to pieces: he has likewise recommended a sort of scoop or spoon in order to take out the broken pieces, as he seems extremely sensible of the ill consequences attending the smallest pieces being left in the bladder. To inform himself whether the bladder be totally free from any fragments of the stone, he has contrived an instrument he calls *verriculum*, with which he examines carefully every part of the bladder: he

says,

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says, that the most eminent operators of his time neither used dilators nor instruments to break the stone, but trusted to their fingers or the goose-bill forceps for the extraction. Should any small branches of the pudica interna be wounded in the operation, in case a large stone has been extracted, the bleeding will rather be of service than prejudicial; and I should rather encourage it, by fomenting the wound and parts adjacent with some emollient fucus, in which there is a third or fourth part vinegar. A pledget of soft digestive is to be laid on the surface of the wound, which should be frequently renewed: for the dressing being pressed down deep in the wound, with a view to obtain granulations from the bottom, is extremely likely to make the wound fistulous; which seldom happens by the superficial method of dressing. Excoriations of the buttocks may be prevented by placing a sheet under them several times doubled, so as to be in breadth about 18 or 20 inches: it must be rolled up all but as much as is necessary to be laid under the patient. At first the remainder of the roll is put by his side, which unrolls as the nurse draws the wet part from under him: by this method he is almost constantly kept dry. If excoriations should happen, or any other unfavourable symptom, surgery will direct what should be done. I generally keep the patient on a low diet for a week or ten days, as occasion may require.

"To obtain the first stool, a clyster for the most part is necessary; which I greatly prefer to purging medicines given by the mouth, as they frequently occasion more stools than one would wish. I think I have sometimes gained time, after the urine had passed a day or two by the usual channel, by applying compresses and slips of plaster on the lips of the wound to keep them in contact, assisted by the T bandage.

"Having frequently observed in several of my pupils, when they attempted to perform this operation on dead subjects, that they had great difficulty in getting at the prostate gland, so as to divide it properly; and having repeatedly remarked the embarrassment that several operators have had in effecting it on the living subject; I was induced, many years since, to show, in my courses of operations, the two following instruments: the first by the French is called *bistourie cachée*; the method of using which is as follows.

"The incision of the external integuments being made as above directed, the membranous part of the urethra is then to be opened with the point of the knife laterally, as near to the prostate gland as possible: through this opening of the urethra, the bistourie cachée is to be introduced by the groove of the staff into the bladder; as soon as that is effected, the instrument should be disengaged from the staff, which may then be withdrawn. You then place the instrument in such direction, as, when you withdraw, it to make the wound of the gland on the left side, rather obliquely downwards and outwards than horizontally lateral. When you have placed your instrument to your mind, incline the handle towards your patient's left thigh; then press on the spring, which will bring out the blade of the knife that before was concealed in the groove, and withdraw it, observing that obliquity of the handle towards the left thigh during the whole time you are dividing the neck of the bladder. There is great

nicety in making this drawing cut: for if the blade of the knife be not placed with some obliquity downwards, it will wound the ereclor penis, and that branch of the hypogastric artery called *pudica externa*; if placed quite perpendicular, it will wound the vesiculæ feminales and intestine. If you withdraw it in a straight line towards you, the bladder will be wounded beyond its neck. These hints observed, the instrument I think will be of use to those who find a difficulty in dividing the gland with a knife.

"The other instrument I call the *double gorgeret*. The upper part on which the blade is fixed must be united with the under half, by means of the grooves in its upper edges receiving the lower edges of that part with the knife affixed; they then become one instrument, which, if the blade is taken off, somewhat resembles the extreme part of a cow's horn. The manner of using this instrument is as follows: The incisions of the integuments and urethra being made as directed for cutting with the bistourie cachée, the beak of the gorgeret is to be introduced into the groove of the staff. I then take the staff from my assistant with my left-hand, and incline the handle to the patient's left groin; in which situation, I can pass the instrument with the blade pointing obliquely outwards and downwards, and then push it on quite into the bladder, of which I am informed by the urine running through the instrument, which serves as a direction how much farther the instrument should be pushed on, in order to divide about two-thirds of the length of the gland. I then withdraw the upper half of the instrument with the blade, the lower part that remains becoming the common gorgeret. I should have remarked, that I take the instrument, when its parts are united, in my right hand, the wooden handle resting in the palm against the ball of my thumb, and my thumb placed on the upper part of the handle: by this means the two parts of the instrument will be kept in contact when used, merely from the resistance of the prostate gland, &c. during its introduction. The remaining part of the operation is finished as usual in the lateral method; except that when you want to disengage the forceps, it will be necessary to raise the left-hand that holds the gorgeret, at the same time that the right is depressed. It is possible I may be of the partial to my own contrivance; but I cannot say that I have ever seen any other instrument that has been since made, formed with the same intentions with mine. The common gorgeret, if it does not cut on its edge, and the membranous part of the urethra only be opened, will probably force off the prostate gland and neck of the bladder from its continuation with the urethra; which Mr. Cheselden assured me has more than once been the case, from the shoulders near the beak not being able to dilate, unless the prostate is in some measure divided at its connection with the membranous part of the urethra: therefore I find the double gorgeret, even without the blade, is more easily introduced than the common gorgeret, and without hazard, as by dilatation it prepares the parts for the introduction of the forceps; which preparatory dilatation is still of greater service when the gland is to be divided with the blade affixed; and the lower part of the gorgeret will defend the intestine and vesiculæ feminales from being wounded.

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Instruments used by Mr. Bromfield in performing the operation.

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Advantages of the double gorgeret.

"Many who espouse the lateral operation, as it is called, conclude, that the gland should be wounded laterally and horizontally; and for that purpose have invented various instruments to cut it through its whole length, to facilitate the extraction of a large stone. The prostate gland, I believe, is very rarely entirely divided in the present method of performing the operation, and I think never horizontally laterally, as is supposed; which indeed is obvious from the situation of the groove of the staff, which must cause the opening to be in the under part of the gland, a little to the left side. When the common dissecting knife only is employed, some, as soon as they have made an opening into the urethra, in that part where the groove of the staff can be felt most sensibly, in order to avoid wounding the rectum, divide the gland obliquely upwards and outwards. From what I have seen of this method of operating, I am convinced there is not any advantage in it; but, on the contrary, that it is rather prejudicial where the stone is large: for the resistance of the gland being taken away in the upper part by the incision, and the ligamentous and muscular parts remaining undivided below, the stone is thrown up towards the symphysis of the bones of the pubis, which is the smallest part of the angle of the pelvis, through which the stone is to pass: the great force consequently requisite to extract it, under these circumstances, frequently occasions the stone to be broken, and the neighbouring parts very much contused and lacerated; which could not be the case, were all the resistance taken away below where the distance between the ischia is greatest.

"Though almost all operators would gladly wish (by what I understand) to divide the prostate gland throughout its whole length, it is what I would always choose to avoid: about two-thirds of it nearest to the membranous part of the urethra, I am convinced, will be sufficient, and attended with more advantages than the cutting it entirely through; as the only obstacle a stone meets with is in that part of the gland, and as the neck of the bladder beyond that will dilate sufficiently in most cases without laceration, and as the wounded parts will sooner heal by the muscular fibres, which act as a sphincter, recovering their tone, than they would do if the urine were constantly running through them. By this method of operating, and proper treatment of the wound afterwards, I do not recollect a single instance of a fistula remaining."

SECT. XIII. Of Castration, and the Extirpation of Encysted and Cancerous Tumours.

§ 1. Of Castration.

This is one of the most melancholy operations in the practice of surgery, since it seldom takes place but in disorders into which the patient is very apt to relapse, viz. those of a scirrhus or cancer: for under most of the symptoms described as rendering it necessary, it is absolutely improper; such as a hydrocele, abscess of the testes, an increasing mortification, or what is sometimes understood by a sarcocele; of which last it may not be amiss to say a word. In the utmost latitude of the meaning of this term, it is received as a fleshy swelling of the testicle itself, called likewise *hernia carnea*; or in some enlargements, such

as in a clap, more frequently *hernia humoralis*; but generally speaking, is considered as a fleshy excrescence formed on the body of the testis, which becoming exceedingly hard and tumefied, for the most part is supposed to demand extirpation, either by cutting or burning away the induration, or amputating the testicle. But this maxim too precipitately received, has very much misguided the practitioners of surgery.

It sometimes happens that the epididymis is tumefied, independent of the testicle; and, feeling like a large adventitious excrescence, answers very well to the idea most surgeons form of a *sarcocele*: but not being aware of the different nature and texture of the epididymis, they have frequently confounded its disorders with those of the testicle itself, and equally recommended extirpation in the induration of one and the other. But all indurations of the glandular part of the testicle not tending to inflammation and abscess, generally, if not always, lead on to scirrhus and cancers; whereas those of the epididymis seldom or never do. It is true, in spite of internal or external means, these last often retain their hardness, and sometimes suppurate, but, however, without much danger in either case.

Before castration, it is laid down as a rule to inquire whether the patient has any pain in his back; and in operation that case to reject the operation, upon the reasonable presumption of the spermatic vessels being likewise diseased: but we are not to be too hasty in this determination; for the mere weight of the tumour stretching the cord, will sometimes create this complaint. To learn the cause, then, of this pain in the back, when the spermatic cord is not thickened, let your patient be kept in bed, and suspend his scrotum in a bag-truss, which will relieve him, if disordered, by the weight only; but if the spermatic cord is thickened or indurated, which disease, when attended with a dilatation of the vessels of the scrotum, is known by the Greek appellations *circocoele* and *varicocoele*, the case is desperate, and not to be undertaken.

But supposing no obstacle in the way to the operation, the method of doing it may be this. Lay your patient on a square-table of about three feet four inches high, letting his legs hang down, which, as well as the rest of his body, must be held firm by the assistants. Then with a knife begin your wound above the rings of the abdominal muscles, that you may have room afterwards to tie the vessels, since for want of this caution operators will necessarily be embarrassed in making the ligature: then carrying it through the *membrana adiposa*, it must be continued downward, the length of it being in proportion to the size of the testicle. If it is very small, it may be dissected away without taking any part of the scrotum. If the testicle, for instance, weighs twenty ounces; having made one incision about five inches long, a little circularly, begin a second in the same point as the first, bringing it with an opposite sweep to meet the other in the inferior part, in such a manner as to cut out the shape of an oval whose smallest diameter shall be two inches: after this dissect away the body of the tumour, with the piece of skin on it, from the scrotum; first taking up some of the blood-vessels, if the hæmorrhagy is dangerous. Then pass a ligature round the cord, pretty near the abdomen; and, if you have space between

tween the ligature and testicle, a second about half an inch lower, to make the stoppage of blood still more secure. The ligatures may be tied with what is called the *surgeon's knot*, where the thread is passed through the ring twice. This done, cut off the testicle a little underneath the second ligature, and pass a needle from the skin at the lower part of the wound thro' the skin at the upper part, in such a manner as to envelope in some degree the found testicle, which will greatly facilitate and quicken the cure; or if one stitch will not answer the purpose, you may repeat it in such part of the wound where the skin on each side lies most loose.

In large tumours, it is advisable to cut away great part of the skin; for besides that the hæmorrhagy will be much less in this case, and the operation greatly shortened, the skin by the great distention having been rendered very thin, will great part of it, if not taken away, sphacelate, and the rest be more prone to degenerate into a cancerous ulcer.

§ 2. Of Encysted Tumours.

That called *scatoma** is never painful until by its weight it grows troublesome, nor is it a mark of general indisposition of body; so that the extirpation seldom fails of success. The size of some of them is very large, frequently weighing five or six pounds, and there have been instances of their weighing above forty.

When the *scatoma* is irregular in its surface, with eminences and depressions, it is fleshy; whereas the fat one has for the most part a uniform smooth outside. The operation for the *scatoma* will be understood by the description of that for the scirrhus.

The *anthierama*† is much more common than the *meliceris*‡; at least, if all encysted tumours with matter not curdled, may, in compliance with custom, be called so: These are more frequent, and grow larger than those where the matter is curdled, being often attendant on scrophulous indispositions, which makes them more difficult of cure.

The cysts of these tumours, with the skin covering them, after a certain period of growth, resisting any further enlargement, do frequently inflame and break; but this opening is not so advantageous for the cure as extirpation by the knife, which should be done in the infancy of the swelling. When the tumours are no bigger than a small golden pippen, they may be dissected away from under the skin, by making a straight incision only through it; but if they exceed this bulk, an oval piece of skin must be cut through first, to make room for the management of the knife and taking away the tumour; in which case, it will be advisable to take off the upper portion of the cyst with the skin; and then, by the help of a hook, to dissect away as much of the remainder of it as can be conveniently, which is a less painful and more secure method than destroying it afterwards with escharotics. This rule is to be observed when the cyst runs so deep amongst the interstices of the muscles, as to make it impossible to remove the whole of it, where, if we cut off a great quantity, the rest usually comes away in sloughs and matter.

The *ganglion* of the tendon is an encysted tumour of the meliceris kind, but its fluid is generally like the white of an egg: when it is small, it sometimes dissolves of itself; pressure and sudden blows do also re-

move it; but for the most part it continues, unless it be extirpated. It is no uncommon case to meet with this species of ganglion running under the ligamentum carpalæ, and extending itself both up the wrist and down to the palm of the hand. The cure of this disorder cannot be effected but by an incision through its whole length and dividing the ligamentum carpalæ.

The dressing in these cases does not at all differ from the general methods of treating wounds.

§ 3. Of the Amputation of the Cancered and Scirrhus Breast.

When a scirrhus has admitted of a long delay before the operation, the patient seems to have a better prospect of cure without danger of a relapse, than when it has increased very fast, and with acute pain.

The scirrhus may be distinguished, by its want of inflammation in the skin, its smoothness and slipperiness deep in the breast, and generally by its pricking pain; which as it is more or less, increases the danger accordingly; though there are some few with little or none in the beginning: as the tumour degenerates into a cancer, which is the worst degree of scirrhus, it becomes unequal and livid, and the vessels growing varicose, at last ulcerates.

In extirpating the scirrhus, if it be small, a longitudinal incision will dilate sufficiently for the operation; but if too large to be dissected out in that manner, an oval piece of skin must be cut through first, the size of which is to be proportioned to that of the tumour; for example, if the swelling is five inches long and three broad, the oval piece of skin cut away must be nearly of the same length, and about an inch and a half in breadth. In taking off the whole breast, the skin may be very much preserved, by making the wound of it a great deal less than the basis of the breast, which must be carefully cleared away from the pectoral muscle. This is not difficult to do, because all these scirrhuses being enlarged glands, are encompassed with their proper membranes, which make them quite distinct from the neighbouring parts, and easily separable: at least this is the case when the tumour is moveable; for sometimes it adheres to the subjacent muscle, and that muscle to the ribs; in which circumstance, the operation is impracticable. When it is attended with knots in the arm-pit, no service can be done by amputation, unless the knots be taken away; for there is no sort of dependence to be laid on their subsiding, by the discharge of the wound of the breast.

The bleeding of the large arteries is to be stopped by passing the needle twice through the flesh, almost round every vessel, and tying upon it, which will necessarily include it in the ligature. In order to discover the orifices of the vessels, the wound must be cleaned with a sponge wrung out of warm water.

The scirrhus tumours which appear about the lower jaw, are, generally speaking, scrophulous disorders, that distinguish themselves almost by the circumstance of fixing on the salivary glands. These are very stubborn of cure, but not so bad as the scirrhus, since they frequently suppurate, and heal afterwards: if they impolthumate again after healing, it is for want of a good bottom, which may sometimes be procured by destroying their bad surface with a caustic. Besides these, there is another species of scirrhus in the neck, that

that succeeds better after extirpation than either of the former kind; this is an enlargement of the lymphatic glands, which run close up by the jugular vein, and is distinguishable from the cancers of this part, by its moveableness, want of pain, the laxness of the skin covering it, the small degree of pressure it makes on the oesophagus and trochea, and lastly the good habit of body, as it seldom affects the constitution, which cancers here do very early, after their first appearance. This tumour, from its situation, requires great exactness in the cutting off: they sometimes extend up to the chin towards the mouth, and occasion a division of the salivary duct in operating, which proves very troublesome to heal; but, when all other methods have failed, may be cured by a perforation into the mouth, through that part of the cheek where it is wounded, which by a tent or small seton may be made fistulous; then, by properly dressing upon the outside, the oozing of the saliva that way will be prevented, and the external orifice healed without difficulty.

The treatment of all these wounds may be with dry lint first, and afterwards as in common wounds.

SECT. XIV. *Of the Operation for the Empyema, Ascites, and Hydrocele.*

§ 1. *Of the Empyema.*

The operation for the empyema implies an artificial opening made into the cavity of the thorax, by which we evacuate any fluid that lies there extravasated, and is become dangerous by its weight and quantity. The fluids described as necessary to be avoided by this operation, are blood, matter, and water.

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Of the different cases in which the operation for empyema is requisite.

When blood is the fluid supposed to require evacuation by this method, it is always extravasated through some wound of the vessels of the lungs or thorax; and being discharged in great quantities on the diaphragm, is said to oppress respiration, till let out by some convenient opening made in the most depending part of that cavity, which is the only kind of perforation into the thorax distinguished by the name of the operation for the empyema: But though this opening is universally recommended in the case here stated, yet we meet with few or no examples where it has been practised for a mere extravasation of blood.

The second circumstance in which this operation takes place, is a rupture of matter from the pleura, mediastinum, or lungs, into the cavity of the thorax; where accumulating, it at length proves fatal for want of a discharge. It is true, that the case occurs but very seldom where the operation is necessary; because, in most abscesses of the thorax, the matter is usually spit up as fast as it is generated; and in the dissection of those who have died of this species of consumption, we rarely find much extravasated pus in the cavity, though a great portion of the lungs be destroyed. However, there are a few cases which require the operation; and these may be distinguished by the following symptoms. The patient is obliged to lie upon the diseased side, or, in case there is matter in both cavities of the thorax, on his back; because the mediastinum can seldom support the weight of the incumbent fluid, without suffering great pain. But this rule is not certain, it sometimes happening that the patient can lie with ease on that side where

there is no fluid. Another symptom of extravasated matter, is an evident undulation of it, so that in certain motions it may be hard to quash. For the most part too, upon careful inquiry, an œdema, or at least a thickening of some portion of the intercostal muscles, will be discovered. And lastly, if there be much fluid, it will be attended with a preternatural expansion of that side of the chest where it lies. When therefore these signs appear after a previous pleuritic or pulmonary disorder, and the case has been attended with the symptoms of a suppuration, it is most probably owing to a collection of matter; though, the patient will also labour under a continual low fever, and a particular anxiety from the load of fluid.

The last sort of fluid said to require issue from this operation is water, which however very seldom collects in such manner as to become the proper subject of the operation: for if the dropsy of the thorax be complicated with an anasarca, or even ascites, it is certainly improper; and indeed it hardly ever takes place, but where the distemper is single, and takes its rise from the same sort of disorders in the lymphatics of the pleura, as the hydrocele does from those of the tunica vaginalis. The symptoms of this dropsy are, a small cough without spitting; a little slow fever, from the disturbance of respiration; sometimes, too, the water, by a sudden jerk, may be heard to quash; and generally speaking, its weight upon the diaphragm and mediastinum are so troublesome as to oblige the patient to stoop forward, and to turn upon the affected side when he lies down; for the same reason, when there is water in both cavities of the thorax, he is forced to lie on his back.

The manner of operating, whether it be for the discharge of matter or water, is to pitch upon the depending part of the thorax, which some have supposed to be between the eighth and ninth ribs, and others between the ninth and tenth, at such a distance from the vertebræ that the depth of the flesh may not be an impediment to the perforation. This distance is determined to be about a hand's-breadth: and here, with a knife, scissars, or trocar, we are ordered to make the perforation; but in doing it there are a great many difficulties. In fat persons, it is not easy to count the ribs, and the wound will be very deep, and troublesome to make; it is hardly possible to escape wounding the intercostal artery, which runs in this place between the ribs. But if the only advantage proposed by the situation of the wound be derived from its dependency, the purpose of discharging the fluid will be as well answered by an opening between the sixth and seventh ribs, half way from the sternum towards the spine; which, by laying ourselves down, becomes in effect as depending an orifice as the other in sitting up; and by an opening made in this manner we avoid all the inconveniences in the other method: for in this part of the thorax there is very little depth of muscles; the artery lies concealed under the rib; and the diaphragm is at a great distance. The opening is best made with a knife; and should be about an inch long through the skin, and half an inch through the subjacent muscles: tho', to make the incision with less risk of wounding the lungs, it may be advisable to dilate it with the blunt-pointed knife (as is practised in the operation for the bu-

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Practice. bubonocoele), after having made a small puncture with a common knife. The treatment of the wound will be according to the nature of the discharge. If, after a few days, there appears no drain, you may let the orifice heal up; but if it continues, it may be kept open with a short silver canula, until such time as an alteration in that circumstance will give us leave to cicatrize with safety.

§ 2. *Of the Paracentesis, or tapping for the Dropsy.*

THIS operation is an opening made into the abdomen, in order to empty any quantity of extravasated water, collected in that species of dropsy called the *ascites*; but as there is much more difficulty in learning when to perform than how to perform it, and indeed in some instances requires the nicest judgment, we shall endeavour to specify the distinctions which render the undertaking more or less proper.

⁴⁸⁷ There are but two kinds of dropsy: the *anasarca*, called also *leucophlegmacy*, when the extravasated water swims in the cells of the *membrana adiposa*; and the *ascites*, when the water possesses the cavity of the abdomen. In the first kind, the water is clear and limpid; but in the second, a little grosser, very often gelatinous and corrupted, and sometimes even mixed with fleshy concretions.

The operation of tapping is seldom the cure of the distemper: but dropsies, which are the consequence of a mere impoverishment of the blood, are less likely to return than those which are owing to any previous disorder of the liver; and it is not uncommon for dropsies that follow agues, hæmorrhages, and diarrhoeas, to do well; whereas in such as are complicated with a scirrhus liver, there is hardly an example of a cure.

The water floating in the belly, is, by its fluctuation, to determine whether the operation be advisable; for if, by the laying one hand on any part of the abdomen, you cannot feel an undulation from striking on an opposite part with the other, it is to be presumed there will be some obstacle to the evacuation. It sometimes happens, that a great quantity, or almost all the water, is contained in little bladders, adhering to the liver and the surface of the peritonæum known by the name of *hydatids*; and the rest of it in different-sized ones, from the degree of a hydatid, to the size of a globe holding half a pint or pint of water. This is called the *encysted dropsy*, and from the smallness of its cysts makes the operation useless; but is not difficult to be distinguished, because there is not a fluctuation of the water, unless it is complicated with an extravasation.

When the fluctuation is hardly perceptible, (except the teguments of the abdomen are very much thickened by an *anasarca*), in all probability the fluid is gelatinous.

There is another kind of dropsy, which for the most part forbids the operation, and is peculiar to women, being seated in the body of one or both ovaries. There is no example of this species but what may be known by the hardness and irregularity of the tumour of the abdomen, which is nearly uniform in the other cases.

When the ovary is dropical, the water is generally deposited in a great number of cells formed in the body of it; which circumstance makes the fluctuation

insensible, and the perforation useless: though sometimes there are only one or two cells; in which case, if the ovary is greatly magnified, the undulation will be readily felt, and the operation be advisable.

When the *ascites* and *anasarca* are complicated, it is seldom proper to perform the operation, since the water may be much more effectually evacuated by scarifications in the legs than by tapping.

Upon the supposition that nothing forbids the ex-⁴⁸⁸traction of the water, the manner of operating is this. ^{tapping.}

Having placed the patient in a chair of a convenient height, let him join his hands so as to press upon his stomach; then dipping the trocar in oil, you stab it suddenly through the teguments, and, withdrawing the perforator, leave the waters to empty by the canula. The abdomen being, when filled, in the circumstance of a bladder distended with a fluid, would make it indifferent where to wound; but the apprehension of hurting the liver, if it be much enlarged, has induced operators rather to choose the left side, and generally in that part which is about three inches obliquely below the navel. If the navel protuberates, you may make a small puncture with a lancet through the skin, and the waters will be readily voided by that orifice, without any danger of a hernia succeeding; but it should be carefully attended to whether the protuberance is formed by the water or rupture; in which latter case, the intestine would be wounded, and not without the greatest danger. The surgeon, neither in opening with the lancet, nor perforating with the trocar, need fear injuring the intestines, unless there is but little water in the abdomen, since they are too much confined by the mesentery to come within reach of danger from these instruments; but it sometimes happens, that when the water is almost all emptied, it is suddenly stopped by the intestine or omentum pressing against the end of the canula; in which case you may push them away with a probe. During the evacuation, your assistants must keep pressing on each side of the abdomen, with a force equal to that of the waters before contained there: for, by neglecting this rule, the patient will be apt to fall into faintings, from the weight on the great vessels of the abdomen being taken off, and the sinking of the diaphragm succeeding; in consequence of which, more blood flowing into the inferior vessels than usual, leaves the superior ones of a sudden too empty, and thus interrupts the regular progress of the circulation. To obviate this inconvenience, the compression must not only be made with the hands during the operation; but be afterwards continued, by swathing the abdomen with a roller of flannel, about eight yards long and five inches broad, beginning at the bottom of the belly, so that the intestines may be borne up against the diaphragm: you may change the roller every day till the third or fourth day, by which time the several parts will have acquired their due tone. For the dressing, a piece of dry lint and plaster suffice; but between the skin and roller it may be proper to lay a double flannel a foot square, dipt in brandy or spirit of wine.

This operation, though it does not often absolutely cure, yet it sometimes preserves life a great many years, and even a comfortable one, especially if the waters have been long collected.

§ 3. *Of the Hydrocele.*

THE term *hydrocele*, if used in a literal sense, means any tumour produced by water; but surgeons have always confined it to those which possess either the membranes of the scrotum, or the coats of the testicle and its vessels.

The first of these, viz. that which has its seat in the membranes of the scrotum, is common to the whole bag, and to all the cellular substance which loosely envelopes both the testes. It is, strictly speaking, only a symptom of a disease, in which the whole habit is most frequently more or less concerned, and very seldom affects this part only. The latter, or those which occupy the coats immediately investing the testicle and its vessels, are absolutely local, very seldom affect the common membrane of the scrotum, generally attack one side only, and are frequently found in persons who are perfectly free from all other complaints.

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Different kinds of hydrocele confounded together by chirurgical writers.

Notwithstanding the obvious and material difference between the two kinds of disease, they have by the majority of writers been confounded together; have been considered as springing from the same immediate source, and as requiring the same kind of treatment; although the one is plainly and evidently a mere symptom or attendant on a general disorder, and the others are strictly and absolutely local complaints. This one fundamental error has been the occasion of many others. The supposition, that all collections found in the membranes and coats of the scrotum and testicles are of the same general kind, has produced an infinite variety of wild conjectures concerning the particular and immediate nature and origin of them. By some they have been attributed to a particular indispotion of the liver, kidneys, or spleen; by others, to a natural and necessary connection between the spermatic vessels and those of the kidney: by many the fluid has been thought to be of the urinary kind, or at least that it ought to have passed through the kidney; but that, mistaking its right way, it gets into the membranes of the scrotum and testicles: while others have affirmed, that all complaints of this kind are really symptoms of a dropsical habit; that the fluid comes from the cavity of the belly, and either passes through the peritoneum, or extends that membrane down into the scrotum. Many cautions have been laid down against attempting the cure of one species of this disease hastily, or without a previous course of medicine, upon a supposition that the defluxion is of a noxious nature, and that by falling on this part it frees the constitution from several other dilemperers. It has been described as frequently producing a corrupted or otherwise diseased testicle; as being nearly allied in nature to those tumours which are called encysted, whose tunics are formed out of the common membrane by mere pressure; and as being generally accompanied with a true hernia, or descent of the intestine or omentum; which last (supposed) circumstance has been gravely urged as a reason for not attempting a radical cure. The same wanton liberty has been taken in assigning different seats to these disorders, as in accounting for their origin: every part which invests or accompanies the spermatic vessels or the testicles, not only the tunica communis of the process, and the cavity of the

tunica vaginalis (the true and real seats of one or other of these disorders), have been enumerated, but several imaginary ones have been added; firm compact membranes have been split into lamellæ, and cysts and coats have been devised which never had a real existence.

If all this were matter of mere speculation, and produced no mischief in practice, it would be of no importance; but in matters of physic and surgery this seldom or never happens: erroneous ideas of the nature, origin, and seats of diseases, most commonly are followed by improper methods of treating them. In the present case, the absurdity of the conjectures concerning these circumstances in the disorder, is fully equalled by the methods of cure which have been proposed and practised.

Upon a supposition that the extravasation of fluid was the consequence of a dropsical habit, strong purges and powerfully diuretic medicines have been prescribed; actual cauterics have been used, and ligatures and incisions made, both on the spermatic vessels and in the groin, to hinder the descent of the water from the cavity of the belly; astringent liquors and ardent spirits have been injected, with a view to closing or folding broken lymphatics; tedious and painful operations have been practised for the eradication of imaginary cysts; directions have been given to evacuate the water at different times, lest the patient's strength should fail or his health suffer, by its being done too suddenly; and the testicles being supposed to be frequently spoiled by long lying in the water, castration has often been performed in the simple hydrocele.

The scrotum is the common receptacle of both the testicles, and consists of the cuticula, cutis, and what all the anatomists have now agreed to call the *dartos*; which is a loose cellular membrane, perfectly void of fat, and whose cells or cavities communicate with each other, with the utmost freedom through every part.

As this membrane has no immediate communication with the cavity of the abdomen within the peritoneum, it is plain, that whatever kind or quantity of fluid may be deposited in it, it cannot be derived from the said cavity, even though the patient should labour under a true ascites: but as its cells have a free intercourse with those of the general cellular membrane all over the body, they will be liable to be affected by all those disorders which have their seat in that membrane; that is, by all disorders proceeding from a low impoverished state of blood, from a deficiency of the urinary secretion, or from non-execution of the office of the absorbent vessels; and consequently, in anasarous and leucophlegmatic habits, will become the seat of a watery extravasation.

This watery swelling of the scrotum, although it is most frequently a symptom of a dropsical habit, and very often accompanies both the general anasarca and the particular collection within the abdomen called the *ascites*; yet, even in the latter case, neither is or can be derived from the cavity of belly, but is confined to the tela cellulosa, which lies on the outside of the peritoneum: the water derived from hence distends the scrotum in the same manner, and for the same reasons, that it often does the legs and feet. The cells of the *dartos* being larger and absolutely void of fat, and the skin which covers them being extremely

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Improper directions for the cure.

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Of the watery swelling of the scrotum.

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tremely dilatable, and giving way for a larger influx into this part than into most others, has indeed occasioned its being taken notice of as a particular disease, though it is most properly a symptom only.

This being the case, and the true method of cure consisting in an internal medical process, it has been improperly ranked among the species of hydrocele; though the nature of the contents will certainly admit the use of the word.

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Description
of the wa-
tery swell-
ing of the
scrotum.

It is an equal soft tumour, possessing every part of the cellular membrane in which both the testicles are enveloped, and consequently is generally as large on one side as on the other: it leaves the skin of its natural colour; or, to speak more properly, it does not redden or inflame it: if the quantity of water be not large, nor the distention great, the skin preserves some degree of rugosity, the tumour has a doughy kind of feel, and easily receives and for a while retains the impression of the fingers; the raphe or seam of the scrotum divides the swelling nearly equally; the spermatic process is perfectly free, and of its natural size; and the testicles seem to be in the middle of the loaded membrane. This is the appearance when the disease is in a moderate degree; but if the quantity of extravasated serum be large, or the disease farther advanced, the skin, instead of being wrinkled, is smooth, tense, and plainly shows the limpid state of the fluid underneath: it is cold to the touch, does not so long retain the impression of the finger, and is always accompanied with a similar distention of the skin of the penis; the preputium of which is sometimes so enlarged, and so twisted and distorted, as to make a very disagreeable appearance. These are the local symptoms; to which it may be added, that a yellow countenance, a loss of appetite, a deficiency of urinary secretion, swelled legs, a hard belly, and mucous stools, are its very frequent companions.

The cure of the original disease comes within the province of the physician, and requires a course of internal medicine: but sometimes the loaded scrotum and penis are so troublesome to the patient, and in such danger of mortification, that a reduction of their size becomes absolutely necessary; and at other times a derivation or discharge of the redundant extravasated serum from this part is ordered as an assistant to the internal regimen.

The surgical means in use for this end is called in general *scarification*: a term whose precise sense has by no means been settled; from which it has now and then happened, that a general order being given, and the particular method of executing it being left to the choice of those who have not been sufficiently acquainted with this kind of business, much hazard has been incurred, and considerable mischief done which might have been avoided.

The means of making this discharge are two, viz. puncture and incision: the former is made with the point of a lancet; the latter with the same instrument, or with a knife.

The generality of writers on this subject have spoken of the two methods in such a manner, that a practitioner who had seen but little of either, would be inclined to think that it was a matter of great indifference which we should make use of, and that the

safety and utility of each were equal: which is by no means the case.

The intention of the use of either is, by a discharge of extravasated serum, to alleviate the present uneasiness; and, by reducing the size of the scrotum, to render it less troublesome, and less likely to mortify. In some few instances it has indeed happened, that this drain has proved a radical cure of the original disease; but that has been accidental, and is not in general to be expected. The intention is generally palliative; and, if the patient lives, is most likely to require repetition: therefore, if there be any difference between the two methods, with regard either to ease or safety, there can be no doubt which ought to be preferred.

All wounds of membranous parts in anasarctous or dropsical habits, are necessarily both painful and hazardous; they are apt to inflame, are very difficultly brought to suppuration, and will often prove gangrenous in spite of all endeavours to the contrary. But the larger and deeper the wounds are, the more probable are these bad consequences. Simple punctures with the point of a lancet are much less liable to be attended by them than any other kind of wound; they generally leave the skin easy, soft, cool, uninfamed, and in a state to admit a repetition of the same operation if necessary. Incisions create a painful, crude, hazardous sore, requiring constant care. Punctures seldom produce any uneasiness at all, and stand in need of only a superficial pledget for dressing.

Now although there is so very material a difference in the symptoms and trouble attending the two methods, yet there is none in their effect: the communication of the cells of the dartos with each other is so free through every part of it, that punctures made with the fine point of a bleeding lancet into the most superficial of them, will as certainly and as freely drain off all the water as a large incision, without any of its inconveniences or its hazard.

Another species of hydrocele affects the cells of the tunica communis.

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Hydrocele
of the cells
of the tu-
nica com-
munis.

When the disease is simple, it is perfectly local; that is, it is confined entirely to the membrane forming the tunica communis, and does not at all affect either the dartos, the tunica vaginalis testis, or any other part.

It is a complaint which does not give a great deal of trouble, unless it arrives to a considerable size; and being by no means so frequent as either of the other two kinds of hydrocele, it is in general but little known or attended to. With some it passes for a varix of the spermatic cord; with others, for the descent of a portion of omentum, which having contracted an adhesion cannot be returned. Thus its true nature not being in general rightly understood, and it giving but little trouble or uneasiness while it is within moderate bounds, and neither hindering any necessary action or faculty, they who have it are most frequently advised to be contented with a suspensory bandage, and find very little inconvenience from it.

Sometimes it arises to so large a size, and gets into such a state, as to become an object of surgery, and to require our very serious attention.

In general, while it is of moderate size, the state of it is as follows. The scrotal bag is free from all appearance

pearance of disease, except that when the skin is not corrugated it seems rather fuller, and hangs rather lower on that side than on the other, and, if suspended lightly on the palm of the hand, feels heavier: the testicle, with its epididymis, is to be felt perfectly distinct below this fulness, neither enlarged, nor in any manner altered from its natural state: the spermatic process is considerably larger than it ought to be; and feels like a varix or like an omental hernia, according to the different size of the tumour: it has a pyramidal kind of form, broader at the bottom than at the top: by gentle and continued pressure, it seems gradually to recede or go up, but drops down again immediately upon removing the pressure, and that as freely in a supine as in an erect posture: it is attended with a very small degree of pain or uneasiness; which uneasiness is not felt in the scrotum where the tumefaction is, but in the loins.

If the extravasation be confined to what is called the *spermatic process*, the opening in the tendon of the abdominal muscle is not at all dilated, and the process passing through it may be very distinctly felt; but if the cellular membrane which invests the spermatic vessels within the abdomen be affected, the tendinous aperture is enlarged, and the increased size of the distended membrane passing through it produces to the touch a sensation not very unlike that of an omental rupture.

While it is small, it is hardly an object of surgery; the pain or inconvenience which it produces being so little, that few people would choose to submit to an operation to get rid of it, and it is very seldom radically curable without one: but when it is large, or affects the membrane within the cavity as well as without, it becomes an apparent deformity, is very inconvenient both from its size and weight, and the only method of cure which it admits is far from being void of hazard; as must appear to every one who will consider, or who is at all acquainted either with the nature of lymphatic extravasation or absorption, or with the frequent consequences of wounds inflicted on parts merely membranous.

The *encysted hydrocele* of the tunica communis has its seat in the same part as the preceding, viz. the tunica communis or cellular membrane, which invests the spermatic vessels; with this difference, that in the former the water is diffused in general through all the cells of the membrane, whereas in this it is contained in one cavity only.

It is a complaint by no means unfrequent, especially in children. It was very well known to many of the ancients, and has been very accurately described by some of them; but later writers have often mistaken it for and represented it as a wind-rupture, or pneumatocele, a disease existing in their imaginations only. It most frequently possesses the middle part of the process, between the testicle and groin, and is generally of an oblong figure; whence it has by some people been compared to an egg, by others to a fish's bladder. Whether it be large or small, it is generally pretty tense, and consequently the fluctuation of the water within it not always immediately or easily perceptible; for which reason it has been supposed to contain air only. It gives no pain, nor (unless it be very large indeed) does it hinder any necessary action. It is

perfectly circumscribed, and has no communication either with the cavity of the belly above, or that of the vaginal coat of the testicle below it. The testis and its epididymis are perfectly and distinctly to be felt below the tumour, and are absolutely independent of it. The upper part of the spermatic process in the groin is most frequently very distinguishable. The swelling does not retain the impression of the fingers; and when lightly struck upon, sounds as if it contained wind only. It undergoes no alteration from change of the patient's posture, nor is affected by his coughing, sneezing, &c. and has no effect on the discharge *per anum*.

Infants are much more subject to this disease than adults, though it often affects the latter. In young children it frequently dissipates in a short time; especially if assisted by warm fomentation, and an open belly. If it does not disperse, that is, if it be not absorbed, the point of a lancet will give discharge to the water, and in young children will most frequently produce a cure. In adults, the cyst formed by the pressure of the fluid does sometimes become so thick as to require division through its whole length; which operation may in general be performed with great ease and perfect safety: though even this may prove troublesome, hazardous, and fatal; of such consequence are wounds in membranous parts in some particular habits.

The third species of this disease is that which is ⁴⁹⁴Hydrocele confined to the vaginal coat or bag which loosely envelopes the testicle. In a natural healthy state, the ⁴⁹⁵Hydrocele cavity of this bag always contains a small quantity of a fine fluid exhaled from the capillary arteries, and constantly absorbed by vessels appointed for that purpose. This fluid in the natural small quantity serves to keep the tunica albuginea moist, and to prevent a cohesion between it and the vaginalis; a consequence which almost necessarily follows any such diseased state of these parts as prevents the due secretion of it. On the contrary, if the quantity deposited be too large, or if the regular absorption of it be by any means prevented, it will be gradually accumulated, and, by distending the containing bag, will form the disease in question.

The two preceding species of hydrocele have their seat in the tunica communis of the spermatic vessels, that is, in the cellular membrane which invests them; one by a general diffusion of lymph through all its cells, the other by a collection of it in one particular cyst or bag: that which makes our present subject has no concern or connection with that membrane at all, but is absolutely confined to the tunica vaginalis testis.

It is a disease from which no time of life is exempt; not only adults are subject to it, but young children are frequently afflicted with it, and infants sometimes born with it.

From all the circumstances attending the complaint, it is pretty clear, that whatever tends to increase the secretion of the fluid into the sacculus beyond the due and necessary quantity, or to prevent its being taken up and carried off by the proper absorbent vessels, must contribute to its production; which is so slow and gradual, and at the same time so void of pain, that the patient seldom attends to it until it has arrived to some size. Not but that it sometimes is produced very sud-

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The size and figure of the tumour are various in different people, and under different circumstances. In general, at its first beginning, it is rather round; but as it increases it frequently assumes a pyriform kind of figure, with its larger extremity downward: sometimes it is hard, and almost incompressible, so much so, that in some few instances it has been mistaken for an induration of the testicle; at other times it is so soft and lax, that both the testicle and the fluid surrounding it, are easily discoverable. It is perfectly indolent in itself, though its weight does sometimes produce some small degree of uneasiness in the back. The great characteristic (as it is called) of this disease, and on which almost all writers have agreed to lay the greatest stress, and to rest their proof of the nature of the disorder, viz. the transparency of the tumour, is the most fallible and uncertain sign belonging to it; it is a circumstance which does not depend upon the quantity, colour, or consistence of the fluid constituting the disease, so much as on the uncertain thickness or thinness of the containing bag, and of the common membrane of the scrotum.

If they are thin, the fluid limpid, and the accumulation made so quick as not to give the tunica vaginalis time to thicken much, the rays of light may sometimes be seen to pass through the tumour; but this is accidental, and by no means to be depended upon. Whoever would be acquainted with this disorder must learn to distinguish it by other, and those more certain, marks, or he will be apt to fall into very disgraceful as well as pernicious blunders. The colour of the fluid is very different and uncertain: sometimes it is of a pale yellow, or straw-colour; sometimes it is inclined to a greenish cast; sometimes it is dark, turbid, and bloody; and sometimes it is perfectly thin and limpid.

⁴⁹⁵ Different methods of cure in the hydrocele. The methods of cure (as they are called) in this species of hydrocele, though various, are reducible to two, viz. the palliative, or that which pretends only to relieve the disease in present, by discharging the fluid; and the radical, or that which aims at a perfect cure without leaving a possibility of relapse. The end of the former is accomplished by merely opening the containing bag in such a manner as to let out the water; that of the latter cannot be obtained unless the cavity of that bag be abolished, and no receptacle for a future accumulation left. One may be practised at all times of the patient's life, and in almost any state of health and habit; the other lies under some restraints and prohibitions, arising from the circumstances of age, constitution, state of the parts, &c.

⁴⁹⁶ Instruments used in the palliative cure. The palliative cure may be accomplished by a very simple operation. The only circumstances requiring our attention in it, are, the instrument wherewith we would perform it; and the place or part of the tumour into which such instrument should be passed. The two instruments in use, are the common bleeding lancet, and the trocar.

The former having the finer point, may possibly pass in rather the easier, (though the difference is hardly perceptible), but is, in our opinion, liable to inconveniences to which the latter is not. The trocar, by means of its canula, secures the exit of the whole

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fluid without a possibility of prevention; the lancet cannot. And therefore it frequently happens, when this instrument is used, either that some of the water is left behind, or that some degree of handling and squeezing is required for its expulsion; or that the introduction of a probe, or a director, or some such instrument, becomes necessary for the same purpose. The former of these may, in some habits, be productive of inflammation: the latter prolongs what would otherwise be a short operation, and multiplies the necessary instruments; which, in every operation in surgery, is wrong. To which it may be added, that if any of the fluid be left in the vaginal coat, or insinuates itself into the cells of the dartos, the patient will have reason to think the operation imperfect, and to fear that he shall not reap even the temporary advantage which he expected. The place where this puncture ought to be made, is a circumstance of much more real consequence; the success of the attempt, the ease, and even sometimes the safety, of the patient, depending upon it.

Whoever conceives, as many have done, and some still do, that the testicle hangs loose in the middle of the water within the vaginal coat, must also suppose that every part of the general tumour is equally fit and proper for this operation. The idea is erroneous, and the experiment may prove highly mischievous. All the anterior and lateral parts of the vaginal coat are loose and detached from the albuginea; in its posterior and superior part these two tunics make one; consequently the testicle is, as it were, affixed to the posterior and superior part of the cavity of the sac of an hydrocele, and consequently the water or fluid can never get quite round it. This being the state of the case, the operation ought always to be performed on that part of the tumour where the two coats are at the greatest distance from each other, and where the fluid must, therefore, be accumulated in the largest quantity; and never on that part of it where the fluid cannot possibly be. The consequence of acting otherwise must not only produce a disappointment by not reaching the said fluid, but may prove, and has proved, highly and even fatally mischievous to the patient.

⁴⁹⁸ It was a custom formerly, after performing this operation, to make use of fomentations and discutient applications, upon a supposition that by such means a return of the disease might be prevented. Among the old writers are to be found the forms of medicines to be applied to the groin and scrotum, to prevent a future descent of the fluid; but anatomy and experience have proved the falsehood of such supposition, and the absurdity of such applications: the present practitioners content themselves with a bit of lint and a plaster; and if the scrotum has been considerably distended, they suspend it in a bag-truss, and give the patient no farther trouble.

In most people the orifice thus made heals in a few hours, (like that made for blood-letting); but in some habits and circumstances, it inflames and festers: this festering is generally superficial only, and is soon quieted by any simple dressing; but it sometimes is so considerable, and extends so deep, as to affect the vaginal coat, and by accident produce a radical cure. It has also been known to prove still more troublesome, and

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⁴⁹⁷ Proper place for the perforation.

⁴⁹⁹ This operation fomentations.

⁴⁹⁹ This operation fomentations.

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and even fatal; but then the circumstances both of the patient and of the case have been particular, and such as required attention.

Every other method of treating this kind of hydrocele, except the puncture, was either originally intended to obtain a radical cure, or, having been found to have been often productive of such, has been by different people ranked sometimes among the palliative, sometimes among the radical, means.

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Of cures
attempted
by means
of ligature,
cautery,
seal, &c.

In many of the old writers are found directions for obtaining the cure of this disease by the use of a seton, a canula, a tent, a caustic, a ligature, an injection, or an incision.

Some of these are adopted or preferred by one, and some by another, according to the theory which they have entertained of the disorder, or to the benefits which they have seen to have accidentally arisen from the use of the said means.

To reduce these under some kind of method, (which the manner of their being delivered to us does in general not very easily admit,) we may say, that the seton, the tent, and the canula, were either originally meant to palliate a disease of which the old practitioners had very disagreeable apprehensions, or that they were made use of upon a supposition that the fluid contained in the cyst was in itself noxious; or that the general habit of the patient was relieved, and many other disorders prevented, by the said humour falling or being deposited in that part; or from an opinion that the cure of it ought not by any means to be hastily or rashly attempted: that the caustic, cautery, and ligature, were designed to prevent the supposed descent of the water from the abdomen into the scrotum; and that the injection was calculated for the constriction of a supposed breach in the lymphatic vessels.

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Reasons
against the
use of the
cautery.

Some of these (happily for mankind) are now quite laid aside, the reasons for their use being found to be false and groundless; of this kind are the cautery, the ligature, and the injection. The water is now, by every body who has made any inquiry into the matter, known to be formed and collected in the part where it is found; and not to have fallen into it from the belly: and, though an obstruction in the lymphatic vessels of the spermatic cord, may in some degree prevent the regular and due absorption of the fluid from the vaginal tunic, yet no breach or rupture of such vessels can ever produce the disease in question: the extravasation, in such case, must be in another part; and may possibly cause a hydrocele of the cellular kind, in the common membrane of the spermatic vessels, but which can never be found within the tunica vaginalis.

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Of the tent
and canula.

The reasons originally given for the use of the tent and the canula, viz. the noxious quality of the fluid, and the necessity of a gradual cure, are now also known and acknowledged to be without foundation; and therefore, though these methods, or methods like these, do still continue to be used, yet it is with another view, and upon other principles: not with intention to lengthen the time of a cure, by making a gradual drain for the prevention of other disorders; but merely to abolish the cavity of the tunica vaginalis, by having excited and maintained such a degree of inflammation and suppuration as shall produce an union between that coat and the albuginea testis.

This is indeed the only rational end which can by any of these means be pursued; for the disorder being absolutely local, and the tunica vaginalis (the seat of it) most commonly somewhat altered from its natural state, by having been distended; unless the absorbent vessels can again be restored to a capacity of doing their duty, (a circumstance which does not very often happen), the arteries will continue to exhale new serum into the cavity, and the hydrocele will still remain, or be renewed in a short time after each discharge.

To obtain this end, two kinds of means are proposed. In the use of one, it is intended, by means of a small wound, to excite such a degree of inflammation, as shall occasion or be followed by a total and absolute cohesion of the tunica vaginalis with the tunica albuginea: in the other, a larger and more free incision is made, whereby the cavity of the former of these coats is converted into a hollow or open sore or ulcer, to be filled up by a new incarnation; or else a part of the said tunic being cut away, its power of again holding the extravasated fluid is equally prevented.

The first, or union of the two coats in consequence of inflammation, has sometimes been found to follow the use of such means as were intended to procure only a temporary relief: it sometimes follows the simple puncture with the trocar or lancet; the ancient method of letting out the water by a small incision frequently produced it; and the seton, the tent, and the canula, though used for another purpose, or at least for other reasons, were found to be followed by it so often, that they soon were ranked among the means for obtaining a radical cure.

They were indeed originally designed to discharge the water gradually; and to continue such a drain from the parts where it had been collected, as might prevent any of the ill consequences apprehended from the removal of the local disorder: but the inflammation which supervened sometimes producing a cohesion of the sacculus to the surface of the testicle, what was originally calculated for a palliative remedy only, was by many adopted for a radical one.

If the event and consequence flowing from these means were as much in our power as they have been said to be, that is, if we could with any tolerable precision or certainty determine the degree of inflammation to be excited, and the effect of such inflammation on the vaginal coat, there would be no doubt of the utility of them; but this is far from being the case: for although it sometimes is sufficient for the purpose wished for, and rises no higher than just to a degree equal to that purpose, yet it also frequently happens, that either such degree and extent of it is not excited, or it rises much higher and proves much more painful and fatiguing than was promised or intended; or, after a great deal of pain and confinement, a partial cohesion only has been the consequence, and the disease has still remained, notwithstanding all the patient's and our trouble. Sometimes the pain, inflammation, and symptomatic fever, are but little; but, on the other hand, they are all three sometimes so great as to become alarming, at least to a patient who has been taught to expect a cure upon much more easy terms. The whole scrotum sometimes becomes excessively inflamed, and, after a good deal of pain and trouble, large

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Bad consequences
sometimes
flowing
from the
use of these
methods.

Practice. large sloughs are produced, and the process becomes as irksome as any of those whose event (with regard to a cure) is much more certain.

If the inflammation be but slight, the pain and tumefaction moderate, the symptomatic fever light, the suppuration small, and an universal cohesion of the two membranes is produced, the event is very fortunate, and a very troublesome complaint is thereby got rid of upon very easy terms. If either the inflammation be confined to the dartos, where it sometimes produces several superficial abscesses (of no consequence toward the cure of the disease), or if it has been so partial as only to have occasioned the cohesion between the tunics of small compass, the cavity will not by this means be abolished, nor any thing like a radical cure be obtained; consequently the patient will have undergone all the fatigue, confinement, or pain (be it more or less) for nothing: but if the inflammation rises high, if the scrotum swells considerably, and large deep sloughs are formed (as sometimes happens), the symptoms and the hazard are then fully equal to what attend those more certain methods. Which of the three will be the event, no man can say. Under the same external appearances, different people are more or less liable to inflammation and fever: the confinement of matter, in consequence of too small an opening, will in some habits make strange havoc in a very short time; and if a large opening and a plentiful suppuration must at last be submitted to, the method by a large incision at first is preferable, as the cure is more certain, and the loss of time less. Different circumstances in the patient will render one method preferable to and more likely to succeed than another; but whenever a cure is attempted by any of the before-mentioned means, the uncertainty of the event should be made known, and the patient be apprised of what may happen either with regard to trouble or disappointment.

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Of the radical cure.

All the methods hitherto taken notice of are calculated to produce a perfect or radical cure, without making a large wound, or bearing the appearance of a surgical operation: those of which we are now to speak, are intended for the same purpose; but by making a large and free opening into the bag containing the fluid, to render the accomplishment of such purpose more certain.

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Method of curing by caustic.

These are called the cure by *caustic* and the cure by *incision*. The cure by caustic is calculated to spare the terror which a cutting instrument always conveys, and (as the patrons of it say) to avoid the painful symptoms and hazard which frequently attend a large incision in these parts. The method is this: A piece of the common paste caustic, rather less than a finger's breadth, properly secured by plaster, is applied the whole length of the anterior part of the tumour, which will necessarily make an eschar of proportional size. When this eschar either casts off or is divided, an opening of nearly the same length and breadth is thereby intended to be made into the cavity of the tunica vaginalis testis; by which means an opportunity is given to the surgeon to apply such dressings to the inside of the said tunic as shall, by the generation of new flesh, fill up and abolish its cavity. The preference which some practitioners have given to this method before that by incision, has been upon a suppo-

sition, that a circumstance, which very seldom happens will most frequently occur; we mean the penetration of the caustic through the vaginal tunic containing the fluid.

By this they hope to avoid the symptoms which are supposed to be generally excited by the division of the said bag by a cutting instrument; but this the caustic very seldom does. If the tumour be very large and full, the containing parts be very much on the stretch, and the skin and dartos very thin, the caustic may now and then penetrate through to the vaginal coat: but this, whatever may be thought or pretended, very seldom happens; and when it does not, the tunica vaginalis must be divided in the same state and manner as if no caustic had been applied. All the difference between the two methods (caustic and incision) will then amount to this: That in the former, the skin being mortified, the patient is freed from a part of his apprehension at its being cut; and the surgeon, fancying that his escharotic has gone through the vaginal coat, will divide it as a part of the eschar: but a more careful examination of what he is about at the time of such operation, would generally convince him that he divides the bag unaltered by the caustic; and the symptoms which often attend this process confirm it. It has indeed been proposed to divide the eschar made in the skin down to the surface of the tunica vaginalis, and then by the application of a fresh caustic to make an eschar in that coat also. But whoever makes or submits to this experiment, will find, that of two evils he chooses the greater; and, to avoid the pain of incision, incurs a much greater degree of it by the repetition of the escharotic. The pain attending the first application of the caustic is indeed to some persons but little; but in many it is fully equal to that of the knife, and must always be of much longer duration: if it does not penetrate the tunica vaginalis, that bag must be divided by a cutting instrument, (as we have already said), in the same state as if no caustic had been applied; which incision is and must be accompanied with the same symptoms (in the same person) as in the operation by the knife only. Nor can we at all times confine the caustic, so as that it shall not cause a much larger fore than is intended or can be necessary.

Upon the whole, the cure by caustic, as it spares the terror and apprehension of a bloody operation by the knife, and as it requires no dexterity in the operator, may, on those two accounts, become preferable both to many patients and surgeons: yet whoever promises to perform, or expects to receive, a radical cure by caustic upon much easier terms than by incision, will most frequently be disappointed; that is, they will frequently find the fever and inflammatory symptoms full as high, and the sore full as painful, in the one as in the other, and consequently all their care and attention to obviate mischief full as necessary. Neither is the necessary confinement, in general, at all less in the one than in the other.

The method of performing the operation by the knife is as follows: Having appointed an assistant to grasp the upper-part of the tumour, in order to restrain it tense below, a puncture should be made in the lower and anterior part through the skin and vaginal coat. If the operator intends to finish the incision

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Of performing the operation by the knife.

with a knife, he should make this puncture large enough to admit the end of his fore-finger; which he should introduce immediately before the water is all discharged and the vaginal coat collapsed; and upon that finger so introduced, he should continue his division of the whole length of the bag and of the scrotum which covers it. If he intends to use the probe-scissors (a more tedious and a more painful method), he may make his first puncture with a lancet, and then introduce his scissors. Upon the first division, the water rushes out, and the tumour subsides. If the puncture be made small, a part of the fluid will insinuate itself into the cells of the dartos; and by the immediate collapse of the vaginal coat, the operator will find some difficulty in introducing either his finger or his instrument into the orifice made in it. If he does not do this, he will divide only the skin and dartos, and the patient must undergo a second incision for the division of the cyst: all which inconvenience may be avoided, by making the first opening large enough for the introduction of the finger; and when that is in, all the rest is upon that very easily executed.

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Treatment
of the testicle
and
wound after the operation.

When the vaginal tunic is divided, and the fluid thereby discharged, the testicle, covered only by its tunica albuginea, comes into view; and, if the incision was either begun or continued very low, it generally thrusts itself out from the wound. This should be gently replaced; and if the vaginal coat is not much thickened by having been long distended, nothing more need be done than to lay a small quantity of fine lint into its cavity, and then, covering the wound with a large pledget and a soft bolster, tie the scrotum up in a suspensory bag. This operation, if properly performed, may be executed in a very few seconds: it requires no other violence than the mere division of the parts; and if this division be made with a knife rather than scissors, it will require much less time, and cause much less pain.

The membranous structure of the parts on which this wound is inflicted, their continuation from the peritonæum, and the great irritability of some of those which are necessarily laid bare, and put under a necessity of receiving dressings, must occasion pain and symptomatic fever: this it is the business of art to moderate and relieve; phlebotomy, lenient aperitives, febrifuges, and opiates, will therefore become necessary. But in this case, as in many others, it will generally be found much more easy to prevent bad symptoms, than to remove them when they have been permitted to attain a considerable height. The operation is, or ought to be, confined to the young and the healthy, in whom inflammatory symptoms are most likely to occur; but (we may venture to say) to whom we have more efficacious remedies to apply in such disorders, than can be used to people of a different habit and in different circumstances.

The general induration of all the parts about, the thick tumid lips of the incision, and the general inflammatory enlargement of the scrotum, have, for the first four or five days, a disagreeable appearance; and may, if neglected or wrong treated, prove very troublesome or even hazardous; and the kind of discharge which during that time is made (a thin discoloured gleet), seems very unequal to the reduction of so much tumefaction: but when the febrile symptoms

are appeased, and a kindly suppuration is begun, let the surgeon have patience, and not by an over-officiousness, or by improper dressings, interrupt nature in what she is about: let him, by warm fomentations, keep the parts clean and perspirable; let him dress the wound with a small quantity of soft easy digestive applications, and, covering the whole scrotum with a soft warm poultice, suspend it in a proper bag, and he will in general soon see a favourable change in all the appearances; he will see the inflammation disappear, the tumour resolve, and all the tumefaction in due time subside. But if he neglects these general cautions, and, under a notion of assisting digestion, goes to work with precipitate and other irritating dressings, the face of things will not be so agreeable: the tumour will not subside; and he will continue, or rather create, a painful undigested sore, with all its consequences; but for which he only is accountable.

In about six weeks the scrotum is generally reduced to nearly its natural size; and when the wound is quite healed, the cicatrix is a mere line, correspondent to the original incision; which is a circumstance of more consequence to the patient than is imagined, especially if he be obliged to get his bread by labour.

If the tunica vaginalis containing the water, by long or frequent distention or from any other cause is become thick and hard, and cannot therefore contract itself or be contracted upon the evacuation of the fluid, it will contribute considerably to the thickness of the lips of the wound, as well as to their hardness, pain, and difficulty of digestion. In this case, the best way is to remove a part of it on each side at the time of the operation. The cellular structure of the dartos easily admits this to be done; and when these sides are thus taken away, the lips of the wound consist only of the common integuments. A knife will do this with much more ease and expedition than any other instrument whatever. The method proposed by the late Mr Douglas, of doing it by repeated snips of the probe-scissors, is operose, unhandy, and unnecessarily painful and tedious; nor is the cutting away an oval piece of the scrotum, as advised by that gentleman and some others, at all necessary: on the contrary, the more loose that part of the scrotum is which is to cover the testicle (now deprived of its vaginal coat) the better, as it will be more capable of corrugation.

With these cautions, and under the proper restrictions already mentioned, this method of obtaining a radical cure is very practicable. That it is sometimes accompanied by troublesome symptoms, is beyond all doubt; and so is the method by caustic. We cannot say that we have never seen it prove fatal; nor can that be said of any operation of consequence: much depends on the choice of a proper subject, and the observance of the necessary means and cautions; without which, both this and the use of the caustic will always be troublesome, and sometimes hazardous.

When the quantity of fluid is large, and the scro-⁵⁰⁹ticum and tunic much on the stretch, Mr Pott thinks the water by mere puncture, ^{ter by} ^{puncture is} ^{sometimes} it is better to discharge the water by mere puncture, and not to perform the operation for the radical cure until a fresh accumulation has again moderately distended it. The inflammation necessarily consequent ^{upon}

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upon the division of these parts; just after they have been so much on the stretch, and so suddenly let loose, may be productive of worse symptoms, and a higher degree of fever and tumefaction, than usually occurs when the same parts are divided in a less distended state.

In this operation, the point to be aimed at, as Mr Pott observes, is to excite such a degree of inflammation, both in the tunica vaginalis and tunica albuginea, as shall occasion a general and perfect cohesion between them: and this, if possible, without the production of slough or abscess, without the hazard of gangrene, and without that degree of symptomatic fever which now and then attends both the caustic and the incision; and which, when it does happen, is so alarming both to patient and surgeon.

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Of the use
of a seton.

These ends he has frequently obtained by the use of a seton. It is a method of cure mentioned by Aquependens, as used by Guido and others before him, (though their process was somewhat different from his.) He has several times tried it on subjects of very different ages, some of them more than 50 years old. It requires confinement to bed only for a few days; after which the patient may lie on a couch to the end of the attendance, which is generally finished in about three weeks or a month at the farthest; and during all that time no other process or regimen is necessary, than what an inflammation of the same part from any other cause would require.

SECT. XV. Of Trepanning.

THERE appears scarce any part of the cranium, from the frontal sinuses to the insertions of the muscles into the occipital bone, that may not be perforated with safety. There are some late instances in this kingdom, where the trepan has been successfully applied to the frontal sinuses. How far it might be practicable to separate the muscles from and apply the trepan to the inferior part of the occipital bone, almost to the foramen magnum, may be worth future consideration; as^s it is no unreasonable supposition, that a case may happen to be so circumstanced as to admit of no other remedy; and, according to Celsus, a doubtful one is better than none (a).

The parts of the skull not eligible for the application of the trepan are, 1. The frontal sinuses. 2. The futures, in young subjects; for in old ones the adhesion of the dura mater to them is but little more than to other parts of the cranium. 3. The middle of the os frontis, towards the nose, where the spinal process of that bone projects considerably. 4. The anterior and inferior angles of the parietal bones, on the internal parts of which run the arteries of the dura mater. 5. The sagittal future, on account of the longitudinal sinus running immediately under it. 6. The lambdoidal future, under which lies the course of the lateral sinuses. 7. The occipital bone, on account of its great inequality of thickness, and irregularity of its internal surface. 8. The os temporale, as the temporal muscle must unavoidably be wounded in making room for the trepan: and lastly, we must be careful, not to apply it to a yielding fractured part of the bone, that

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Parts of the
skull not
eligible for
trepanning.

will not resist the necessary force in making the perforation.

There are, however, instances from the best authorities, of the successful application of the trepan to all these exceptionable parts, sufficient to encourage a cautious and judicious practitioner upon emergencies; to which, says Mr Gooch, I will venture to join my own experience, hoping it may have some weight in determining a matter of so much importance to surgery. The frontal sinuses have been trepanned with success in London and Paris. Perforations may be made lower down the os frontis in children than in adults, without running the hazard of falling upon the sinuses; for they gradually enlarge, extending higher up as they arrive at puberty. Mr Gooch has applied the trepan near the middle of the os frontis, without meeting with any obstacle from the spinal process: and at the anterior and inferior angles of the parietal bones, without opening the *art. dura matris*. The operation has been performed by Mr Warner upon the sagittal future, when bits of bone stuck in the longitudinal sinus, which he easily extracted after enlarging the wound with his lancet, stopping the hæmorrhagy with dry lint without any difficulty.

After having deliberately considered every circumstance, and resolved upon the operation, the instruments, sponges, dressings, compresses, bandage, and every necessary thing, are to be disposed in perfect good order, that the operator may have nothing to seek when he wants it. The head is to be shaved, if it has not been already, as indeed it should all over immediately after any of the preceding accidents: it is then to be rested and firmly held upon a person's knees; and, with the knife appropriated to this use and the scalpum, a piece of the scalp is to be removed, of a circular, elliptical, or other figure, as the circumstances of the case require. The scalping should be of such extent, as may give a fair opportunity of making as many perforations as shall be found necessary, as far as the surgeon's judgment and observation can direct him. He ought not to be sparing in this respect, lest he should be under the disagreeable necessity of extending the incision farther. The manner of cutting, is to apply force enough to the knife, to carry it quite through to the bone at once, not bearing too much upon the point, especially if we cut over loose fragments, which we should endeavour to avoid; the edge of the knife should be so inclined, as to cut rather more of the pericranium than the skin. When we have proceeded thus far, the pericranium is to be raised a little, with the point of the knife, quite round the incision; and then the scalpum used, which will be found the best instrument to clear the bone of that membrane, as has been found by frequent experience. Should it be thought proper to proceed immediately to trepanning, if any considerable vessels have been divided in scalping, they must be secured by needle and ligature; but when we do not intend performing the operation directly, dry lint with compress and bandage is generally sufficient to restrain the hæmorrhagy; but sometimes the pressure of an assistant's fingers upon it will serve that purpose without a ligature.

(A) Bontius, a writer of the best credit, relates a singular case of a sailor, whose head was crushed between the ship and a boat; in consequence of which dreadful accident, the greater part of the occipital bone was taken away in fragments, almost as far as the foramen magnum, and the patient perfectly cured by him and another surgeon.

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ture, when we determine to proceed to the operation directly.

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The trephine the most eligible instrument.

That kind of trepan called the *trephine*, is now in general use in all places: it is more commodious than the other, and can be better managed and regulated in the operation, as the different bearings may require; and it will cut full as fast, being worked both backwards and forwards. Before the operation is begun, the patient's head must be fixed so that the light may fall properly upon it, and in such a convenient position, that the instrument may be placed perpendicularly upon the part; and of such a height and manner, that the attitude may be easy during the operation, which often proves tedious, requiring many perforations (s).

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Of the posture of the patient's head, working of the saw, &c.

Whether the patient has the operation performed in bed or seated in a chair, it is always found that resting his head on a pillow, with a board underneath it, upon the knees of an assistant, is preferable to any other manner; for being thus placed, the assistant will have more power to keep it steady, to resist the motion of the instrument. When the head is well adjusted, the next step is to make a hole with the perforator, deep enough to fix the central pin of the trephine, in order to prevent the saw from slipping out of its circular course, till it has formed a sulcus sufficiently deep to be wrought steadily in; and then the pin is to be taken out. If the skull is thick, the teeth of the saw must be brushed clean now and then during the trephination; and dipping it into oil as often, will greatly facilitate the motion, and expedite the operation, making it less disagreeable to the patient if he has his senses; and, in order to lose no time, it would not be amiss to be provided with two instruments of the same size.—We must remember, after having made some considerable progress in the operation, to examine the sulcus often with a picktooth, or some other proper instrument, in order to discover where the bearings are necessary to be made.—These precautions are of more consequence when we are employed in perforating a part of the skull that we know has an unequal thickness, especially after having passed the diopse. And though we are told by writers in general, that we may saw boldly till we come at the diopse, generally to be known by an appearance of blood, yet we should be upon our guard in this point; examining if the piece be loose, when we have sawn some way into the bone, lest we should happen through inadvertence to wound the subjacent membrane; for in some parts of the skull there is naturally very little diopse, and in old subjects scarce any remains to afford direction to our judgment by the bloody appearance. And for the same reason, it is also to be remembered, that childrens skulls are very thin.—When the piece is quite loose, it is to be taken out with the forceps contrived for this purpose; and if the lower edge of the perforation is left jagged, it is to be smoothed with the lenticular, that it may not irritate the dura mater. The next step is to raise the depressed piece or pieces of the cranium with the

elevator; or to extract the fragments of the bone, grumous blood, or any extraneous body, with proper instruments. After this, if there appears good reason to apprehend that blood, lymph, or matter, is contained under the dura mater, we should open it directly with a lancet very cautiously; endeavouring to avoid the blood-vessels ramified upon it, and those which lie immediately under it: and, on this occasion, it will be prudential to conceal the instrument as much as we can, by wrapping it all round with tow almost to the point, in order to prevent impressions being made upon the spectators to our prejudice.

When we have recourse to the trepan, on account of a fissure in which the bone will not yield, we should apply the instrument so as to include part of it, if not directly over it, as it is most likely the extravasated blood or lymph should be found directly underneath it: and when the fissure is of great extent, it may be proper to make a perforation at each end, if the whole can be conveniently brought in view; and, in some cases, more perforations may be requisite, according to the course of it, even to its full extent.

When we propose to make several perforations, in order to remove depressed fragments of the bone that are firmly fixed, and having the internal surface larger than the external, or to raise them sufficiently, it is necessary to apply the trepan as near the fractured parts as they will admit of; making the perforations adjoining, to save the trouble of cutting the intermediate spaces with the head-saw: and, as before hinted, we should invariably observe to make the perforations in the most depending parts we can, for the same reason as we endeavour to obtain depending openings in the fleshy parts. And in perforating the skull, where there is great inequality of its thickness, it appears more advisable to raise the piece before it is cut quite through in every part of it, to obviate injuring the subjacent membrane with the saw.

When the skull has suffered an injury upon a future, and it is not thought advisable to use the trepan there, especially in young subjects, in whom the dura mater adheres more strongly than in adults, as has been remarked, we should always remember to make a perforation on each side of the future; for this obvious reason, because there cannot be a free communication between the one side and the other, on account of the attachment of that membrane to the future.

After the elevation of the fragments of the bone, or the removal of them, the extraction of extraneous bodies, and the evacuation of extravasated blood, lymph, or sanies, &c. the membranes may be dressed with *unguent. à gum. elemi*, extolled by Franciscus Arceus, the inventor of it, made of a softer consistence with *bals. à copaib.* or some other natural balsam; applying it just warm with a feather, and soft lint lightly over it, dressing the other parts as we have already directed in wounds of the head: after which, it may be proper to embrocate the whole head with *ol. et acct. adding a little spirit. lavend.* and to apply

(n) Scultetus says, he was obliged to make 7 perforations in a fracture with great depression. Glandorp says, his master Spiegelius made the same number upon the like occasion. Bionia made 12. Hilpount of Nassau had 27 made in different parts of his head by Henry Chadborn, a very eminent surgeon; and that nobleman has attested the cure under his own hand. Mr Gooch made 13 in the case of an old man, with success, as related in his Cases and Remarks on Surgery.

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After the dressing, the patient is to be placed in as easy a position in his bed as possible, with his head and shoulders elevated a little more than ordinary; and the rules we have laid down in the cure of wounds are to be duly observed. Warmer applications and bandages are required in winter than in summer. The degree of heat in the room must be regulated according to the temperature of the season; and it is necessary to exclude the light. In injuries of the head, bad symptoms are apt to come on sooner in warm, moist, sultry weather, than in a cold season, when it may be very beneficial to make the circumambient air warm, and dress the wound as expeditiously as possible, defending it from the attack of the cold air. A strict regimen and observance of the non-naturals are now of the greatest importance to be attended to; for a slight transgression therein may prove of fatal consequence, as we have amply evinced.

When the digestion of the wound proves kind, we shall soon observe granulations of flesh, of a good complexion, shooting from the extremities of the vessels, and throwing off the parts of the dura mater that may have suffered; which, by extending themselves and twisting one with another, form in the aperture a substance having the appearance of flesh. The same operation of nature, in a longer time, throws off exfoliations from the circumference of the perforation and other parts of the denudated skull, thicker or thinner, sooner or later, according to the age and constitution of the patient, the degree of injury the substance of the bone has sustained, the season of the year, &c. The granulations which arise from the different parts, uniting together, constitute the organized or vascular carnosous substance, which is called the *incarnation* of the wound: and this regenerated substance, in young subjects, generally acquires a perfect bony hardness in the perforation, but seldom in old persons.

In order to remove the fungi mentioned, n° 132. ligature, excision, and escharotics, have been recommended; and sometimes practised with fatal effects, throwing the nervous system into great disorder. And as there is so much to be apprehended from these methods, we should by all means take early care to prevent the growth of such excrescences; which, if neglected, may increase to a great size in a short time.

The best method of doing this is, first to apply to the dura mater a sindon, spread with the balsam recommended, or dipped into it, moderately warm, according to the state the membrane appears in: then a plate of lead is to be exactly adjusted in the perforation upon the sindon, having the ears of it turned back upon the skull; over which a compress, consisting of a few doubles of common plaster, with a

piece of very thin sheet-lead or card interposed, is to be laid; filling the wound up with even lint, rather above the level of the scalp; then a small easy compress of cloth, faced with *cerat. alb.* is to be applied, with a piece of card or thin stiff paper on the outside of it; over which, strips of common plaster about an inch broad are to be laid crucially, extending two or three inches beyond the compress. By this means the plate will be properly confined, and the degree of pressure may be easily regulated, without inconvenience to the patient, or interrupting the discharge at the wound; and should a greater degree of pressure be required, it may be obtained by thickening the compress, and making one of the strips of plaster pass through a slit in the other, as in the uniting bandage. After proceeding thus far, the head is to be embrocated, and a large thin compress spread with *cerat.* applied over the crucial plasters, with easy bandage, as before directed. When the dura mater is granulated with flesh, the sindon or lint, moistened with a mixture of *tinct. myrrhæ* and *aq. calcis*, is a good application; and the other parts of the wound are also to be attended to, according to the rules of surgery which we have before laid down, in order to prevent the luxuriance of flesh, till the exfoliations are completed; for should this point be neglected, and loose flesh suffered to creep upon the bone from the circumference of the wound, much inconvenience and trouble, besides pain to the patient, might proceed from such inattention.

An abatement of the symptoms after the operation, with a good aspect of the wound in a healthy subject, give us reason to hope for success; but if the symptoms continue threatening, with a diness, glassy appearance, or livid colour of the wound, or a discharge of a feid gleet from the membranes or brain, they are to be looked upon as very bad omens: however, we are to omit the use of no rational means, having instances upon record of the happy event of the most alarming cases to encourage our perseverance. The symptoms after the operation may require frequent bleeding, as well as strict regimen.

Should the patient, at any time after the cure, complain of pain or disorder in his head, with symptoms of plenitude, recourse ought to be had immediately to bleeding and gentle purging, with the observance of a spare diet; and for some time after his cure, he should also be very exact in his regimen and government of himself, both as to body and mind. It will be likewise very prudent to wear for a considerable time a thin brass, steel, or tin plate, to defend the part against external injuries, especially if there has been any great loss of the bone; under which circumstance, in old persons, such a defence may be found necessary for life.

SECT. XVI. Of Tumours on the Heads of new-born Children.

THIS kind of tumour proceeds from an extravasation of blood; probably in consequence of some injury in a laborious, hasty, or injudicious delivery; as the heads of children are so tender, and the vessels are so near the surface, that time should always be allowed for a gradual dilatation of the parts, to admit of the exclusion of the fetus with safety. It is seldom observed on any other parts

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Of the method of preventing fungi.

519
Causes of tumours on the heads of children.

of the head than the parietal bones; and the extravasated blood is most frequently lodged between the pericranium and the cranium.

§20
Description of the tumours.

This tumour is generally circumscribed by a ridge, when the extravasated fluid is contained between the cranium and the pericranium, and feels as if there was a depression or deficiency of the bone; but the deception is owing to the fluid in the distended pericranium yielding to the fingers, and to the ridge circumscribing the tumour, which, without very accurate examination, may be taken for the edge of the bone.

Some surgeons have looked upon this sort of tumour as an aneurism proceeding from the inside of the skull, others as a hernia of the brain. But was either of these the case in question, it must appear between, and not upon, the bones it does; and a pulsation would be observed in it.

§21
Method of cure in the foundling-hospital.

The surgeons of the foundling-hospital, who have had the greatest opportunities of discovering the nature of these tumours, and the best method of cure, from their large experience, say, they generally succeed by opening them, in case the children were otherwise healthy; and that they prefer this method, rather than waiting in expectation of absorption by any other, apprehending that the bad consequences they have seen may proceed from the putrid quality of the fluid contracted by its stagnation. They make an incision the whole length of the tumour; lay soft dry lint under the edges of the wound, to favour the discharge of the extravasated blood, after pressing out as much as they can without bruising the tender parts; and then apply a pledgit of common digestive over the lint, with easy compresses and bandage.

§22
Another method.

Some other practitioners, of experience too, are against opening these tumours; advising the application of compresses, moistened in warm austere red wine, or red wine and vinegar, to be renewed as often as they grow dry; and say they have generally observed absorption of the fluid to be the effect of this method without bad consequences. However, should there appear no diminution of the tumour by regularly pursuing this method a reasonable time, it will then certainly be advisable to open it, lest the fluid should be absorbed in a putrid state, or the bone injured by it, whence bad consequences might ensue: and if the bone received an injury originally, the necessity of opening is indisputable.

SECT. XVII. Of the Cataract, cutting the Iris, and Operation for the Fistula Lacrymalis.

§ 1. Of the Cataract.

The cataract, called by the Latins *suffusio*, is a disease of the crystalline humour, rendering the whole body of it opaque; so that the rays of light which, in the natural state of its transparency, were transmitted to the tunica retina, become now totally intercepted, and produce no effect. This is pretty nearly the account delivered down to us by Hippocrates and the ancient Greeks, who likewise knew it by the name of *glaucoma*.

§23
The cataract a disease of the crystalline humour.

Anatomists have frequently dissected the eyes of persons under this disorder after their death; and have found it to be always an opacity of the crystalline humour, agreeably to the definition of a glaucoma: so

that by consequence we must understand the words *cataract* and *glaucoma* as synonymous terms.

§24
Different colour of cataracts.

The general criterion of the fitness of cataracts for the operation is taken from their colour: the pearl-coloured, and those of the colour of burnished iron, are esteemed proper to endure the needle; the white are supposed milky, the green and yellow horny, and incurable.

The depression of a cataract of any colour would be the cure, if that alone was the distemper of the eye; but it generally happens, that the yellow cataracts adhere to the iris so firmly as to become immovable; besides, when they follow in consequence of a blow, which is often the case, either the cells of the vitreous humour are so much disturbed and broken, or the retina affected, that a degree of blindness will remain, though the cataract be depressed.

To judge whether the cataract adheres to the iris, if you cannot at once distinguish it by your sight, shut the patient's eye, and rub the lids a little; then suddenly opening it, you will perceive the pupil contract, if the crystalline humour does not prevent the action by its adhesion: and when this is the case in any kind of cataract, the operation can hardly be advised.

Another consideration of the greatest moment, before undertaking the cure, is to be assured of the right state of the tunica retina; which is very readily learnt, where there is no adhesion of the cataract, from the light falling between the iris and crystalline humour, which if the eye is not sensible of, it is a certain indication of another malady, and absolutely forbids the operation. Generally this cataract takes its rise from headaches, convulsions, and nervous disorders.

§25
Method of performing the operation.

When none of these objections forbid the operation, it may be thus done. Having placed your patient in a convenient light, and in a chair suitable to the height of that you yourself sit in, let a pillow or two be placed behind his back, in such a manner, that the body bending forward, the head may approach near to you; then inclining the head a little backward upon the breast of your assistant, and covering the other eye so as to prevent its rolling, let the assistant lift up the superior eye-lid, and yourself depress a little the inferior one: this done, strike the needle through the tunica conjunctiva, something less than one tenth of an inch from the cornea, even with the middle of the pupil, into the posterior chamber, and gently endeavour to depress the cataract with the flat surface of it. If, after it is dislodged, it rises again, though not with much elasticity, it must again and again be pushed down. If it is membranous, after the discharge of the fluid, the pellicle must be more broke and depressed; if it is uniformly fluid, or exceedingly elastic, we must not continue to endanger a terrible inflammation by a vain attempt to succeed. If a cataract of the right eye is to be couched, and the surgeon cannot use his left-hand so dexterously as his right, he may place himself behind the patient, and use his right-hand.

We have not recommended the speculum oculi, because, upon the discharge of the aqueous humour through the puncture, the eye, being somewhat emptied, more readily admits of the depression of the crystalline humour than when pressed upon by the instrument.

§26
Why there is no occasion for using the speculum oculi.

As to the method of testing the succeeding inflammation,

Practice. mation, bleeding and other gentle evacuations are found absolutely necessary.

§ 2. Of cutting the Iris.

THERE are two cases where this operation may be of some service; one when the cataract is from its adhesion immovable; and the other when the pupil of the eye is totally closed up by a disorder of the muscular fibres of the iris, which gradually contracting the orifice, at last leaves the membrane quite impermeable. This last distemper has hitherto been deemed incurable. The adhesion of the cataract has also been considered as a species of blindness not to be relieved. But Mr Cheselden has invented a method of making an artificial pupil, by slitting the iris, which may relieve in both the instances here stated.

In doing this operation, the patient must be placed as for couching, and the eye kept open and fixed by the speculum oculi, which is absolutely necessary here; then introducing the knife in the same part of the conjunctiva you wound in couching, insinuate it with its blade held horizontally, and the back of it towards you, between the ligamentum ciliare and circumference of the iris, into the anterior chamber of the eye; and after it is advanced to the farther side of it, make your incision quite through the membrane; and if the operation succeeds, it will upon wounding fly open, and appear a large orifice, though not so wide as it becomes afterwards.

The place to be opened in the iris will be according to the nature of the disease: if the membrane itself be only affected with a contraction, the middle part of it, which is the natural situation of the pupil, must be cut; but if there be a cataract, the incision must be made above or below the cataract, though it is more eligible to do it above.

The contracted iris from a paralytic disorder, is so often complicated with an affection of the retina, that the success is very precarious in this case. This operation has answered best in adhesions of the crystalline humour, though but very seldom even there.

§ 3. Fistula Lachrymalis.

The fistula lachrymalis is generally understood to be such a disorder of the canals leading from the eye to the nose, as obstructs the natural progress of the tears, and makes them trickle down the cheek. Although the seat of this disease is the same in almost every subject, yet its appearance is very different in different persons, and under different circumstances. These variations depend principally on, 1. The degree of obstruction in the nasal duct; 2. The state of the cellular membrane covering the sac; 3. The state of the sacculus itself; 4. That of the bone underneath; 5. The general state and habit of the patient.

Sometimes a serous kind of defluxion, by which the lining of the sac and duct are so thickened as to obstruct or prevent the passage of the fluid through them into the nose, makes the whole complaint; and the cellular membrane on the outside not being diseased, there is no appearance of inflammation. In this case the duct is stopped, and the sacculus dilated, but without any alteration in the colour of the skin; a fungus appears in the corner of the eye next to the

nose; and upon the application of a finger to this tumour, a clear viscid mucus is discharged through the puncta lachrymalia: the patient feels no pain, nor finds any inconvenience, except what is produced by the discharge of this mucus, and by the trickling of the lymph down the cheek.

In some cases the mucus is not perfectly and always clear, but is sometimes cloudy, and looks as if it had a mixture of milk or cream in it: at first waking some of it is generally found in the corner of the eye; and the eye-lashes being smeared over with it during sleep, most commonly adhere together in the morning.

This is the most simple state of the disease, what the French have called the *hernia*, or *hydrops sacculi lachrymalis*. It is frequently met with in children who have been rickety, or are subject to glandular obstructions: and in this state it sometimes remains for some years, subject to little alterations, as the health or habit shall happen to vary, the sacculus being sometimes more sometimes less full and troublesome; the mucus which is pressed out is sometimes more sometimes less cloudy, and now and then it is attended with a slight ophthalmia, or an inflammation of the eye-lids; but which, by common care, is easily removed.

If the sacculus is not much dilated, the discharge small, and produced only by pressure, the chief inconveniences are the weeping eye, and the gumming together of the lids after sleeping: but these, by being attended to, may be kept from being very troublesome; and if the disease makes no further progress, may be so regulated as to render any more painful process totally unnecessary.

If the dilatation is considerable, the swelling is more visible, and the quantity of mucus is larger; it is also in this state more frequently mixt and cloudy, and more troublesome, from the more frequent necessity of emptying the bag; but if the patient be adult, it may, even in this more dilated state of it, be kept from being very inconvenient.

If an inflammation comes on, the tumour is thereby considerably increased, the discharge is larger, as well during sleep as upon pressure; the skin covering it loses its natural whiteness and softness, becomes hard, and acquires an inflamed redness; and with the mucus a mixture of something, which in colour resembles matter, is discharged, especially if the pressure be made with any force or continued for any time. This circumstance, added to the painful sensation and inflamed appearance of the parts, has been productive of a supposition that in this state there is either an ulcer or an abscess within the sacculus or duct. This opinion, though it may possibly sometimes have some foundation in truth, yet is in general entertained much too hastily, and is also the principal source whence most of the mistakes concerning this disease have sprung; but as there is a certain criterion by which we may distinguish between pus and mucus, practitioners cannot now be liable to such errors in this respect as formerly.

The inflammation of the cellular membrane covering the sac is a circumstance which makes a considerable difference both in the appearance of the disease and in its requisite treatment; in some cases it is

confined merely to the surface of the tumour in the corner of the eye; in others it spreads still farther, affecting the eye-lids, cheek, and side of the nose.

When the parts are in this state, the mucus within the bag has generally the appearance of being matter; that is, it wears a deep yellow colour, and is of a more thin consistence: if the puncta lachrymalia are naturally large and open, and the inflammation confined to the surface of the face, its contents will pass off pretty freely, and the skin will remain entire. This is what the ancients called the *simple* or *imperfect*, or *anachylops*.

But when the skin covering the lachrymal bag has been for some time inflamed, or subject to frequently returning inflammations, it most commonly happens that the puncta lachrymalia are affected by it, and the fluid, not having an opportunity of passing off through them, distends the inflamed skin, so that at last it becomes sloughy, and bursts externally. This is that state of the disease which is called perfect *Anachylops* or *Eggleps*: the discharge which used to be made thro' the puncta lachrymalia, while the skin was entire, is now made through the new opening, and, by excoriating the eye-lids and cheek, increases the inflammation, and gives the disease a much more disagreeable appearance. In some, the matter bursts through a small hole; and after it has discharged itself the tumour subsides, the neighbouring parts become cool, and though the skin covering the surface of the sacculus is sloughy and foul, yet there is no reason to believe that the sac itself is much diseased below. In others the breach is large, the skin remains hard and inflamed, and, from the appearance of the fore, there is reason to suppose the whole inside of the bag to be in a diseased state; and in some cases which have been much neglected or irritated by ill treatment, the cavity of the sacculus seems to be filled with a loose ill-conditioned fungus, which gleets largely, and produces inflammation and excoriation of all the parts about.

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In what
cases a car-
ries of the
bone attends
this disease.

There is also another circumstance which sometimes is found to attend this disorder, viz. a carious state of the bones. This was by our forefathers supposed to be a frequent one, and was the principal reason for their so free use of caustic, cautery, and scalpra, in the treatment of it; but since the disease has been more minutely examined into, this circumstance has been found to be a very rare one. When the fistula lachrymalis is a symptom of the lues venerea, as it sometimes is, the bones are indeed often carious; but then the fistula is not the original complaint, but produced secondarily, and is a consequence of the diseased state of the os ethmoides and ossa spongiosa of the nose, and is not curable by any local means or applications, but depends entirely on the cure of the disease of which it is a symptom.

An abscess after the small-pox, by falling on the lachrymal bag, has made it all slough away, and leave the bones bare; which circumstance also sometimes attends the free use of strong escharotics applied to destroy what is called the *cyst*; but without the accession of some other disorder producing it, or the most absurd method of treating the complaint, a caries of the bones will very seldom be met with. Indeed the combination of other diseases, either of the general habit, or affecting the same or the neighbouring parts, does

often make a very material difference, both in the appearance of the disorder, in the prognostic, and in the proper method of treating it; which therefore should always be inquired into. For instance, the patient is sometimes subject to an habitual ophthalmia or lippitudo, which will add to the deformity, and give a good deal of additional trouble during the cure: an osenza, or some other disease of the membrane and cells of the ethmoid bone, or a polyposus excrescence within the nose, are now and then combined with it. The habit is sometimes, as we have before observed, infected with the lues venerea, of which this disease may be a symptom: stremous glandular obstructions are its too frequent companions; and, what is worst of all, it is sometimes cancerous.

From what has been said, we may divide this disease into four general heads or states, under which all its lesser distinctions may be comprehended. The first consists in a simple dilatation of the sacculus and ob-
struction of the nasal duct, discharging upon pressure a mucus, either quite clear or a little cloudy; the skin covering the bag being entire and perfectly free from inflammation. In the second, the tumour is somewhat larger; the skin which covers it is in an inflamed state, but entire; and the discharge made through the puncta lachrymalia is of a pale yellow or purulent colour. In the third, the skin covering the sacculus is become sloughy, and bursts; by which means the swelling is in some measure lessened: but the mucus, which while the skin was entire used to be pressed out through the puncta lachrymalia, now discharges itself through the new aperture. The ductus ad nares, both in this and the preceding state, are not otherwise diseased than by the thickening of its lining. In the fourth, the passage from the sacculus lachrymalis into the nose is totally obliterated, the inside of the former being either ulcerated or filled up with a fungus, and attended sometimes with a caries of the bone underneath.

The ancients, who supposed this disorder, in its first state, to be an inflammatory effluxion from the brain on the caruncle, tending to suppurate, directed their first attention to prevent such consequence: for which purpose they employed phlebotomy, cathartics, issues, setons, collyria, and refrigerant applications of all sorts; and these not succeeding, they had recourse to such as they thought would hasten the suppuration of the supposed abscess.

By the improper use of medicines of the latter kind, it frequently happened that the skin became inflamed and burst: the discharge which necessarily followed this accident, together with the heated appearance of the parts about, confirmed their opinion of a collection of matter within; and, according to such supposition, they attempted to obtain a cure by dilating the orifice, and endeavouring to make an incanation from the bottom of the hollow. Not being acquainted with the situation or use of the nasal duct, they took no care to free it from the obstruction under which it laboured; but, dressing the fore like a common imposthumation, permitted it either to be filled up with a loose fungus, or to contract itself to a narrow fistulous orifice; which daily discharging a discoloured kind of fluid, and not healing by such means as they made use of, they concluded the bone underneath was
carious.

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cients.

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carious, and made way down to it, either by removing the parts with a cutting instrument, or by destroying them with caustic and cautery, intending to procure an exfoliation, and thereby a firmer basis to heal on.

But since the use of the ductus nasalis has been known, since it has been discovered that an obstruction in this is the primary and principal cause of the disorder, and that what passed for the cavity of an abscess is really the facculus lachrymalis, both the intention of cure, and the means, have been considerably altered.

In the first and most simple state of the disease, viz. that of mere obstruction without inflammation, much pains have been taken to restore the parts to their natural state and use, without making any wound or division at all; the introduction of a probe, the injection of a fluid, and a constant compression made on the outside of the facculus in the corner of the eye, are the principal means by which this has been attempted.

Some few years ago, M. Anel made a probe of so small a size as to be capable of passing from the eyelid into the nose, being introduced at one of the puncta lachrymalia, and passing through the facculus and duct; with which probe he proposed to break thro' any small obstruction which might be found in its passage. He also invented a syringe, whose pipe is small enough to enter one of the puncta, and by that means to furnish an opportunity of injecting a liquor into the facculus and duct; and with these two instruments he pretended to be able to cure the disease whenever it consisted in obstruction merely, and the discharge was not much discoloured. The first of these, viz. the passage of a small probe through the puncta, has a plausible appearance; but will, upon trial, be found very unequal to the task assigned: the very small size of it, its necessary flexibility, and the very little resistance it is capable of making, are manifest deficiencies in the instrument; the quick sensation in the lining of the sac and duct, and its diseased state, are great objections on the side of the parts; supposing it were capable of answering any valuable end, which it most certainly is not.

That the passing a fine probe from one of the puncta lachrymalia into the nose is very practicable, is known from experience; but the pain it gives, and the inflammation it often excites, are much greater than any benefit which does or can arise from it.

It is said, that the principal use of this probe is to clear the little ducts leading from the puncta into the facculus, and the obstruction of those ducts is often mentioned as a part of this disease. Hence one would be led to suppose that it was a circumstance which frequently occurred; whereas it is seldom, if ever, met with. Nor, even if it did happen, could it ever produce the disease in question; the principal characteristic of which is a discharge into the inner corner of the eye upon pressure made in the angle. This discharge is made from the facculus through the puncta, and proves that the latter are open. The passing a probe, therefore, through these, seems to be perfectly unnecessary, since a stoppage of them would never give rise to that disease, which consists in an obstruction to the passage of any thing from the sac into the nose, and not from the eye into the sac.

The syringe, if used judiciously while the disease is

recent, the sac very little dilated, and the mucus perfectly clear, will sometimes be found serviceable; it gives no pain; and a few trials render the use of it very little troublesome.

Fabricius ab Aquapendente invented an instrument, which was so contrived, as by means of a screw to make a pressure externally on the lachrymal bag; from the use of which, he says, his patients received much benefit. This instrument has been considerably improved by late practitioners, and is still recommended as very useful.

All the good that can be obtained by compress and bandage, this screw is capable of procuring; but it is also subject to all the same inconveniences, arising from the impossibility of determining exactly the due degree of pressure: for if it be so great as to bring the sides of the upper part of the sac into contact, all communication between it and the puncta will be thereby stopped; if it be too slight, the accumulation will not be prevented; nor does it in either case contribute to the removal of the obstruction in the nasal duct, the primary and original cause of the disease.

If the curative intention was to procure an union of the sides of the facculus, as in the case of parts separated from each other, by the formation of matter or sloughs, and the pressure could be made uniformly and constantly, possibly it might be so managed as to answer a valuable purpose; but as that is not the intention, the pressure, whether made by an instrument, or by a common roller and compress, contributes little or nothing toward a cure.

Besides these means of attempting a cure without incision, the gentlemen of the French academy have tried some others, such as the introduction of a probe into the lower part of the nasal duct within the nose, the injection of a fluid by the same orifice, the passing a seton from the punctum lachrymale superius through the facculus and duct and out at the nostril, there to remain till the cure is completed: and for those purposes they have invented and given figures of a number of probes, syringes, and many other instruments, which, they say, have been very successfully used; though others have not found them to answer the purpose.

When the disease is got beyond the simple state just described, that is, when the parts round about are much or constantly inflamed, or the skin covering the tumour is burst, there is something more to be done if a cure is intended.

In this state, an opening in the upper part of the facculus lachrymalis becomes in general absolutely necessary; and as a wound made by a knife leaves a much less disagreeable scar than that which necessarily follows the bursting of the skin, one being a mere simple division, the other a loss of substance; it will always be found best to anticipate the accident of bursting, by making the opening as soon as the integuments are in such a state as to threaten it.

For the making this incision, authors have been very particular in their directions with regard to its place, manner, and form. They have ordered it to be semilunar, having its concave part toward the eye, and that the point of union of the lids should be exactly opposite to the centre of the incision. This lunated figure was calculated to correspond with the course of the fibres of the orbicular muscle, upon a supposition

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that a transverse section of them would produce an inversion of the lower lid, an effect which never follows: all that the surgeon need observe is, to take care to keep the knife at a proper distance from the juncture of the palpebræ, to begin the incision a very little above a line drawn from that juncture toward the nose, and to continue it downward; its form may full as well be straight as any other, and the best instrument to make it with is a small crooked bistury.

If the facculus is already burst, the place of opening is determined; and the orifice may be enlarged with a knife, or dilated.

The incision made, the facculus should be moderately distended, either with dry lint or a bit of prepared sponge; by which means an opportunity will be gained in two or three days of knowing the state of the inside of the sac, and of the ductus nasalis: if the former is neither sloughy nor otherwise diseased, and the obstruction in the latter but slight, it sometimes happens, that, after a free discharge has been made for some days, and the inflammation occasioned by the first operation is gone off, the sac contracts itself, a superficial dressing, with moderate pressure, heals the fore, the lachrymal fluid resumes its wonted course, and the disease disappears.

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Of dilating
the passage
into the
nose.

If this simple method does not succeed, or from the state of the parts seems unlikely to do so, another must be tried, which the opening already made will enable us to put in practice. The point to be aimed at is, if possible, to render the nasal duct pervious to the lachrymal fluid; and we must endeavour to obtain this end by such means as give the least pain, excite the least inflammation, and leave the parts as near as possible in their natural state; that is, we are to endeavour to dilate the passage from the sac to the nose, by some means which will gradually distend it without destroying its texture, in the same manner as the dilatation of the urethra ought to be effected in the case of strictures, by passing either a probe, or a piece of catgut, or a bougie, gently into it, as far as it will easily go, and repeating it occasionally, until it is got quite through, and the passage is free (A).

When a passage has been once obtained, it should be carefully kept open, either by a piece of catgut, a small bougie, a leaden probe, or something of that sort; and when it is thoroughly established, the fore may be permitted to contract, until it becomes no more than what serves for the introduction of the bougie into the duct; in this state it should be kept open for some time, injecting now and then a little aqua calcis, softened with mell. rosar. through from above into the nose; and when it appears that the passage is so free and so well established that there is good probability of its preserving itself, the orifice in the angle of the eye, by being covered only by a superficial bit of plaster, or pledgit, will contract and close; and if during its closing moderate pressure be used on the facculus, to prevent a fresh accumulation of mucus, it will assist the cure.

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Of making
an artificial
passage.

The last state of this disorder is that in which the natural passage from the facculus to the nose is so dis-

eased as to be quite obliterated, or in which the bones are sometimes found to be carious. The methods hitherto described have all been calculated to preserve the natural passage, and to derive the lachrymal fluid again through it: in this attempt they are sometimes successful; but when they are not, there is no surgical means left, but to attempt the formation of an artificial one in its stead. The upper and hinder part of the facculus lachrymalis is firmly attached to the os unguis, a small and very thin bone just within the orbit of the eye; which bone is so situated, that, if it be by any means broken through or removed, the two cavities of the nose and of the orbit, communicate with each other; consequently the os unguis forms the partition between the hinder part of the lachrymal bag, and the upper part of the cavity of the nose; and it is by making a breach in this partition that we attempt the formation of an artificial passage for the lachrymal fluid.

To make this opening, many different instruments have been devised, and used; a large probe, an instrument like a common gimblet, a curved trocar, &c. each of which, if dexterously and properly applied, will do the business very well: the one necessary caution is, so to apply whatever instrument is used, that it may pierce through that part of the bone which lies immediately behind the facculus lachrymalis; and not to push up too far into the nose, for fear of injuring the os spongiosum behind, while it breaks its way.

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Mr Pott's
method.

Mr Pott prefers the curved trocar, which has served his purpose well, and from which he never experienced any inconvenience. In using it, the point should be turned obliquely downward, from the angle of the eye toward the inside of the nose; the accomplishment of the breach will be known by the discharge of blood from the nostril, and of air from the wound upon blowing the nose. The most precise direction in this part of the operation will be of but little use to him who has no idea of the natural structure and disposition of the parts concerned, and who ought therefore to get such information as soon as he can: but whoever is at all acquainted with this matter, or will attend to the situation and connection of the os unguis, knows that this bone is divided into two parts by a perpendicular ridge; that the lachrymal sac is connected to all that part which is anterior to this ridge; and that the posterior part of the bone contributes to form the orbit of the eye, and has little or no connection with the lachrymal sac. The trocar must be applied therefore to that part of the bone which is anterior to the ridge, and consequently behind the lachrymal bag; by the passage of the instrument, all this part of the bone will in all probability be broken, but from which no mischief will ensue.

As soon as the perforation is made, a tent of lint should be introduced, of such size as to fill the aperture, and so long as to pass through it into the cavity of the nose: this should be permitted to remain in two, three, or four days, till the suppurating of the parts renders its extraction easy; and after that a fresh one should be passed every day, until the clean granulating

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How to
keep it
open.

(A) This caution is very necessary to be observed in the cure of strictures of the urethra; in which case the proper intention is, gradually to dilate the passage, and to procure an increased discharge of mucus from the lacune: this should always be done gently, and by means which give as little pain as possible; whatever irritates or gives pain will certainly do mischief, will add to the obstruction, and increase the dysury.

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lating appearance of the fore makes it probable that the edges of the divided membrane are in the same state. The business now is to prevent the incarnation from closing the orifice, for which purpose the end of the tent may be moistened with spir. vitriol. ten.; or a piece of lunar caustic so inclosed in a quill as to leave little more than the extremity naked, may at each dressing, or every other or every third day, be introduced, by which the granulation will be repressed, and the opening maintained: and when this has been done for some little time, a piece of bougie of proper size, or a leaden canula, may be introduced instead of the tent; and, leaving off all other dressing, the fore may be suffered to contract as much as the bougie will permit, which should be of such length that one extremity of it may lie level with the skin in the centre of the eye, and the other be within the nose.

The longer time the patient can be prevailed upon to wear the bougie, the more likely will be the continuance of the opening; and when it is withdrawn, the external orifice should be covered only by a superficial pledgit or plaster, and suffered to heal under moderate pressure.

There is another method which has been much recommended by some French writers, to prevent the closing of the opening in the os unguis, and which is now generally approved in this country; namely, to introduce a canula either of gold or silver, or lead, into the aperture, and to permit the fore to heal over it, suffering the canula to remain, or to come away by the nose.

Mr Wathen, who has written a treatise on this subject, generally makes use of gold; because most easy to be procured in a state of perfect purity, which is a quality first to be regarded, whatever the metal be: and he prefers this or silver to lead, chiefly on account of their firmer texture, which must render a tube made of either of them less liable to be affected by any pressure it may receive. The tube is somewhat conical, to prevent its descent into the nose; and it is made sufficiently long, to reach from the upper portion of the bony duct, to its aperture below the os spongiosum.

To introduce it more easily, it is furnished with a style, nearly as long as a common probe; the lower end of which is rounded, so as that, passing through the tube, it may exactly fill the aperture at the small end: and it is prevented from passing further, by a shoulder of the same size with the outside of the tube.

The tube is held upon the style by a doubled thread, which passes through a small hole on the one side of its upper or larger aperture, and is continued to a ring at the upper end of the style. By fastening this thread to the ring, the style and tube become one instrument, capable of being introduced and extracted at pleasure, and possessing all the power of a probe.

By means of this, the operator may be enabled to examine the state of the disease, and to judge with the greatest precision of the diameter of the duct, and consequently of the proper size of the tube. For as the duct in persons of different ages, &c. will vary both in the diameter and length, there must on this account be a proportional difference in the tube:

and the operator should therefore be furnished with styles and tubes of several different sizes.

The necessity of paying a close attention to the size of the tube is apparent. For if it be too large, it cannot be introduced; and if too small, it will be liable to slip, if not pass, through the lower aperture of the duct into the nose. If, again, it rises too high, it may press against the sides of the fac, and thus close the orifice through which the tears should pass. If, on the other hand, it comes down too low, it will project beyond the inferior extremity of the duct, and may produce a very troublesome titillation. When the tube is found exactly to fit, the thread, which was passed through the ring at the upper end of the style, being tied in a knot, at about the distance of an inch from the top of the tube, the longer portion of it, above the knot, is to be cut off. By this the style will be disengaged, so that it may be extracted with ease, leaving the tube behind, with the thread hanging out of the wound.

When the tube is fixed, some simple liquor is to be passed by a syringe through it into the nose, as a proof of its being so placed that it will answer the intended purpose. The opening made in the sac might be entirely closed within the space of a few days, if it was not thought proper to leave the thread in. When it has continued there about a week, if the tears absorbed by the puncta are conveyed by the tube to the nose, the thread, which is double, may then be extracted, by cutting one side of it with the scissors, and drawing the other out. The little orifice thro' which the threads passed will be closed in the space of a day. And thus a disorder, which had continued for months, and perhaps years, may be perfectly cured within the short space of a week.

SECT. XVIII. Of Amputation.

In this operation the great end to be aimed at is, the procuring of a handsome stump, in which the bone may not protrude, but be well covered with flesh; so that no excoriation or rawness may be apt to take place, as is too frequently found to be the case after amputation has been performed in the common manner. As long ago as the year 1679, it was proposed by Jacob Young, an English surgeon, in a treatise intitled *Curus Triumphalis ex Terebinthino*, to preserve a flap of flesh and skin, which was to be folded over the bone, and which, uniting to the parts of the wound after amputation, would effectually cover the bone, and prevent the inconveniences abovementioned. No traces of the success of this method, however, can be found till the year 1696; when a Latin dissertation was published upon it by P. Adrians Verduin, an eminent surgeon in Amsterdam. The most sanguine expectations were formed of its success; and it was even thought that the flap would prevent the necessity of tying up the blood-vessels. However, it does not appear that the method as at that time practised, either did or could succeed; and accordingly it was entirely laid aside, till lately that it has been revived with considerable improvements.

§ 1. Of Amputating the Leg.

IN Verduin's method of amputation, the rule was,

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Of introducing a metal canula.

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Mr Wathen's directions.

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ing the
quantity of
flesh nec-
essary to be
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flap.

to cut away the fleshy parts to the tendo achillis; and after sawing through the bone, if the flap was too big, it again suffered a second incision. To keep this flap united to the bare bone, he contrived a variety of straps and machines, highly embarrassing to the operator, and painful to the sick. But Mr O'Halloran, having demonstrated that the attempting an union of these parts before suppuration was the true cause of this operation's failing of success, and willing to determine the precise quantity of flesh necessary to be taken off in the flap-operation, found that 15 inches might be considered as a medium standard of the circumference of a man's leg; the diameter of which (supposing it a complete circle) would be about $4\frac{1}{2}$ inches, which appeared to him necessary to be preserved below the amputated part, in order to form a flap sufficient to cover the stump. But as this great length of flesh would make the operation practicable but in a few cases, he began to consider of some conciser means. After sawing some tibiae at the usual place of amputation, and measuring the diameter of the two bones together, he conjectured, that about $3\frac{1}{2}$ inches, might be admitted as a general standard of adults. If, then, an oblique section be made of the skin and muscles, at about three inches, or at most three and an half, below the part to be amputated, and continued in a sloping direction till it reaches the bone, at the place of excision; by a circular incision of the remainder of the flesh and skin at this part, we shall preserve flap enough to cover the ends of the bones. By this means surgeons will be enabled to perform this operation, in every case where amputation becomes necessary; and it will be then found as expeditious as the method of the double incision, and attended with no more pain.

After a trial on a body, he found the flap a little short, on account of the thickness of the gastrocnemii muscles; but upon repeating his experiment on another body, and having first carefully drawn back as much skin as he could, a flap of $3\frac{1}{2}$ inches answered exactly, allowing for the melting down of the corpus adiposum, and cellular substance of the muscles, by suppuration, as lessening considerably the bulk of flesh, though not the length of the flap. This rule should not be deemed infallible; because, where the limb is extenuated, a less quantity of skin will suffice to cover the extremities of the bones than where the parts are turgid and full. He has since found, that besides the previous drawing up of the skin, if in the circular tour care is taken to save some skin in the anterior part of the leg, which is easily done by drawing it back during the incision, a flap of three inches will certainly answer. This operation he performed three times successfully in the course of eight months, and never measured the quantity of flesh he intended to preserve, but with the eye; however, in a week after each operation, he was curious enough to measure the particular flaps. The first measured $3\frac{1}{2}$ inches without, from the extremity of the flap to the place of the circular incision; and $2\frac{1}{2}$ from the internal edge of the flap to the bone; and this flap was found sufficient to cover the extremity of the stump, though a good-sized leg; and that the circumference of it measured 24 inches. In the second case, the flap measured from without, three inches; and internally, not quite two. This woman's leg was smaller than the first patient's,

but both bones were rather larger and much more firm. The periphery of this stump was twelve inches. In the third instance, the leg was burnt so high up, that no greater flap could be allowed than two inches and one-fourth, and from within it measured $1\frac{1}{2}$ inches; and yet this stump was also completely covered with a good cushion of flesh and skin. The limb was greatly extenuated, and the circumference of the stump was not quite ten inches. Upon the whole, then, he conjectured that the difference between 3 and $3\frac{1}{2}$ inches of a flap, will take in most legs; i. e. in adults, that it should be seldom under 3, nor ever exceed $3\frac{1}{2}$ inches.

These necessary details premised, where the necessity of taking off a leg is manifest, let the hair be shaved off from the knee to where the limb is to be taken off, which will save the patient a good deal of trouble in the dressings. The skin should then be drawn up pretty tight; and let a small band moderately rolled up, and sewed from its outside folds to the centre of an open roller, of about two inches broad and a yard long, be placed in the ham, over the artery; and with the open one going round the knee, let it be thus firmly secured. If one side of the open band is perforated, so as to make it a kind of uniting band, it will roll smoother. Then with Petit's or the common tourniquet, let the artery be sufficiently compressed. On this occasion Mr O'Halloran prefers the common one; because, by its uniform pressure round the limb, less blood is lost than in the ordinary way. The difference, nevertheless, is not of so much consequence as to give one an absolute preference to the other: the choice, therefore, may be safely left to the option of the surgeon. The patient should be placed on a chair, or low table, of about two feet high, as the leg must have some degree of elevation. All the apparatus being properly disposed, which consist of a straight edged knife, with the blade as long as that of the common cateline, and pointed at its extremity, the common amputating knife, saw, and a few needles armed with flat threads, waxed, of different sizes. Let the leg be elevated about a foot higher than if in an horizontal posture; and with strong tape of about an inch broad, let it be bound round pretty firm at the intended place of excision; and if at this time he lies in a reclining posture, the raising the leg will be the more easy.

Mark with a pen the traces where you are to commence your incision, which should be, in adults at least, three inches from where the bone is to be sawed. Then with the straight incision-knife, make an oblique section from this point almost or quite to the bone, ending at your tape: then with this same, or the common amputating knife, let the circular incision of the remainder of the flesh be expeditiously performed. To do this first part of the operation with greater ease to yourself and advantage to the patient, you must be careful, if the left leg be the part diseased, to place yourself between his legs; and if the right, to be outside the limb. The reason of these situations is very obvious; for you cannot with the right-hand command an exact sight, or commence your operation dexterously, but in these postures. This done, apply a split cloth, the two tails of which should cross over the tibia, and with the single one draw back the flap. Though some operators do not approve of the split cloth in the com-

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Method of
performing
the opera-
tion.

mon method, yet here it is essentially necessary: for this purpose the tape should be first removed. Any little undivided flesh may be now separated by the cateline; the peritœum divided round about, and scraped upwards, agreeable to the advice of professor Monroe; and the ligamentum interosseum divided. The next thing to be done is to saw the bones; but whatever be your position in dividing the soft parts, you must be always between the legs to cut away the bones. As soon as you have marked the traces of the saw on the tibia, run it along both bones, very light and nimble; and continue this manœuvre till the bones are divided. By this means the teeth of the saw will not be entangled in the bones, nor you often obstructed in your motion; but the divided bones will be smooth, and the operation expeditious.

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Of tying up
the blood-
vessels.

The limb being taken off, the tourniquet must be relaxed, and the tibialis anticus, posticus, and interosseus arteries, carefully taken up. Where the flesh was thin, and not very firm, Mr O'Halloran has sometimes made a ligature round the bone in which the artery was included: but if you use, instead of the ligature of the vessels, the agaric or lycoperdon, which, our author thinks, may be safely depended on in the leg and fore-arm, you must be careful that the fungus does firmly adhere to the vessels before you dress up the stump; as also that it be not removed during the last period. As for the vessels that spread themselves on the gastrocnemii and solæus muscles in this operation, the taking them up becomes necessary. The blood being carefully mastered, which you will know by relaxing the tourniquet for some time, and no blood spurting out, you are then to dress the stump thus. Let the tibia be covered with a pledgit of dry lint, and the rest of the stump with soft lint, loose, and strewed with fine flour. In the thigh and arm, besides the future, he generally applies some lycoperdon to the extremities of the principal vessels; the same may be also done in the present case, if the ligature has been used. He particularly recommends it to the space between the tibia and fibula; because it sometimes happens that the interosseus artery shrinks between the bones; and though no appearance of an hæmorrhage at present happens, yet in a few hours it may return. The possibility of this accident justifies the precaution. The flap is likewise to be dressed with soft loose lint, and a cloth cut in form of a double T, and covered with adhesive plaster, is to cover the dressings. Its figure is thus:



The long one is to surround the stump above the amputated part, whilst the tails, by crossing the flap, press it against the stump, and make all the dressings the more compact. This done, an hog's bladder moistened and notched is to inclose the stump; but previous to this an handful of lint is to be applied between the outside of the flap and the bladder: press this last to the stump; and the notches covering each other above make the whole dressings smooth, and the pressure soft, and such as is best calculated to prevent an hæmorrhage. Let a cross compress, moistened,

cover the bladder; and then with a band, of between eight and nine yards long, and near three inches broad, rolled up to two heads, secure your dressings thus:

After removing the tourniquet and other bands used antecedent to the operation, an handful of soft lint should be applied to the ham; which, in the circulations of the band here, greatly restrains the violence of the blood; for as this is the most troublesome and alarming symptom, and the most reproachful to the surgeon, all these precautions are justifiable. With one of the heads of your band make three circulars above the knee moderately tight; then with the same descend, and make two or three turns below the knee, rather smooth than tight; and then mount obliquely till you get above the knee, and here make a circular turn. Let the other head of the band go straight down from the posterior and inferior part of the thigh over the flap, and above the knee anteriorly; which will become here secured by a circular turn of the other head over it. Let the other head again cross the stump and flap from the inside of the thigh, and ascend at its outside above the knee, and here be again secured by a fresh circular turn of the other head. Cross over the stump again between these folds, so as to form on the flap a kind of star of six points; and this fold becomes also secure by a new turn of the other. Let the remainder of both bands be then disposed of round the thigh at pleasure, or cut off.

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The stump being dressed, let the patient be laid on his bed, and a pillow put under the thigh, so as to raise that part. Let the patient be kept to a proper diet: but in this point it is impossible to fix any criterion; for regard must always be had to the patient's usual manner of living, what is high diet to one being insufficient to preserve the life of another. And on this single point the success of many a cure plainly depends. In general, young people of plethoric habits should be kept low; those advanced in years, or whose constitutions are otherwise impaired, should live freer. Some bleed on the commencement of the fever; but this ought to be avoided, except the fever is high, or the subject full of blood; because without a fever there can be no suppuration, of course no tendency to recovery. In general, the first opening of the fore should not be for four or five days, according to the season or symptoms. This should be done, by first softening the dressings in warm water, and removing only as much of the lint as comes off loose and easy. Let the whole part be then covered with pledgits, armed with proper ointment, and secured by the double T plaster, with the compress and bandage already described. The flap and the stump, at every dressing, are to be regarded as distinct forces, and separately dressed. If the discharge is small, it may be promoted by stuping the stump with sponges pressed out of very hot water, by the common digestive, and the like. If abundant, it may be lessened by dosils of lint wet in brandy or tincture of myrrh, or by dry lint alone, which is an excellent absorbent: the bark, in substance, will also greatly restrain it; often a pill or two of calomel. In general, an abundant suppuration will promote a speedy coalition; whereas, when slow, it will be more tedious.

About the 12th day, then, that is, when inflammation is entirely passed, and suppuration effectually

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established, the bare flap may be turned up against the naked stump, and so be secured by plaster, compression, and bandage. Instead of the bandage already described, our author on this occasion uses one composed of a strip of strong cloth to go round the knee; and to the centre of this is fixed another, which, crossing from under the ham, the stump is secured to the circular above the knee by means of four or five pieces of tape attached to this last. The fore should not be opened for at least two days after this, and the dressings taken off with great caution. He often bathed this part very hot; and though the flap should in part separate, yet must it again and again be returned until the parts firmly unite. The little sore which the flap does not cover should be dressed with lint and brandy. Soon after the union of the flap and stump, the former sometimes inflames; but a relaxing fluke, and a poultice of flummery, soon removes this. At every dressing of the remaining little sore of the flesh, the stump may be bathed in bran and water hot, which will greatly accelerate healing. Though after 15 or 16 days the cure may be finished by any common nurse, yet do the parts remain tender for some days longer. By the dissection of one of his patients, who died many months after this operation of a malignant small-pox, our author found it was occasioned by the extremities of the bones not being completely healed: so that what he then thought a disadvantage to this operation, appears now to be one of its greatest excellencies; namely, that the bones should be fairly covered by a firm periosteum; which at the same time accounted for this phenomenon.

§ 2. Of amputating the Thigh.

To attempt this operation, by preserving a flap of flesh in the posterior and inferior part of the thigh, must leave so large a flesh-wound, and so great a quantity of muscular flesh bare, as to require a very great length of time to bring on a firm union of the divided parts: besides, the fever, and great discharge from so large a surface, may alone endanger the patient's life. Mr O'Halloran, after a variety of trials, concluded, that a flap of flesh and skin preserved in the anterior part of the thigh, must answer our most sanguine expectations: for the quantity of flesh here is not much, the skin, corpus adiposum, and rectus muscle, being only interested in the incision; of consequence the wound not considerable, and the flap not required very large. Our author attempted to determine, on a dead body, the quantity of flap necessary to be preserved in this manner. The circumference of the thigh, at four inches from the inferior part of the rotula, measured eighteen inches. Here he drew up the flesh, and bound it by a small band. He then began a flap-incision on the rotula, bringing it up to the circular band, and here sawed through the bone, having first cut through all the intervening flesh. The preserved flap measured three inches externally, and two and an half from the circular incision of the flesh to its internal extremity. The diameter of the femur, in its lowest axis, or nearly from side to side, was exactly an inch and one-tenth; and yet this flap, besides completely covering the bone, extended an half inch beyond it. By this plain and simple experiment, it appears, that the flap-opera-

tion in the thigh, by making your incision in its anterior part, becomes less complex, less painful, and even more expeditious in its cure, than the same operation in the leg. After determining on the precise place on which the limb is to be taken off, care must be taken to have the blood-vessels mastered in the operation, either by Petit's or the common tourniquet, as in the usual manner: then let the flesh and skin be tightly drawn up from the knee, and so secured above the place of election by a circular tape or band. Mr Gooch proposes a kind of thick circular cushion to serve instead of this band, to direct the knife exactly in the circular tour; but Mr O'Halloran thinks that a thick tape will answer this purpose every bit as well, as this operation is mostly exactly even, and that the cushion rather hinders the direction of the knife from the eye. With a straight knife, such as has been described in taking off the leg, commence your flap-incision at about three inches more anteriorly than where the bone is to be sawed through, supposing an adult, and so in proportion to the age and size of the limb. Let this incision be continued in an oblique direction till you reach the bone at the circular tape; then with the same, or a common amputating knife, make your circular sweep, commencing from the side of the flap and directly to the bone; observing here, as in the leg, to place yourself outside the body in taking off the right thigh, and between the legs in removing the left. But then there is no necessity here, as in the leg, of change of place in sawing the bone; because, as it is but one, wherever you place yourself to cut off the soft parts, there you may stay to finish the operation.

As soon as the circular incision is completed, the tape should be removed and the split cloth cross the divided parts, in order to draw up the skin and muscles, the single tail covering the flap; and as soon as the periosteum is separated, &c. let the bone be sawed. The femoral artery should be secured as already directed; and besides this ligature, let some agaric or lycoperdon be applied: and any other considerable branches of vessels may be taken up or stopp'd by the above funguses. Let the surface of the sore be covered with loose unformed lint strewn with flour, and the flap laid over this dressing covered by a double T plaster; an handful of lint outside this, gently pressed against the flap by an hog's bladder, moistened and notched at its orifice; and the whole covered by a cross compress. Let soft lint, tow, or a linen compress, cover the direction of the artery; and secure all these dressings on by a band about three inches broad, and twelve yards long, rolled up in two even heads. Apply a large handful of loose lint or soft tow over the femoral artery near the groin; and after making a couple of circulars about this part, moderately tight, so as to break in some measure the force of the circulating fluid, let the bands cross round the body. Fix a piece of strong tape, about an inch or more broad, and a yard long, along the inside of the amputated thigh, one end of which is to be secured to the band that went round the body, and the other to hang loose over the stump: let a similar piece of tape be in like manner fixed to the outside of the thigh: then, with one of the heads of your bandages, make three or four circulars round the thigh over these tapes, gently descending;

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scending; and with the other head cros directly over the anterior part of the thigh and stump, and ascend posteriorly: a couple of circulars of the other head, gently ascending, will secure it smooth and firm. Descend again over the inside of the thigh, cros the stump, and mount with your first band outside the thigh; and here another circular or two makes this second turn firm. Between the anterior and lateral turns of the band you must bring down your roller cros the stump, and ascend in the opposite direction: and here, again, a couple of circulars of the other roller will make all firm. Between the posterior and lateral parts of the band you must make a fourth turn over the stump, and secure it by another circular, and finish both heads by circulars or spiral turns round the stump; or if too long, they may be cut off. Though the stump be now apparently well bound, yet, by reason of the form of the thigh, the bands may be apt to loosen, or even drop off: to prevent this, let the tapes already mentioned be turned up at their loose extremities; the inside one to cros over the inside of the thigh, and, as it ascends, to be here and there secured by pins to the circulars, and to part of the band that went round the body; and in like manner the outside tape. By this means the circular turns, which only could loosen, will be smoothly retained in their different places, and the whole bandaging convenient, firm, and even. The bandaging, however, should be but moderately tight, as the swelling of the stump will soon make them sufficiently distended.

In winter, the stump should not be opened before the fifth, or even sixth day; nor in summer sooner than the fourth: the bone should be dressed with dry lint, or lint wet in brandy, and the soft parts with the common digelive; taking care to remove no more of the old dressings than what are loose. When suppuration is well established, the stump and flap may be dressed with dry lint, as the soft digelives at this time are apt to encourage exuberant or proud flesh. If, nevertheless, such should rise on the flap, it may be now and then sprinkled with red precipitate; but the surgeon need never be uneasy at attempting an union of the flap and stump at such time. About the 12th or 13th day, and not sooner, should the flap and stump be brought into perfect union: before this they are to be treated as distinct fores, and preserved in such situation by a bandage something like what has been recommended for the leg. But whereas that was secured above the knee, to make this a fixed point, the straps must go round the body, and the body of the band lie on the anterior part of the stump, in order gently to bring the flap and stump into an exact union. This first dressing is not to be opened for three days; and every other rule recommended in the leg is here exactly to be followed. If, in the suppurative state, the fore should have an unusual degree of pain and sensibility, the parts may be often bathed in milk and water; the sick let blood; and even opium, alone or mixed with digelives, may be successfully applied to the parts.

§ 3. Of amputating the Arm.

In amputating the thigh, we have, for very obvious reasons, chose to take the flap from its anterior part, as being a less considerable wound, having less of sub-

stance, and of course sooner covering the bone, the principal object of all. For precisely the same reasons, in taking off the arm, the flap of flesh should be taken from its posterior part, as being less fleshy, and nearer the bone: here a flap of flesh, from two and half to three inches, will be certainly sufficient to cover the bone. The bandaging here must be pretty nearly the same as in the thigh; though, as the arm is almost cylindrical, some may think it unnecessary to cros the band round the body, as it might be apt to heat and oppress the patient. But if this should be thought proper to be dispensed with, a flat tape should from the neck hang down each side of the arm, the bandaging to be performed over it, and the two extremities of it turned back, pinned to the circulars, and so firmly secured to the neck-band. The union should be attempted about the eleventh day.

§ 4. Of amputating the Fore-arm.

To take off the fore-arm, we must look for the flap in its external part, as having less to cut through; but above all, as by this means you avoid bringing in that groupe of tendons which cover the inside of the fore-arm. Here from an inch and an half to two inches will be undoubtedly sufficient to cover the bones; but then in the incision you must comprehend the full breadth of the flesh and skin on the back of the fore-arm. The dressings and bandaging will be easily comprehended from what has been already said; and about the tenth day you may attempt an union of parts.

SECT. XIX. The Method of opening a dead Body.

SURGEONS are often called on this occasion, in order to investigate the cause and seat of diseases and death, either by the relations of the deceased, or the magistrates, to whom report is to be made; therefore, at the time of performing this operation, minutes should be taken of what is observed. The instruments, and all things necessary, should be disposed in order, as for any other operation; as knives, a razor, a great and small saw, scissars straight and curved, elevators, needles threaded, sponges, tow, saw-dust or bran, basons with water, towels, and receivers for the viscera when they are to be taken out of their cavities; and should the body have undergone any degree of putrefaction making it offensive, it will be right to have a mixture of lavender-water and vinegar, or some such thing, to sprinkle it with, &c. The body is to be laid upon a suitable table, advantageously placed for the light, having a cloth thrown over the parts which decency demands should be concealed, especially in females.

When it is intended only to inspect the abdomen and its contents, a longitudinal incision from the xiphoid cartilage to the os pubis, intersected by a transverse one at the navel, will give a fair opportunity of answering these purposes, when the angles are reversed. Should it be required to examine all the three cavities, and the parts contained in them, we are to begin by opening the head, making an incision quite cros to the bone, from ear to ear; which section is preferable to the crucial, commonly made on this occasion: then the scalp may be easily dissected from the skull, and turned down over the face,

Practice.

and towards the neck, giving room for the saw. The head must be held very readily by an assistant during the sawing, which should be begun on the middle of the frontal, proceeding to each temporal bone, and so to finish the circle upon the middle of the occipital bone; which may generally be done conveniently enough, by raising the head and inclining it forward, after having proceeded as far as this bone; or the body may then be turned prone, should that posture be found more convenient, to complete the circle. The cap of the skull is then to be raised with the elevator, occasionally cutting the adhesions of the dura mater: after this the encephalon is to be removed, carefully separating the other attachments of the membrane.

In order to bring the thorax and abdomen, with the parts contained in these cavities, under one view, an incision is to be made on each side the sternum, in the course of the cartilages of the ribs which are annexed to it; dissecting from thence the muscles with the teguments, the space of two or three inches towards the spine; then cutting through the cartilages, which will be seen, and easily divided with a knife a little curved near the point; then the incisions are to be continued from the sternum through the abdominal cavity, in an oblique direction, to each ilion or inguen; after which the clavicles are to be separated from the sternum, or this bone divided at its superior cartilaginous junction, with a strong knife, dissecting it from the mediastinum, and turning it downwards with the muscles, &c. of the abdomen. This is the most eligible manner of opening these cavities, and gives an opportunity of sewing them up, with a better appearance for any person's view afterwards. That kind of stitch called by sempstresses the *herring-bone* or *flat seam*, has a very pretty and neat effect upon these occasions.

If it is proposed to take out the thoracic and abdominal viscera together, for further examination, the diaphragm is first to be cut down to the spine on both sides; then, to avoid being incommoded with blood, &c. two very strong ligatures are to be passed round the œsophagus and large blood-vessels, in which the trachea may be included; tying them strait, and then dividing these parts between the ligatures: the same measures are to be taken in respect to the inferior vessels, upon the lumbar region, a little above the bifurcation of the aorta, including the vena cava; and also upon the rectum. After having observed these precautions, the viscera, with the diaphragm, are to be removed, by a wary dissection, all the way close to the spine; and gently drawing them at the same time, will greatly facilitate the separation.

When the thoracic and abdominal viscera are to be taken out separately, in the first case ligatures must be made as have been described upon the vessels, &c. just above the diaphragm, and in the other just below it, and upon the rectum.

Should we be called upon to perform this office when the body is become very putrid, it will be absolutely necessary to have such parts of it well washed with warm vinegar and brandy, and then sprinkled with lavender-water or some such odoriferous antiputrescent liquor, before the examination, in order to correct the stench, and defend us against the noxious

quality of the effluvia: a precaution, the neglect of which may be attended with very direful effects, and of which we have instances.

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SECT. XX. Of Embalming dead Bodies.

In the early ages of the world, the practice of embalming dead bodies was very common, particularly among the Egyptians; but it has long been disused in almost all countries, except for great personages. See EMBALMING. The following directions are taken from Mr Gooch, to whom they were communicated by a person of great character, and well acquainted with the modern practice of embalming in this kingdom.

After evisceration, as has been directed in opening a dead body, and continuing the incision farther upwards, even into the mouth, and, if practicable, without cutting the skin of the neck, all the cavities are to be well cleaned, and the humidity sucked up with sponges, then washed with *tinct. myrrhe*, and filled with a species, compounded of fragrant herbs, aromatic drugs, and gums reduced to powder not very fine, first restoring the heart to its former residence, after having opened its ventricles, cleaned and washed them with the tincture, stuffed them with the species, and sewed them up; and then the cavities are to be stitched very close with the glover's or spiral suture. Large and deep incisions are also to be made in all the most fleshy parts, cleaning and washing them with the tincture in the same manner, filling them with the antiseptic species, and stitching them up. Then the head, trunk, and limbs, are to be perfectly well covered with cerecloth; putting a piece under the chin, to be secured by sewing on the top of the head, after having well adjusted the cap of the skull, sewed the scalp together, and cleaned the mouth, as has been directed for the other parts, and putting in some of the species. The cerecloth is to be prepared, according to art, with a composition made of wax, rosin, storax, and painter's drying oil. After the application of the cerecloth, with great care and exactness, cut into suitable pieces, according to the respective parts, and closing them well every where; the face being close shaved, is to be covered with some of the above composition melted, and laid on with a brush of a proper degree of heat, and of a moderate thickness; which may have a faint flesh-colour given it with vermilion; and when it is grown cold and stiff upon this part, it may belightly struck over with hard varnish; or this varnish, applied thick, may here serve the purpose alone. A cap is to be well adapted to the head, falling down upon the neck, and to be sewed under the chin, making a few circular turns about the neck with a roller of a fit breadth. All the rest of the corpse is to be inclosed in a sheet, to be artfully cut, and sewed on very close and smooth, with the finest tape, and the flat seam mentioned in the preceding section; over which an appropriate dress is to be put, as the relations or friends think fit to direct and appoint, and then laid into the coffin, which should be in readiness: but when it is some great personage, who is to lie in state for public view before the funeral rites are solemnized, the dress must be appropriated to his dignity and character. The brain and other viscera are to be put with some of the species into a leaden box. Sometimes

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times the heart, prepared as has been directed, to preserve it from putrefaction, is deposited in an urn by itself.

EXPLANATION of Plates CCLXXVIII. CCLXXIX. CCLXXX. CCLXXXI. CCLXXXII.

FIG. 1. A, A director by which to guide the knife in the opening of abscesses that are burst of themselves, or first punctured with a lancet. This instrument should be made either of steel, silver, or iron; but so tempered, that it may be bent and accommodated to the direction of the cavity. It is usually made quite straight; but that form prevents the operator from holding it firmly while he is cutting. The manner of using it is, by passing the thumb through the ring, and supporting it with the fore-finger, while the straight-edged knife is to slide along the groove with its edge upwards, towards the extremity of the abscess.

B, The straight-edged knife, proper for opening abscesses with the assistance of a director; but which, in few other respects, is preferable to the round-edged knife.

C, A crooked needle, with its convex and concave sides sharp: this is used only in the future of the tendon, and is made thin, that but few of the fibres of so slender a body as a tendon may be injured in the passing of it. This needle is large enough for stitching the tendo achillis.

D, The largest crooked needle necessary for the tying of any vessels, and should be used with a ligature of the size it is threaded with in taking up the spermatic vessels in castration, or the femoral and humeral arteries in amputation. This needle may also be used in sewing up deep wounds.

E, A crooked needle and ligature of the most useful size, being not much too little for the largest vessels, nor a great deal too big for the smallest; and therefore, in the taking up of the greatest number of vessels in an amputation, is the proper needle to be employed. This needle also is of a convenient size for sewing up moist wounds.

F, A small crooked needle and ligature for taking up the lesser arteries, such as those of the scalp, and those of the skin that are wounded in opening abscesses.

Great care should be taken by the makers of these needles to give them a due temper: for if they are too soft, the force sometimes exerted to carry them through the flesh, will bend them; if they are too brittle, they snap; both which accidents may happen to be terrible inconveniences, if the surgeon be not provided with a sufficient number of them. It is of great importance also to give them the form of part of a circle, which makes them pass much more readily round any vessel, than if they were made partly of a circle, and partly of a straight line; and in taking up vessels at the bottom of a deep wound is absolutely necessary, it being impracticable to turn the needle with a straight handle, and bring it round the vessel when in that situation. The convex surface of the needle is flat, and its two edges are sharp. Its concave side is composed of two surfaces, rising from the edges of the needle, and meeting in a ridge or eminence, so that the needle has three sides. The best materials for making ligatures, are the flaxen thread

that shoe-makers use; which is sufficiently strong when four, six, or eight of the threads are twisted together and waxed; and is not so apt to cut the vessels as threads that are more finely spun.

G, A straight needle, such as gloves use, with a three-edged point, useful in the uninterrupted future, in the future of tendons where the crooked one C is not preferred, and in sewing up dead bodies, and is rather more handy for taking up the vessels of the scalp.

Fig. 2. A, The round-edged knife, of a convenient size for almost all operations where a knife is used: the make of it will be better understood by the figure than any other description; only it may be remarked, that the handle is made of a light wood, as indeed the handles of all instruments should be, that the resistance to the blades may be better felt by the surgeon.

B, A pair of probe-scissors, which require nothing very particular in their form, but that the lower blade should be made as small as possible, provided it be strong and has a good edge; because, being chiefly used in fistulas *in ano*, the introduction of a thick blade into the sinus, which is generally narrow, would be very painful to the patient.

C, The crooked knife with the point blunted, used in the operation of the bubonocoele.

Fig. 3. A, A trocar of the most convenient size for emptying the abdomen when the water is not gelatinous. It is here represented with the perforator in the canula, just as it is placed when we perform the operation.

B, The canula of a large trocar, recommended in cases where the water is gelatinous.

C, The perforator of the large trocar.

Fig. 4. A, A sound used in searching for the stone. The size represented here is but a little too large for the youngest children, and may be used upon boys till they are thirteen or fourteen years of age: a larger should be employed between that age and adulthood, when one of about ten inches, in a right line from the handle to the extremity, is proper. This should be made of steel, and its extremity be round and smooth.

B, A staff fit for the operation on boys from eight to fourteen years of age. The staff for a man must be of the size of the sound already described.

C, A staff something too big for the smallest children, but may be used upon boys from about four years of age to eight.

The staff has a groove on its convex side, which first serves as a direction where to cut, and afterwards, receiving the beak of the gorget, guides it readily to the bladder. Care should be taken, in making the groove, that the edges of it be smoothed down, so that they cannot wound in passing through the urethra. The extremity should also be open; otherwise it will be sometimes difficult to withdraw the staff when the gorget is introduced, and presses against the end of it.

These instruments are usually made with a greater bending than here represented; but this shape is more like to that of the urethra, and rather more advantageous for making the incision.

D, The yoke; an instrument to be worn by men with an incontinence of urine. It is made with iron,

but for use must be covered with velvet. It moves upon a joint at one end; and is fastened at the other by catches at different distances placed on a spring. It must be accommodated to the size of the penis, and be taken off whenever the patient finds an inclination to make water. This instrument is exceedingly useful, because it always answers the purpose, and seldom galls the part after a few days wearing.

Fig. 5. A, A small catheter made of silver. This instrument is hollow, and serves to draw off the urine when under a suppression. It is also used in the high operation to fill the bladder with water. Near its extremity are two orifices, through which the water passes into its cavity. Care should be taken that the edges of these orifices are quite smooth.

B, The knife used in cutting for the stone: it is the same already described; but it is not improper to repeat the figure with the alteration of a quantity of tow twisted round it, which makes it easier to hold when we perform the lateral operation, and turn the edge upwards to wound the prostate gland.

C, A female catheter, differing from the male catheter, it being almost straight, and something larger.

D, A silver-wire to pass into either catheter, for the removing any grumous blood or matter that clogs them up.

Fig. 6. A, The gorget used upon men in the lateral operation.

B, the gorget used upon children under five years of age in the lateral operation.

A gorget between the sizes of these two will be fit for boys from five years of age to fifteen or sixteen.

These instruments are hollow for the passage of the forceps into the bladder; and their handles lie slanting, that they may the more readily be carried thro' the wound of the prostate, which is made obliquely on the left side of it. The beak at the extremity of the gorget must be smaller than the groove of the staff which is cut upon, because it is to be received in the groove. Care should be taken that the edges of the gorget near the beak are not sharp, lest, instead of dilating the wound as it ought, it should only cut on each side when introduced; in which case, it would be difficult to carry the forceps into the bladder.

C, A gorget, with its handle exactly in the middle. This shaped instrument is used in the old way. All the gorgets should be made of steel.

Fig. 7. A, The forceps for extracting the stone. These are represented a little open, that the teeth may be better seen within-side.

This instrument must be of different sizes for different ages and stones, from the length of four inches to one of near a foot long; but the forceps of about eight inches long will be found most generally useful. The number necessary to be furnished with will be four or five.

Great care should be taken by the makers of this instrument that it move easily upon the rivet; that the extremity of the chops do not meet when they are shut; and particularly that the teeth be not too large, lest, in entering deep into the stone, they should break it. It is of consequence also that the teeth do not reach farther towards the joint than here represented; because a small stone, when received into that part,

being held fast there, would dilate the forceps excessively, and make the extraction difficult; on which account, the inside of the blades near the joint should be smooth, that the stone may slip towards the teeth.

B, A director made of steel, used for the direction of the gorget, in the extraction of the stone from women.

C, A scoop to take away the stone when it is broken into small pieces like sand. This instrument is made of steel.

Fig. 8. A, The perforator, commonly called the *perforating trepan*. With this instrument an orifice is usually made for the reception of the pin on the centre of the piece of bone that is to be taken away in the operation of trepanning; though, if the pin be very sharp, and project but little beyond the teeth of the saw, as in that marked with the letter B, the perforator would be needless; but as the point of the pin presently grows blunt with use, and in that case it is difficult to fix the saw, it is advisable to have this instrument in readiness. It is also handy for boring into the substance of the bones, in order to promote a granulation of flesh on their surfaces. When it is made use of, it must be received and fastened in the handle C.

B, The crown or saw of the trepan, with the pin appearing just beyond the extremities of the teeth. The shape of this saw is cylindrical.

C, The handle of the foregoing instrument, called the *trephine*; which is much preferable to the trepan (an instrument like a wimble used by joiners), because of the great convenience of holding it, and leaning on one side or other of the saw, as we find it necessary: The trepan, however, though allowed to be unhandy, is the instrument most used by surgeons in other parts of Europe, upon the supposition of its working quicker than the trephine.

The trephine here represented is of such a shape as to make it a convenient elevator; for which purpose the extremities of it are made rough.

D, A key to take out the pin E, when the saw has made an impression deep enough to be worked without the help of it.

Fig. 9. A, A convenient forceps to take out the circular piece of bone, when it does not stick to the saw: the contrivance by which they readily lay hold of it, is to make the extremities that are to grasp it with an arch of the same circle as the saw is made. Upon one of the handles there is added a little elevator, to lift up any small splinter of bone.

B, A lenticular: the fore-part of its blade is sharp, in order to scrape the lower edge of the orifice of the cranium, in case any splinters should remain after the operation; and the button at its extremity receives the dust, that it may not fall on the brain; but there is seldom any occasion for this instrument.

C, A rugine or raspator, for scraping bones in order to promote granulations of flesh. The handles of these two last instruments are wood; whereas every part of the others should be made of steel.

Fig. 10. A, The couching needle; the broad part of which towards the point is flat on one side; but on the other is a little convex, to give it more substance and strength.

The handle of this instrument is white ivory, inlaid with a streak of black in that part of it lying even with

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B, A speculum oculi, which is made to open or shut by an iron button sliding along a slit in the handle. This instrument is composed of one piece of steel, in such a manner that it would fly open by its elasticity, if the two branches of the handle were not confined by the button. The circle of it should be covered with velvet, to make it lie softer on the eye-lids.

C, The knife for cutting the iris; the blade of which has two edges, resembling a lancet, which are more advantageous than one only, in cutting the cornea for the extraction of the cataract.

Fig. 11. A, the eye, with the skin of the eye-lids denuded, in order to show the orbicularis muscle: the white streak running from the inner angle of the eye towards the nose, is the tendon of the orbicularis muscle. At a little distance from the internal angle, on the edge of the eye-lids, may be observed two black spots, which are the orifices of the lachrymal channels, and called the *puncta lachrymalia*.

B, the exact dimension of the lachrymal channels and bag; the prickled line represents the edge of the orbit.

C, A small incision knife, more handy than a larger for opening the bag.

D, The perforator to destroy the os unguis, if ever it should happen to be necessary.

E, An iron instrument made thin and pliable, to set even on the forehead, and for use covered with velvet: the holes at the three extremities receive two pieces of ribband, by which it is fastened on the forehead: the button at the end of the screw is to be placed on the sacus lachrymalis, and the screw to be twisted till the button makes a considerable pressure on the bag: the button should be covered with velvet, and a little compress of plaster be laid on the bag before it is applied, to prevent the skin from being galled by the pressure. The little branch of iron which receives the screw must be soft enough to admit of bending, otherwise it will be difficult to place the button exactly on the bag. This instrument is for the left eye only; it should be worn night and day in the beginning of a fistula, and after a fistula has been healed by incision; but as the success depends upon the exact situation of the button upon the bag, it should be carefully looked after.

Fig. 12. A, The bent probe used in extirpating the tonsils, fixed in a handle, with the ligature made of the same thread as the ligatures for tying the blood-vessels.

B, The iron instrument for tying the tonsils.

This instrument is also of great service in extirpating, by ligature, a species of scirrhus that sometimes grows from the neck or cavity of the uterus.

C, The needle with the eye towards the point, for passing the ligature through the tonsil, when the basis is larger than the extremity.

D, A canula made of silver to be used in the empyema.

E, A canula to be used in bronchotomy.

To keep the canulas in their place, small ribbands may be passed through the rings of them, and carried round the body and neck; or they may be held by a ligature run through, and fastened to a hole cut in a piece of sticking-plaster, which is to be laid on each side of them.

Fig. 13. A, The instrument called the *probe razer* to cut the mastoideus muscle in the wry neck; it is sharp only about half its length at that end where the blade is broad.

B, The two pins with the twisted suture, used in the bare-lip.

C, The polypus forceps, with one of the rings open for the reception of the thumb, which would be cramped in pulling the forceps with much force, if it were received in the same sort of ring as in the other handle.

Fig. 14. A, The figure of the amputating knife. The length of the blade and handle should be about thirteen inches.

B, The figure of the saw used in amputating the limbs. The length of the handle and saw should be about seventeen inches.

Fig. 15. The form of the tenaculum used for pulling out bleeding vessels to be tied up.

Fig. 16. and 17. Two needles of a different form from those in ordinary use, recommended by Mr. Bell as the most convenient, particularly in deep wounds.

Fig. 18. The instrument named *porte-aiguille*, for passing through the pins in making the twisted suture.

A, The handles.

B, A groove for receiving the pins used in the suture.

Fig. 19. A flat needle, sometimes useful in stitching blood-vessels that lie between contiguous bones.

Fig. 20. An improved tourniquet by Mr. Bell. The manner of using it described p. 8415.

Fig. 21. An improved trocar by Mr. André, for the purposes of tapping for the ascites or hydrocele. The roundness of its point makes it pierce more easily than the common one, which is triangular. That the instrument may be easily withdrawn after the perforation is made, the canula (fig. 22.) is composed of two pieces screwed together; by unloosening which the instrument will easily dilate them, and they will close by the pressure of the surrounding flesh, so as to afford a passage for the liquid to be drawn off.

Fig. 23. Mr. Bell's trocar for evacuating the contents of an encysted hydrocele. By the flatness of its form, and its point being of the lancet kind, this instrument penetrates the cyst with great ease; and can thereby be used with more safety than the ordinary form of this instrument.

The point of the perforator is commonly made much longer than is necessary. It ought not to pass more than the fifth or sixth part of an inch from the extremity of the canula; of this length it answers equally well as when the point is longer, and it is not so apt to wound the testis on being introduced into the cavity of the tunica vaginalis.

Fig. 24. Represents figs. 25. and 27. united, which is then called the *double gorgeret*, with the cutting blade *g, h*, affixed to it. This instrument is used in lithotomy, and recommended by Mr. Bromfield; (*vide supra*, n° 478, et seq.).

a b, The handle of the hinder part.

c, d, The

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c d, The grooved edge of the under gorgeret, that has received the edge of the upper gorgeret.

e, The beak of the under gorgeret.

f, The handle of the upper gorgeret, by which the instruments when united, are to be introduced into the bladder.

Fig. 25. The upper part of the double gorgeret, with the blade affixed for cutting the prostate gland; *g*, the cutting blade, which is blunt at *b*.

k, A hole or slit, through which the urine will pass as soon as the instrument enters the bladder. This observation will be a guide to the operator, as to the length of the incision he would wish to make of the prostate, by the farther introduction of the instrument when united.

1, The screw to fix the blade to the upper gorgeret.

Fig. 26. The posterior side of the double gorgeret when united for use.

e, The beak formed in the under gorgeret.

11, Shows the hollow of the two gorgerets when united, through which the urine comes out, when the extremity is got into the bladder.

Fig. 27. The under part of the double gorgeret separated from the upper, which varies but little in shape from the common gorgeret.

a, The beak; *bb*, the inner edges of the concave part, grooved as far as *cc* to permit the edges of the upper part to glide in, by which means they become one instrument at the time of introducing it.

Fig. 28. The upper part of the double gorgeret with its convex side uppermost; *f*, the handle; *ee*, the edges of the gorgeret made thin, so as to glide along the groove in the under part of the instrument.

d, The point, which, when united, forms the double gorgeret, and somewhat resembles the extreme part of a cow's horn. In this form it is a very great dilator, and a much safer instrument than the common gorgeret when the membranous part of the urethra only is wounded in the operation of lithotomy.

Fig. 29. The same instrument, only intended to show its internal or concave part.

Fig. 30. The cutting blade separated from the upper gorgeret.

1, A small hole through which a screw passes to fix it to the upper gorgeret, as is expressed by *l*, fig. 28.

m, A little hook-like part, which is received into a slit adapted to it in the upper gorgeret.

The space between *n, o*, is the only part of the blade that should cut.

N.B. Great care must be taken by the instrument-maker, to place the blade on the upper gorgeret in such direction, that its edge may incline obliquely downwards and outwards when the instrument is pushed on to divide part of the prostate gland.

Fig. 31. Mr Wathen's instruments for the cure of a fistula lachrymalis.

A, The ring at the top of the style.

B, The inferior extremity of the style rounded, so as to fill exactly the smaller end of the tube.

C, The shoulder; by means of which the style is prevented from passing further in the tube than it is designed it should.

D, The tube, with a small perforation near its upper or larger aperture for the admission of a thread.

E, The tube, with its thread in it.

F, G, H, The style, tube, and thread put together; which points out the manner in which the instrument is fitted for use.

1, The knot tied in the thread at the distance of an inch from the tube.

Fig. 32. Shows Mr Wathen's contrivance for keeping a broken limb steady. It is applicable either to the superior or inferior extremities; and in the figure is represented as applied to a compound fractured leg.

Fig. 33. Gives the skeleton of the machine which he calls a *conductor*, separated into two portions. The knee-band *a*, made of tin, a little bent; divided by four joints *b*, that it may fit any limb, great or small; holes *c*, for fixing the buckle and strap; others *d*, round each margin for sewing on the padding; two tin canulas *e*, grooved on the outside, and furnished on the inside with brass springs *f*, and catches *g*; small holes *h*, through which the catches pass to meet the serræ of the upright portions, when they are within the canulas.

The figure in the middle represents the inside of the tube with the groove.

Fig. 34. The ankle-band *a*, constructed as the knee-band, but less; shoulders *b*, to support and render the serrated portions parallel to the grooved canulas; both of brass.

By compressing the springs, the catches are raised, and admit the whole length of the upright serrated portions within the canulas; reducing the conductor to near half its length: from which reduction of the instrument, by the disposition of the catches and serræ, the canulas are retracted without difficulty, but cannot be returned the same way unless the catches are elevated by compressing the springs. By this means, when the conductor is fixed, the extension hereby given to the leg, whatever it be, is secured with the greatest certainty, tho' alterable with the utmost ease.

Fig. 35. The same instrument covered with leather, that it may fit easy on the limb.

Fig. 36. and 37. The improved splints applied upon a broken leg, so that the foot-pieces are plainly to be seen on both sides.

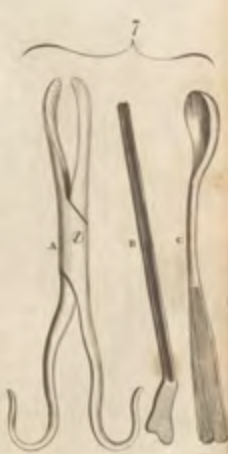
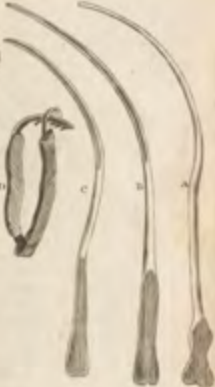
Fig. 38. Shows a machine invented by Mr Gooch for keeping up the hand, and allowing at the same time the motion of the fingers. This machine should be made a little concave, of light tough wood, such as beech, willow, or alder, and be covered with leather to be glued upon the wood. Its dimensions for a limb of a common size should be about ten inches long and three and a half broad. Besides the hooks shown upon the sides, it should have one in the middle. It is to be confined to the limb with filets tied upon stiff paper.

This very simple machine has been found of signal service in luxations of the wrist, and in fractures near that joint, as well as in other cases where it is necessary to have the hand supported, and also occasionally kept in gentle motion to preserve the flexure of the joint.

Rule-joints may be used to more advantage, where there is no occasion to drop the hand, and they will allow of a little motion upwards; when they are used, no hooks are required upon the machine.

SURI-

Fig. 1.















35

33
The Width from End to End, in the View as here Drawn, 16 In.



36

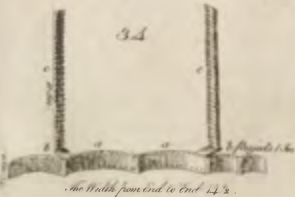
37



38



34



The Width from End to End 14 1/2.

A Bell Sculpt.



(Surinam
||
Surveyor.

SURINAM, the capital of the Dutch settlements in Guiana, situated on a river of the same name, in N. Lat. 6. 16. W. Long. 56. o. It gives name to the country for 100 miles round; and stands on a river of the same name, which is navigable for 30 leagues up the country. Besides Surinam, there are seven or eight large towns, all rich and populous, and about 500 plantations. The colony is very flourishing, and carries on a considerable trade in sugar, tobacco, cotton, flax, dyeing woods, &c.

SURMOUNTED, in heraldry, is when one figure is laid over another.

SURNAME, or **SIRNAME**, a name added to the proper or baptismal name, to denote the person of such a family.

SURREPTITIOUS. See **SURREPTITIOUS**.

SURROGATE, in law, denotes a person that is substituted or appointed in the room of another.

SURRY, a county of England, bounded on the west by Berkshire and Hampshire, on the south by Sussex, on the east by Kent, on the north by Middlesex, from which it is parted by the Thames, whence it had the name of *Sub-rey* from the Saxons, i. e. the country on the south-side of the river. It is 34 miles in length from east to west, 21 in breadth from north to south, and 112 in circumference. It contains 13 hundreds, 140 parishes, of which 35 are vicarages, 11 market-towns, 450 villages, 592,000 acres, and about 170,000 inhabitants. The members sent from it to parliament are 14, of which two are sent by each of the following boroughs, viz. Southwark, Blechingley, Ryegate, Guildford, Gatton, Haslemere, and two for the county.

The air of this county, towards the middle consisting mostly of hills and heath, is sharp, but pure and wholesome. About the skirts, where it is more level, and the soil richer, the air is milder, but still salubrious. In the middle parts the soil is barren enough in general; but towards the extremities, and where the country is open and champaign, it is fruitful in grass and corn, particularly on the south side in Holmstead, in which meadows, woods, and corn-fields, are agreeably intermixed. The soil is also very fertile along the Thames, especially towards London, where it greatly contributes to maintain plenty in the London markets. It has several rivers, abounding with fish, the chief of which are the Wye, the Mole, and the Wandle. The first of these is of great benefit to the county, being navigable from Weybridge to the Thames, and thereby supplying many parts of it with necessities of all sorts. The Mole is so called because it runs about two miles under-ground, entering at a place named the *Swallower*, at the bottom of Boxhill, and emerging again, as is commonly thought, at Leatherhead. The chief articles of commerce produced in the county, are corn, boxwood, walnuts, and fullers-earth, which is sold at a great a bushel.

SURVEYING, the art of measuring land; that is, of taking the dimensions of any tract of ground, laying down the same in a map or draught, and finding the content or area thereof. See **GEOMETRY**.

SURVEYOR, a person who has the oversight and care of considerable works, lands, or the like.

SURVEYOR, likewise denotes a gauger; as also a person who surveys lands, and makes maps of them.

SURVIVOR, in law, signifies the longest liver of joint tenants, or of any two persons jointly interested in a thing.

SUS, in zoology, a genus of quadrupeds belonging to the order of belluae. They have four converging fore-teeth in the upper jaw, and six prominent ones in the under jaw; the snout is truncated, prominent, and moveable. There are five species. 1. The scropha, or common hog, with the body covered with bristles; two large teeth above and below. In a wild state, of a dark brindled colour, and beneath the bristles is a soft short hair; the ears short, and a little rounded. TAME: the ears long, sharp-pointed, and slouching; the colour generally white, sometimes mixed with other colours. In a tame state it is universal; except in the frigid zones, and in Kamtschatka, where the cold is very severe. Since its introduction into America by the Europeans, it abounds to excess in the hot and temperate parts. It is found wild in most parts of Europe. In the forests of South America there are vast droves, which derive their origin from the European kind relapsed into a state of nature; and are what Mr Bancroft in his History of Guiana, 126, describes as a particular species by the name of *Warree*. They cannot bear excessive cold; inhabit wooded countries; and are very swift. In America they are useful by clearing the country of rattle-snakes, which they devour with safety.

Of all quadrupeds, the hog is the most rude and brutal. The imperfections of his form seem to have an influence on his nature and dispositions. All his habits are gross; all his appetites are impure; all his sensations are confined to a furious lust, and a brutal gluttony. He devours indiscriminately every thing that comes in his way, even his own progeny the moment after their birth. This voraciousness seems to proceed from the perpetual cravings of his stomach, which is of an immoderate size; and the grossness of his appetites, it is probable, arises from the bluntness of his senses of taste and of feeling. The rudeness of the hair, the hardness of the skin, and the thickness of the fat, render these animals less sensible to blows. Mice have been known to lodge upon a hog's back, and to eat his skin and fat, without his showing any marks of sensibility. The other senses of the hog are very good. It is well known to the hunters that the wild boar hears and smells at a great distance; for, in order to surprize him, they are obliged to watch him in silence during the night, and to place themselves opposite to the wind, that he may not perceive the smell, which never fails to make him turn back.

But the hog, though the most impure and filthy of all quadrupeds, is yet useful by the very forbiddens of its manners; this alone devouring what is the refuse of all others, and contributing not only to remove what would be a nuisance to the human race, but also converting the most nauseous offals into the richest nutriment: for this reason its stomach is capacious, and its gluttony excessive: not that its palate is insensible to the difference of eatables; for where it finds variety, it will reject the worst with as distinguishing a taste as other quadrupeds.

The parts of this animal are finely adapted to its way of life. As its method of feeding is by turning up the earth with its nose for roots of different kinds,

Survivo
Sus.

Sus.

so nature has given it a more prone form than other animals; a strong brawny neck; eyes small, and placed high in the head; a long snout, nose callous and tough, and a quick sense of smelling to trace out its food. Its intestines have a strong resemblance to those of the human species. The external form of its body is very unwieldy; yet, by the strength of its tendons, the wild boar (which is only a variety of the common kind) is enabled to fly from the hunters with amazing agility: the back-toe on the feet of this animal prevents its slipping while it descends declivities, and must be of singular use when pursued. Yet, notwithstanding its powers of motion, it is by nature stupid, inactive, and drowsy; much inclined to increase in fat, which is disposed in a different manner from that of other animals, and forms a regular coat over the whole body. It is restless at a change of weather, and in certain high winds is so agitated as to run violently, screaming horribly at the same time: it is fond of wallowing in the dirt, either to cool its furcated body, or to destroy the lice, ticks, and other insects with which it is infested. Its diseases generally arise from foul feeding and intemperance; measles, imposthumes, and serophulous complaints, are reckoned among them. These are best prevented by keeping the animals, as the ancients strongly recommended, very clean in their flies; allowing them air, exercise, and a sufficiency of water. Linnæus observes, that its flesh is wholesome food for athletic constitutions, or those that use much exercise; but bad for such as lead a sedentary life: it is, however, of most universal use; and furnishes numberless materials for epicurism.

The boar, or male of these creatures, is chosen with great care, when intended for the propagation of his species; and is thus employed from the age of two to five years, and then either sold or fattened. The males not allotted to this use are castrated, sometimes at the age of six weeks, and sometimes when they are six months old; and then fed to a size either for sale or for the use of the family. Sows are kept for breed generally from one year old to seven, and are then spayed and fattened. They have commonly more grease on their intestines than hogs, these being fattest on their backs.

As to the age of these animals, it is said that the life of the wild boar may be extended to twenty-five or thirty years. Aristotle says, that hogs in general live twenty years; and adds, that both males and females are fertile till they arrive at the age of fifteen. They can engender at the age of nine or twelve months; but it is better to refrain till they be eighteen months or two years. The first litter of the sow is not numerous; and, when only one year old, her pigs are weak, and even imperfect. She may be said to be in season at all times. Though full, she solicits the approach of the male. This may be regarded as an excess among animals; for almost every other species refuse the male after conception. The ardour of the sow, though almost perpetual, is however marked by paroxysms and immoderate movements, which always terminate by her wallowing in the mire. She, at the same time, emits a thick whitish fluid. She goes four months with young; brings forth in the beginning of the fifth; and soon afterwards solicits the male, is impregnated a second time, and of course

brings forth twice a year. The wild sow, which every way resembles the domestic kind, produces only once a year. This difference in fertility is probably owing to want of nourishment, and the necessity of suckling her pigs much longer than the domestic sow, which is never allowed to nurse her young above fifteen days or three weeks. Only eight or nine of the litter are kept longer; the rest are sold. In fifteen days, pigs are excellent food.

As these creatures, though exceedingly voracious, will feed almost on any thing, they are bred and kept every where, and are quickly and cheaply fattened. In miry and in marshy grounds (from which they are not averse) they devour worms, frogs, fern, rush, and fedge roots. In drier and in woody countries, they feed on hips, haws, does, crabs, mast, chefnuts, acorns, &c. and on this food they will grow fleshy and fat. They are a kind of natural scavengers, will thrive on the trash of an orchard, the outcasts of the kitchen, the sweepings of barns and granaries, the offals of a market, and most richly on the refuse of a dairy. If near the sea, they will search the shores for shell-fish; in the fields, they eat grass; and in cities and large towns they are kept in great numbers, and supported chiefly by grains. It is evident that the facility of feeding them everywhere at a small expence, is a national benefit, more especially in a country where the people are accustomed to eat flesh daily, and could not perhaps perform their daily labour if they did not. It is no less observable, that notwithstanding this facility of feeding, and the multitudes of swine maintained, they seldom fail of coming to a good market. In no part of Europe is the management of these creatures better understood than in Britain. The time of farrowing is adjusted to the nature of the farm, the food it can supply; and the number of pigs sold and kept are in like manner adjusted. New kinds of food, more wholesome and nutritive than what were used formerly, have been introduced, such as turnips, carrots, clover, &c. They are in most places regularly managed and closely attended. Tuller, many years since, affirmed from his own experience, that a sow might bring as much profit as a cow. In some countries, it is said, a sow dependent on a dairy bath produced, all expences deducted, about 10*l.* in the space of a year. It may be some satisfaction to the reader to know, that, on a nice calculation, the annual profits of a sow in France are found to be between 50 and 60 livres.—In Britain, these animals in different counties are of very different sizes. In Leicestershire, Northamptonshire, and Pembrokehire, they are very large. In Hampshire, Wiltshire, and wherever they can run in the woods, and feed on mast and acorns, their flesh is firmer and better. The Chinese breed are common with us: they are smaller, blacker, and their legs shorter than ours; so that, when fat, their bellies literally touch the ground. They thrive exceedingly well with us, are very prolific, and their flesh admirably fine and well-tasted.

In considering the advantages derived from these creatures, it is to be observed, that the flesh of all their different kinds, and at all ages, is looked upon as a very substantial and agreeable aliment, and of course, in their proper seasons, the different sorts of provisions this supplies are all of them very saleable. The wild
boar

Sus.

boar was esteemed a prime delicacy amongst the Romans, and the flesh of the tame was much more in favour with our ancestors than with us; though BRAWN has still many admirers, is made in the greatest perfection, and considered as a rarity peculiar to this country. Pork, though it might be wisely prohibited in some warm countries, is found by experience equally nutritive and salutary here. As such it furnishes a very large proportion of that food which is vended in our markets. It takes salt better, and keeps longer, than the flesh of any other animal; and the consumption of it is prodigious when pickled or salted, more especially in our foreign garrisons and in the sea service. Our bacon is differently cured, so as to render it acceptable to all palates; and our hams are not at all inferior to those of other countries. Fresh pork sells nearly as dear as beef; the lard brings double or triple the price; the blood, the intestines, the feet, and the tongue, are all prepared as food. The fat of the intestines and web, which differs from common lard, is employed for greasing axles of wheels, and many other purposes. Sieves are made of the skin; and brushes, pencils, &c. of the bristles. The dung is reputed next in value to that of sheep. Mr Worlidge (Survey of Husbandry, p. 172.) proposes that swine should be turned into a clove, well-paled, and planted with greens, pulse, and roots, on which they may feed, and by their trampling and their dung raise a great quantity of excellent soil. Mr Mortimer assures us (Art of Husbandry, vol. i. p. 117.) that some, on poor light shallow land in Staffordshire, sow a small white pea, which they never reap, but turn in so many hogs to eat them as they think they will fat; and there they lie day and night, and their dung will so enrich the land, that it will bring a good sword upon it, and will graze many years afterwards. Our old husbandmen had an ill opinion of this dung, as supposing it bred weeds, which any dung will do that abounds in salts. In some places they wash with hogs dung for want of soap; which answers tolerably well, if the linen hangs long enough in the air to become thoroughly sweet.

The wild boar was formerly a native of our country, as appears from the laws of Hoeldda, who permitted his grand huntsman to chase that animal from the middle of November to the beginning of December. William the Conqueror punished with the loss of their eyes any that were convicted of killing the wild boar, the stag, or the roebuck; and Fitz-Stephen tells us, that the vast forest that in his time grew on the north-side of London, was the retreat of stags, fallow-deer, wild boars, and bulls. Charles I. turned out wild boars in the New Forest, Hampshire; but they were destroyed in the civil wars.

On the continent the wild boar is hunted with dogs, or killed by surprise during the night, when the moon shines. As he flies slowly, leaves a strong odour behind him, and defends himself against the dogs, and often wounds them dangerously, fine hunting dogs are unnecessary, and would have their nose spoiled, and acquire a habit of moving slowly by hunting him. Mastiffs, with very little training, are sufficient. The oldest, which are known by the tract of their feet, should only be attacked: A young boar of three years old is difficult to hunt down; because he runs very far far without stopping. But the older boars do not

run far, allow the dogs to run near, and often stop to repel them. During the day, he commonly remains in his soil, which is in the most sequestered part of the woods. He comes out in the night in quest of food. In summer, when the grain is ripe, it is easy to surprize him among the cultivated fields, which he frequents every night. As soon as he is slain, the hunters cut off his testicles, the odour of which is so strong, that in a few hours it would infect the whole flesh. The snout of an old boar is the only part that is esteemed; but every part of the castrated and young boar, not exceeding one year fed, makes delicate eating. The pork of the domestic boar is still worse than that of the wild boar; and it can only be rendered fit for eating by castration and fattening. The ancients castrated the young boars which they could carry off from their mothers, and returned them to the woods, where they grew fat, and their pork was much better than that of domestic hogs.

2. The athiopius, or Ethiopian hog, with small tusks in the lower jaw, very large ones in the upper, in old boars bending towards the forehead in form of a semicircle: no foreteeth: nose broad, depressed, and almost of a horny hardness; head very large and broad: beneath each eye a hollow, formed of loose skin, very soft, and wrinkled; under these a great lobe or wattle, lying almost horizontal, broad, flat, and rounded at the end, placed so as to intercept the view of any thing below from the animal. Between these and the mouth on each side, there is a hard callous protuberance. The mouth is small: skin dusky: bristles disposed in fasciculi, of about five each; longest between the ears and on the beginning of the back, thinly dispersed on the rest of the back. Ears large and sharp-pointed, inside lined with long whitish hairs: tail slender and flat, not reaching lower than the thighs, and is covered with hairs disposed in fasciculi. Body longer, and legs shorter, than in the common common swine: its whole length 4 feet 9 inches; height before, 2 feet 2 inches: but in a wild state, it grows to an enormous size.—These animals inhabit the hottest parts of Africa, from Senegal to Congo, also the island of Madagascar. We know little of their nature; but they are represented as very fierce and swift, and that they will not breed with the domestic sow.

3. The tajacu, or pecary, with four cutting teeth above, and six below: two tusks in each jaw; those in the upper jaw pointing down, and little apparent when the mouth is shut; the others hid: length from nose to the end of the rump about three feet: head not so taper as in common swine: ears short and erect: body covered with bristles, stronger than those of the European kind, and more like those of a hedge-hog; they are dusky, surrounded with rings of white; those on the top of the neck and back are near five inches long, grow shorter on the sides; the belly almost naked; from the shoulders to the breast is a band of white: no tail: on the lower part of the back is a gland, open at the top, discharging a fetid ichorous liquor; this has been mistakenly called a *navel*.—Inhabits the hottest parts of South America, and some of the Antilles: lives in the forests on the mountains: not fond of mire or marshy places: less fat than the common hog. They go in great droves. They are very fierce, and will fight stoutly with the beasts of prey: the ja-

Sus.
Sufa.

guar, or American leopard, is their mortal enemy; often the body of that animal is found with several of these hogs slain in combat. Dogs will scarce attack this animal: if wounded, it will turn on the hunters. They feed on fruits and roots; also on toads and all manner of serpents, which they hold with the fore-feet and skin with great dexterity. The flesh is reckoned very good food; but all writers agree that the dorsal gland must be cut out as soon as the animal is killed, or the flesh will become so infested as not to be eatable. The Indian name of this species is *paquiras*, from whence seems to be derived that of *pecary*.

Plate
CCLXXVI
fig. 1.

4. The babyrussa, or Indian hog, with four cutting teeth in the upper, six in the lower jaw; ten grinders to each jaw; in the lower jaw two tusks pointing towards the eyes, and standing near eight inches out of their sockets; from two sockets on the outside of the upper jaw two other teeth, twelve inches long, bending like horns, their ends almost touching the forehead: ears small, erect, sharp-pointed: along the back are some weak bristles; on the rest of the body only a sort of wool, such as is on the lambs: the tail long, ends in a tuft, and is often twisted: the body plump and square. Inhabits Buero, a small isle near Amboina: it is also found in Celebes, but neither on the continent of Asia or Africa; what M. de Buffon takes for it is the Ethiopian boar. They are sometimes kept tame in the Indian isles: live in herds: have a very quick scent: feed on herbs and leaves of trees; never ravage gardens like other swine: their flesh well-tasted. When pursued and driven to extremities, they rush into the sea, swim very well, and even dive, and pass thus from isle to isle. In the forests they often roll their heads, by hooking their upper tusks on some bough. The tusks, from their form, are useless in fight.

5. The hydrocheris, or river-hog, has a very large and thick head and nose; small rounded ears; large black eyes; upper jaw longer than the lower: two strong and great cutting teeth, and eight grinders, in each jaw; and each of those grinders form on their surface seemingly three teeth, each flat at their ends: legs short; toes long, connected near their bottoms by a small web; their ends guarded by a small hoof: no tail: hair on the body short, rough, and brown; on the nose, long and hard whiskers. It grows to the size of a hog of two years old.—Inhabits the eastern side of South America, from the isthmus of Darien to the river of Amazons: lives in the fenny parts not remote from the banks of great rivers: runs slowly; swims and dives remarkably well, and keeps for a long time under water: feeds on fruits and vegetables: is very dexterous in catching fish, which it brings on shore and eats at its ease: it sits up, and holds its prey with its fore-feet, feeding like an ape: feeds in the night, and commits great ravages in gardens. They keep in large herds, and make a horrible noise like the braying of an ass. The flesh is tender, but has an oily and fishy taste. They are easily made tame, and grow very fat.

SUSA, the ancient royal residence of the kings of Persia, built by Darius Hytaspis, according to Piny; though he probably only restored it, being a very ancient city, founded by Tithonus father of Memnon. It was in compals 120 stadia, of an oblong quadrangle

form, with a citadel called *Memnoneum*. In scripture it is called *Susan*, the royal citadel, from the great number of lilies growing in that district (Athenaeus); situate on the river Uhlai, or Euleus (Daniel): and the Spaniards call at this day a lily *ajafena* (Pinedo.) Sufa was the winter, as Ecabatana was the summer, residence of the kings of Persia, (Xenophon, Strabo, Plutarch.) Here the kings kept their treasure, (Herodotus.) Now called *Tufter*.

SUSPENSION, in Scots law. See LAW, N° clxxxv. 5. 6. 7.

SUSSEX, a county of England, deriving its name from its situation in respect of the other Saxons, and called *Suffex*, i. e. the country of the South Saxons, has Hampshire on the west, the British channel on the south, Surrey on the north, and Kent on the east. Its length is 65 miles, its breadth 29, and its circumference 170. It is divided into 6 rapes, and these into 65 hundreds, in which are 312 parishes, of which 123 are vicarages, one city, 18 market-towns, 1060 villages and hamlets, and about 120,000 thousand souls. It has few good ports, though it lies along the channel for 65 miles, which is its greatest length, the coast being encumbered in many places with rocks; and where it is more open, such quantities of sand are thrown upon it by the south-west winds, and the harbours so choked up, that they will not admit vessels of any great draught or burden. The county is well watered by the rivers Arun, Adar, Ouse, Rother, Lavant, Cuckmeer, Ashburn, and Aften, by which it is well supplied with fish, as well as from the sea. Hence different places of the county are famed for different sorts of fish, as the Arun for mullets, which enter it from the sea in summer in shoals, and by feeding upon a particular kind of herb become extremely delicious; Chichester for lobsters, Selsey for cockles, Amberley for trout, Pulborough for eels, Rye for herrings, and the county in general for carp. It is remarkable, that all the rivers above-mentioned rise and fall into the sea within the county.

The air, as well as the soil, is various in different parts of the county. Upon the coast the air is aguish, upon the hills and downs pleasant and wholesome; but somewhat moist and foggy in the valleys, the soil being deep and rich, and the vegetation in summer very vigorous. The downs in some places are very fertile in corn and grass; in others they feed great flocks of sheep, whose flesh and wool are very fine; but of the latter no inconsiderable quantity is clandestinely exported to France. In the Weald and the valleys the roads are very deep, especially in winter. In the north quarter are many woods, and some forests in other places; whence the king's yards are supplied with the largest and best timber in England, beside what is made into charcoal and consumed in the iron-works; for on the east side is plenty of iron ore, with furnaces, forges, and mills for manufacturing it. The gunpowder of this county is said to excel that of any other. Those delicious birds called *wheat-eats* are bred in this shire: they are no bigger than a lark, but almost an entire lump of fat. That part now called the *Wild or Weald* of Sussex, was anciently a mere desert for hogs and deer, of great extent, taking in a part of Kent and Surrey; and was called *Andersida Silva*, *Coid Andred*, and *Andradswald*, from *Andersida*

Suspension
Sussex.

Sutherland. an adjoining city. This county is in the home-circuit and diocese of Chichester, giving title of earl to the family of Yelverton, and sends 28 members to parliament, viz. two for the county, two for the city of Chichester, and two for each of the following towns, Horsham, Lewis, Bramber, East-Grinstead, Midhurst, Shoreham, Steyning, Arundel, Hailings, Rye, Winchelsea, and Seaford; of which the four last are cinque-ports.

SUTHERLAND, one of the most northerly counties of Scotland. Including Strathnavern, it borders on Caithness to the east and north-east, is bounded by the ocean on the north, the country of Aylshy on the west, Ross on the south, and by the German sea on the east and south-east. It stretches about 80 miles in length, and 40 in breadth; is generally hilly, though in many parts arable; well watered with small rivers and streams replete with fish, and exhibiting about 60 lakes, the habitation of various fish, swans, ducks, geese, &c. The largest of these is Lochfyn, extending 41 miles in length: some of them are interperfed with small verdant islands, which in summer yield a very agreeable prospect. On the coast are many commodious harbours, and all the bays swarm with fish; nay, the sea in this place produces some valuable pearls. Sutherland affords iron, stone, free-stone, lime-stone, and slate, in abundance. Here are also quarries of marble, and mines of coal, though the people use turf and peat for fuel. Lead-ore, impregnated with silver, and even some gold, hath been found in this province, together with crystals and pebbles.

The air is so temperate, and the soil so good, that saffron has here been brought to perfection. Many parts of the country are remarkably fruitful in corn, and the pasturage is excellent every where. Besides three great forests, there are many smaller woods in Sutherland, abounding with deer and other game. On the hills are fed numerous flocks of sheep and black cattle; small, yet sweet and juicy. There is one bird peculiar to this shire, called *knag*, which resembles a parrot, and digs its nest with its beak in the trunks of oaks. The northern part, called *Strathnavern*, and separated from the rest by a ridge of mountains, is bounded on the north and west by the Deucaledonian and Vergivian oceans, on the east by Caithness, and on the south by Aylshy. The length of it, from east to west, amounts to 34 miles; but the breadth from north to south does not exceed 12 in some places. It is very hilly; and the mountains are so high, that the snow remains on the tops of them till midsummer. It is watered by Naver, from whence it derives its name: as this district gives a title to the eldest son of the earl of Sutherland. Here are several woods, frequented by deer and other game, which the people take great delight in hunting. Iron-mines have been worked in some places, but to no great advantage. Strathnavern has many fresh-water lakes or lochs; the chief of which are Loch Naver, and Loch Lye: there are several islands on the northern coast; and in various parts of the country we see monuments of victories obtained over the Danes or other foreign invaders. Sutherland boasts of some towns, and a great many villages. The people are numerous, hardy, bold, and enterprising; courteous to strangers; cheer-

ful, open, frugal, and industrious. They, as well as their neighbours of Caithness, speak the language, and wear the garb, used in the Lowlands of Scotland. They carry on a considerable salmon-fishery. They drive a traffic with their black cattle, sheep, and horses, at the neighbouring fairs; but export their corn, barley, salt, coal, salmon, salted beef, butter, cheese, wool-skins, hides, and tallow. Here are provisions of all sorts in plenty; and so cheap through all this country, that a gentleman may keep house and live much more sumptuously for 200*l.* a year than he can live for three times the money in the south of England.

SUTLER, in war, on who follows the army and furnishes the troops with provision. They pitch their tents, or build their huts, in the rear of each regiment, and about head-quarters.

SUTRIUM, (anc. geog.) a famous city, and an ancient colony of the Romans; the key of Etruria. The colony led seven years after the taking of Rome by the Gauls, (Velleins). Now *Sutri* in St Peter's patrimony, on the river Pozzolo; surrounded on every side with rocks, 24 miles to the north-west of Rome.

SUTTON (Samuel), was born at Alfreton in Derbyshire, and going into the army served under the duke of Marlborough in queen Anne's wars with great credit. He afterwards came to London, commenced brewer, and kept a coffee-house in Aldersgate street, which was well frequented by the learned men of that time, by whom Mr Sutton was much respected, as a man of strong natural parts and uncultivated genius. About the year 1740, he schemed a very simple and natural method for extracting the foul air from the wells of ships, by pipes communicating with the fire places of the coppers; which operated as long as any fire was kept burning for the ship's use. In this happy invention, so conducive to the safety of mariners, he met, however, with a formidable competitor in Dr Stephen Hales; who was at the same time engaged in promoting his own ventilators: tho' these ventilators were by no means so well adapted to sea-use, where room and labour are precious, as Sutton's air pipes; which could scarcely be said to occupy any room, and required no labour to work them, as they produced a regular circulation of air, on philosophical principles. Nevertheless, though Mr Sutton's invention was warmly patronized by Dr Mead and Dr Watson, it was ungenerously discouraged by some leading men in the navy department. Dr Mead annexed an account of these air-pipes, and the history of the author's difficulties in procuring a fair trial to be made of them, to his Discourse on the Scurvy. Mr Sutton took out a patent in 1744, to secure the profits of his invention to himself; and died about the year 1752.

SUTTON'S Air-pipes. See *Air-Pipes*.

SUTURE, in anatomy, a kind of articulation peculiar to the cranium or skull. See *ANATOMY*, n^o 2 c. and chap. ii. *passim*.

SUTURE, in surgery, a method of uniting the lips of wounds together. See *SURGERY*, n^o 65, 397, *et seq.*

SWABBER, an inferior officer on board ships of war, whose employment it is to see that the decks are kept clean and neat.

Swallow
||
Swammerdam.

SWALLOW, in ornithology. See *Hirundo*.

SWALLOW-*Wort*, in botany. See *Asclepias*.

SWAMMERDAM (John), a celebrated and learned natural philosopher, was the son of John James Swammerdam, an apothecary and famous naturalist of Amsterdam, and was born in 1637. His father intended him for the church, and with this view had him instructed in Latin and Greek; but he, thinking himself unequal to so important a task, prevailed with his father to consent to his applying himself to physic. As he was kept at home till he should be properly qualified to engage in that study, he was frequently employed in cleaning his father's curiosities, and putting every thing in its proper place. This inspired our author with an early taste for natural history; so that, not content with the survey of the curiosities his father had purchased, he soon began to make a collection of his own, which he compared with the accounts given of them by the best writers. When grown up, he seriously attended to his anatomical and medical studies; yet spent part of the day and the night in discovering, catching, and examining the flying insects proper to those different times, not only in the province of Holland, but in those of Guelderland and Utrecht. Thus initiated in natural history, he went to the university of Leyden in 1651; and, in 1663, was admitted a candidate of physic in that university. His attention being now engaged by anatomy, he began to consider how the parts of the body, prepared by dissection, could be preserved, and kept in constant order for anatomical demonstration; and herein he succeeded, as he had done before in his nice contrivances to dissect and manage the minutest insects. Our author afterwards made a journey into France, where he spent some time at Saumur, and where he became acquainted with several learned men. In 1667, he returned to Leyden, and took up his degree of doctor of physic. The next year the grand duke of Tuscany being in Holland, in order to see the curiosities of the country, came to view those of our author and his father; and on this occasion Swammerdam made some anatomical dissections of insects in the presence of that prince, who was struck with admiration at our author's great skill in managing them, especially at his proving that the future butterfly lay with all its parts neatly folded up in a caterpillar, by actually removing the integuments that covered the former, and extricating and exhibiting all its parts, however minute, with incredible ingenuity, by means of instruments of inconceivable fineness. On this occasion the duke offered our author 12,000 florins for his share of the collection, on condition of his removing them himself into Tuscany, and coming to live at the court of Florence; but Swammerdam, who hated a court life, declined his highness's proposal. In 1663, he published a *General History of Insects*. About this time, his father began to take offence at his inconsiderately neglecting the practice of physic, which might have supported him in affluence; and would neither supply him with money nor cloaths. This reduced him to some difficulties. In 1675, he published his *History of the Ephemeræ*; and his father dying the same year, left him a fortune sufficient for his support: but he did not long survive him, for he died in 1682. Gausius gave a translation of all

his works from the original Dutch into Latin, from which they were translated into English, in folio, in 1758. The celebrated Boerhaave wrote his life.

SWAN, in ornithology. See *Anas*.

SWANPAN, or Chinese *ANACUS*; a board or instrument for performing arithmetical operations, described by Du Halde in his *History of China*. The following construction is an improvement of that by Mr G. Smethurst, published in the *Gent. Mag.* for 1748.

In the square frame of wood *ABCD*, are four Plate divisions formed by the bars *EF* and *GH*; of these *CCLXX*. divisions three are separated into two parts by the lesser bars *ab*. In each of the smaller divisions are placed wires, to be taken out at pleasure; and on each of the wires in the left-hand divisions is strung a small ivory ball, or large bead; and on the wires on the right-hand division are placed four such balls or beads.

The balls in the left-hand divisions, when brought up to the middle bar, stand each for five; and those in the right divisions, when brought to the bar, stand for units.

The balls in the two lower divisions represent integers, or the whole of any quantity; those on the uppermost wires stand for ten of such integers, the next for hundreds, and so on, as is expressed in the figure. The wires, in all the divisions, may be increased to any number you think proper.

The balls in the four upper divisions represent parts of integers; those in the two divisions next the left-hand stand for tens; and those in the two other divisions, for units of such parts.

Now if the sum you would set down be integers, begin with the balls in the two lower divisions: for example, on the third row from the top bring two balls, of the right-hand division, up to the middle bar (see the figure); then bring up two on the next row, and one on the same row in the left division; next, four on the top row, and one on the other side of the same row: then in the first row of units, from the bottom, and in the right-hand division, place two balls, on the second row one, and one also on the same line in the right-hand division of tens; lastly, on the third row of units place three balls. The balls being thus placed, if the integers be pounds sterling, they will express 279 l. 2s. 11 d. If the integers be hundred weights, the sum will be 279 cwt. 2 qrs. 11 lb. 3 oz.; or if they be years, they will denote 279 years, 2 months, 11 days, 3 hours.

A part of these balls may represent fractions, either vulgar or decimal: the balls in the first two divisions of parts may stand for the numerators, and those in the other two for denominators; or the numbers in either of these divisions may be added to those in the integers, as decimals. There may also be holes made in the bars where the dots are placed, in which pegs may be occasionally put, to show that those numbers stand for fractions.

By this instrument all the operations of arithmetic may be readily performed. Suppose, for example, you would multiply the sum set down in the division of integers, that is, 279, by 3. Begin with the lowest line, and say 3 times 2 is 6, therefore set that number up; then on the next row, say 3 times 7 is 21, therefore instead of 7 set up 1 on that line, and carry the

Swan,
Swanpan.

Swanpan
|
Sweden.

the two tens to the line below, which will make the number there 8. Then at the upper line say, 3 times 9 is 27, therefore set 7 on that line, and carry 2 to the next line below, which will make that number 3. So that the balls on the three lines will then express 837.

If you would divide 279 by 3, begin in like manner with the lowest line: but as 3 cannot be taken in 2, you add the next number to it, and say, the threes in 27 are 9; therefore set back the 2 on the lowest line, and place 9, instead of 7, on the next line above: then at the uppermost line say, the threes in 9 are 3; therefore instead of 9 place 3 on that line, and consequently the quotient will be 93. When there is a remainder, it may be placed with the divisor, as a fraction, in the upper divisions. Where there are many figures in the multiplicand and multiplier, the latter may be placed in the first two divisions of parts, and the former and products in the divisions of integers. In like manner, when there are several figures in the dividend and divisor, the former may be placed in the division of integers, the latter in the first two divisions of parts, and the figures of the quotient, as they rise, in the remaining two divisions.

It is well worth observing, that by means of this instrument a blind man may be taught to add, subtract, multiply, divide, and perform all the other operations of arithmetic, with as much certainty as another person can by figures.

SWANEMOTE, SWAINMOTE, or SWEINMOTE. See FOREST-COURT.

SWEAT, a sensible moisture issuing from the pores of the skins of living animals.

SWEDEN, one of the most northerly kingdoms of Europe, lying between Lat. 55. 20. and 69. 30. north, and between 12° and 32° east from London. On the south it is bounded by the Baltic, the Sounds, and Schager-rack, or Categate; on the north by Danish Lapland; on the east by Muscovy; and on the west by the mountains of Norway.

The early history of Sweden is no less involved in fables than that of most other nations. Some historians have pretended to give regular catalogues of the princes who reigned in Sweden in very early times; but they differ so much among themselves, that no credit can be given to them. However, all agree that ancient Scandinavia was first governed by judges elected for a certain time by the voice of the people. Among these temporary princes the country was divided, until, in the year of the world 2054, according to some, or 1951, according to others, Eric, or, if we believe Puffendorf, *Suenon*, was raised to the supreme power, with the prerogatives of all the temporary magistrates united in his person for life, or until his conduct should merit deposition.

From this very early period till the year 1366 of the Christian era, the histories of Sweden present us with nothing but what is common to all nations in their early periods, viz. the endless combats and massacres of barbarians, tending to no other purpose than the effusion of blood. At the time just mentioned, however, Albert of Mecklenburg, having concluded a peace between Sweden and Denmark, which two kingdoms had been at violent war for some time before, was proclaimed king of Sweden. The peace

was of short duration, being broken in 1368; on which Albert entered into an offensive and defensive league with the earl of Holstein, the Jutland nobility, the dukes of Sleswick, Mecklenburg, and the Hanse-towns, against the kings of Denmark and Norway. Albert proved very successful against Waldemar king of Denmark at that time, driving him entirely out of his dominions; but he himself was defeated by the king of Norway, who laid siege to his capital. Soon after this, a new treaty of peace was concluded, by which Albert was allowed to enjoy the crown of Sweden in peace. However, having formed a design of rendering himself absolute, he fell under the displeasure of his subjects, and Margaret of Norway was proclaimed queen of Sweden by the malcontents. A war immediately ensued, in which Albert was defeated and taken prisoner; but as the princes of Mecklenburg, the earls of Holstein, and the Hanse-towns entered into a league in his favour, the war was so far from being extinguished by this event, that it raged with more fury than ever.

At length, in 1394, the contending parties came to an accommodation. Albert was set at liberty, on condition that he should in three years surrender to Margaret all pretensions to the city of Stockholm; and the Hanse-towns engaged to pay the sum of 60,000 marks of silver in case of Albert's breach of faith. Not long after this, Eric the son of Albert died; and he, having no other child, did not think it worth his while to contend for the kingdom of Sweden: he therefore acquiesced in the pretensions of Margaret, and passed the remainder of his days at Mecklenburg.

Margaret died in 1415, and was succeeded by Eric of Pomerania. This prince's reign was cruel and oppressive to the last degree. The people were ruined by taxes; and the Danes being every where preferred to the offices of power, committed the greatest cruelties. The consequence of this was a revolt; and Charles Canutson, grand marshal of Sweden and governor of Finland, having joined the malcontents, was declared commander in chief of their army. Eric was now formally deposed, and commenced pirate: Canutson was chosen regent; but beginning to oppress the people, and aspiring openly at the crown, the Swedes and Danes revolted; in consequence of which a revolution took place, and Christoffer duke of Bavaria, nephew to Eric, was chosen king of Denmark, Sweden, and Norway, in 1442.

On the accession of the new prince, complaints against Canutson were brought from all quarters; but, through the interest of his friends, he escaped the punishment due to him; and in 1448, Christoffer having died after a tyrannical reign of somewhat more than five years, he was raised to the throne at which he had so long aspired. However, the kingdoms of Denmark and Norway refused to own allegiance to him; upon which a war immediately commenced. In 1454 peace was concluded, and Denmark for the present freed from the Swedish yoke. Neither did Canutson long enjoy even the crown of Christian Sweden itself. Having quarrelled with the archbishop of Upsal, the latter formed such a strong party that the king could not resist him. Christian king of Denmark was called to the throne of Sweden; and in 1459 once more united the three kingdoms. He is driven out.

Sweden.

War with Denmark

prisoner by Margaret of Norway.

Is defeated

and taken

prisoner by

Margaret of Norway.

Set at liberty

Margaret

is succeeded

by Eric a

cruel tyrant.

A general

revolt takes

place, and

Eric is de-

posed.

The three

kingdoms

united under

Christian king

of Den-

mark, who

proves a

tyrant, and

is driven

out.

Early hi-
story un-
certain.

Albert of
Mecklen-
burg de-
clared king
in 1366.

Sweden.

enjoyed his dignity but a short time; for having begun to oppress his subjects in an arbitrary manner, he was obliged to retire to Denmark in 1463. Katil bishop of Lincoping, who had driven out the king, took upon himself the office of regent. Next year Christian returned with a powerful army; but was defeated. The people then thought proper to recal Canutson: but he, on his first accession, having offended the warlike bishop Katil, was by him defeated, and obliged to renounce his right to the crown. After this the kingdom was rent into factions; between whom the most cruel civil wars took place, until the year 1467, when Canutson was again recalled, and enjoyed the kingdom, though not without difficulty and opposition, till his death, which happened in 1470.

The confusion in which the Swedish affairs had been so long involved did not cease on the death of Canutson. Christian again invaded Sweden; but was defeated by Steen Sture, nephew to the late king. After this the kingdom seems to have remained in peace till the year 1487, when the Russians invaded Carelia, committing every where the greatest ravages. These were soon driven out: but in 1497, a rupture happening betwixt Sture and the senate, an offer was made of the Swedish crown to John king of Denmark. This prince readily accepted the offer, and was crowned accordingly; but no sooner was he seated on the throne than he became odious to the Swedes, from his partiality to the Danes. In a short time he set out for Denmark, leaving his queen, with a strong garrison, in the citadel of Stockholm. He was no sooner gone than the capital was invested; and though the queen made a noble defence, she was at last obliged to capitulate, on condition of being allowed to pass into Denmark. All the garrison were made prisoners of war, and the queen herself was confined in a monastery till the following year.

The Swedish affairs continued to be involved in the same dreadful confusion as we have already related, until the year 1520, when a great revolution was effected by Gustavus Ericson, a nobleman of the first rank, who restored the kingdom to its liberty, and laid the foundation of its future grandeur. The occasion of this great revolution was as follows: In 1518, Christian king of Denmark invaded Sweden, with a design to subdue the whole country: but being defeated with great loss by young Steen Sture, the regent at that time, he set sail for Denmark. But meeting with contrary winds, he made several descents on the Swedish coast, which he ravaged with all the fury of an incensed barbarian. The inhabitants, however, bravely defended themselves, and Christian was reduced to the utmost distress; one half of his forces having perished with hunger, and the other being in the most imminent danger by the approach of a rigorous winter. He then thought of a stratagem, which had almost proved fatal to the regent; for having invited him to a conference, at which he designed either to assassinate or take him prisoner, Sture was about to comply, had not the senate, who suspected the plot, interposed and prevented him. Christian then offered to go in person to Stockholm in order to confer with Sture, upon condition that six hostages were sent in his room. This was accordingly done; but the wind

happening then to prove favourable, he set sail for Denmark with the hostages, of whom Gustavus Ericson was one. Next year he returned; and having drawn Sture into an ambush, the regent received a wound of which he died some time after. The kingdom being thus left without an head, matters soon came to the most desperate crisis. The army disbanded itself; and the senate, instead of taking proper measures to oppose the enemy, spent their time in idle debates. Christian in the mean time advanced into the heart of the kingdom, destroying every thing with fire and sword; but on his arrival at Stragnez, he granted a suspension of arms, to give the people time to deliberate on their situation, and to reflect that they might easily get rid of their troubles by electing him king. This they accordingly did; and Christian proved one of the most bloody tyrants that ever sat on the throne of any kingdom. Immediately after his coronation, he gave grand entertainments for three days; during which time he projected the diabolical design of extirpating at once all the Swedish nobility, and thus for ever preventing the people from revolting, by depriving them of proper leaders. As the tyrant had signed articles, by which he promised indemnity to all who had borne arms against him, it became necessary to invent some cause of offence against those whom he intended to destroy. To accomplish his purpose, Gustavus Trolle, formerly archbishop of Upsal, but who had been degraded from that dignity, in an oration before his majesty lamented the demolition of Steckas his place of residence, and the losses sustained by the see of Upsal, amounting to near a million of money. He then proceeded in a bitter accusation against the widow and the son-in-law of Sture the late regent, comprehending in the same accusation about 15 of the principal nobility, the whole senate, and the burghers of Stockholm. The consequence of this was, that above 60 of the principal nobility and people of first rank in Sweden were hanged up as traitors. Innumerable other cruelties were committed; part of which are owned by the Danish historians, and minutely related by those of Sweden. At last he departed for Denmark, ordering gibbets to be erected, and causing the peasants to be hanged on them for the slightest offences, all the way as he passed along; and it is related of him, that at Jencoping he caused two boys, one of seven and the other of nine years of age, to be whipped to death.

This monstrous cruelty, instead of securing him on the throne, exasperated the whole nation against him. It has already been mentioned, that Gustavus Ericson, or, as he is commonly called, *Gustavus Vasa*, was among the number of the hostages whom Christian had perfidiously carried to Denmark in 1519. Large promises had been made in order to reconcile him to Christian, and threats had been used for the same purpose, but all in vain. Secret orders were given to strangle him in prison; but the officer to whom the assassination was committed remonstrated to the king about the consequences of it, and prevailed on him to change the sentence of death into close confinement in the castle of Copenhagen. Some of the hostages perished in consequence of the rigorous treatment they met with; but Gustavus withstood all hardships. At last one Banner, a Danish nobleman, pre-
vailed

Sweden.

11 He treacherously carries off six hostages of, whom Gustavus Ericson is one.

12 Is chosen king, and proves a most bloody tyrant.

13 Massacres the nobility, and causes gibbets to be erected as he passes along.

14 Adventures of Gustavus Vasa or Ericson.

9 John king of Denmark obtains the Swedish crown, but is driven out.

10 Christian king of Denmark invades Sweden, but is defeated and driven out.

vailed on the king to put him into his hands, in order to try whether or not he could prevail upon him to change his sentiments. The king, however, told Banner, that he must pay 6000 crowns in case the prisoner should make his escape. Banner generously assented; and having brought the noble prisoner to his fortrefs of Calo in Jutland, soon allowed him all the liberty he could desire, and otherwise heaped favours upon him. All this, however, could not extinguish his remembrance of the cruelties of Christian, and the desire he had of being serviceable to his country. He therefore determined to make his escape; and the liberty he enjoyed soon put him in a capacity of effecting it. Having one day mounted his horse, under pretence of hunting as usual in the forest, when he got at a proper distance, he changed his dress to the habit of a peasant; and quitting his horse, he travelled for two days on foot through by-paths, and over mountains almost impassable, arriving on the third at Flensburg. Here no one was admitted without a passport; and Gustavus dreaded presenting himself to the governor or the officer upon guard, for fear of being discovered. Happily for him, it chanced to be on that season of the year when the merchants of Lower Saxony drove a considerable trade in cattle, which they purchase in Jutland. Gustavus hired himself to one of these merchants; and under favour of his disguise escaped out of the Danish territories, and arrived at Lubeck.

Banner was no sooner acquainted with his escape, than he set out after him with the utmost diligence, found him at Lubeck, and reproached him with great warmth as ungrateful and treacherous; but he was soon appeased by the arguments urged by Gustavus, and especially by the promise he made of indemnifying him in the loss of his ransom. Upon this Banner returned, giving out that he could not find his prisoner. Christian was enraged at his escape, apprehending that he might traverse all his designs in Sweden; and gave orders to Otho his general to make the strictest search, and leave no means untried to arrest him. Gustavus applied to the regency for a ship to convey him to Sweden, where he hoped he should be able to form a party against the Danes. He likewise endeavoured to draw the regency of Lubeck into his measures; and reasoned with so much zeal and ability, that Nicholas Gemina, first consul, was entirely gained: but the regency could never be prevailed on to declare for a party without friends, arms, money, or credit. However, before his departure, the consul gave him assurances, that if he could raise a force sufficient to make head against the enemy in the field, he might depend on the services of the republic, and that the regency would immediately declare for him. Gustavus desired to be landed at Stockholm; but the captain of the ship, either having secret orders to the contrary, or business elsewhere, steered a different course, and put him on shore near Calmar, a city hitherto garrisoned by the troops of Christina widow of the regent. In truth, the governor held this place for his own purposes, and only waited to make the best terms he could with the Danes. When Gustavus arrived, he made himself known to him and the principal officers of the garrison, who were mostly Germans, and his fellow-soldiers in the late administra-

tor's army. He flattered himself that his birth, his merit, and connections, would immediately procure him the command. But the mercenary band, seeing him without troops and without attendants, regarded him as a desperate person devoted to destruction, refused to embrace his proposals, and even threatened to kill or betray him if he did not instantly quit the city.

Disappointed in his expectations, Gustavus departed with great expedition; and his arrival being now publicly known, he was again forced to have recourse to his peasant's disguise to conceal him from the Danish emissaries dispersed over the country to search for him. In a waggon loaded with hay he passed thro' every quarter of the Danish army, and at last repaired to an old family-castle in Sundermania. From hence he wrote to his friends, notifying his return to Sweden, and beseeching them to assemble all their force in order to break through the enemy's army into Stockholm, at that time besieged; but they, too, refused to embark in so hazardous and desperate an attempt.

Gustavus next applied himself to the peasants: but they answered, that they enjoyed salt and herring under the government of the king of Denmark; and that any attempts to bring about a revolution would be attended with certain ruin, without the prospect of bettering their condition; for peasants they were, and peasants they should remain, whoever was king. At length, after several vain attempts to throw himself into Stockholm, after that city was surrendered to the king, after the horrid massacre of the senate, and after running a thousand dangers, and undergoing hardships and fatigues hardly to be supported by human nature, he formed the resolution of trying the courage and affection of the Dalecarlians. While he was in the deepest obscurity, and plunged in almost insurmountable adversity, he never relinquished his designs or abandoned hope. The news of the massacre had, however, very near sunk him in depondency, as thereby he lost all his friends, relations, and connections, and indeed almost every prospect of safety to himself or deliverance to his country. It was this that inspired the thought of going to Dalecarlia, where he might live with more security in the high mountains and thick woods of that country, if he should fail in the attempt of exciting the inhabitants to revolt.

Attended by a peasant, to whom he was known, he travelled in disguise through Sundermania, Nericia, and Westermania, and arrived, after a laborious and painful journey, safe in the mountains of Dalecarlia. Scarce had he finished his journey, when he found himself deserted by his companion and guide, who carried off with him all the money he provided for his subsistence. Thus forlorn, destitute, half starved, he entered among the miners, and wrought like a slave under ground, without relinquishing his hopes of one day ascending the throne of Sweden. His whole prospect for the present was to live concealed, and gain a maintenance, until fortune should effect something in his favour: nor was it long before this happened. A woman in the mines perceived, under the habit of a peasant, that the collar of his shirt was embroidered. This circumstance excited curiosity; and the graces of his person and conversation, which had something in them to attract the notice of the meanest of the vul-

19
His friends
refuse to
assist him.

20
Applies in
vain to the
peasants.

21
Arrives in
Dalecarlia,
is robbed
by his guide
and obliged
to work in
the mines.

22
Is discover-
ed and re-
lieved.

15
He escapes
from Den-
mark.

16
Arrives at
Lubeck.

17
Attempts
in vain to
draw the
regency of
Lubeck over
to his side.

18
He arrives
at Calmar,
but meets
with an un-
favourable
reception.

Sweden.

gar, afforded room for suspicion that he was some person of quality in disguise, forced by the tyranny of the government to seek shelter in these remote parts. The story came to the ears of a neighbouring gentleman, who immediately went to the mines to offer his protection to the unfortunate stranger; and was astonished on recognising the features of Gustavus, whose acquaintance he had been at the university of Upsal. Touched with compassion at the deplorable situation of so distinguished a nobleman, he could scarce refrain from tears; but however had presence of mind enough not to make the discovery. At night he sent for Gustavus, made him an offer of his house, and gave him the strongest assurances of his friendship and protection. He told him, he would meet with better accommodations, and as much security as in the mines; and that, should he chance to be discovered, he would, with all his friends and vassals, take arms in his defence.

This offer was embraced by Gustavus with joy, and he remained for some time at his friend's house; but finding it impossible to induce him to take part in his designs, he quitted him, and fled to one Peterson, a gentleman whom he had formerly known in the service. By him he was received with all the appearance of kindness; and, on the very first proposal made by Gustavus, offered to raise his vassals. He even named the lords and peasants whom he pretended to have engaged in his service; but in a very few days after, he went secretly to a Danish officer, and gave him information of what had passed. The officer immediately caused the house to be surrounded with soldiers, in such a manner that it seemed impossible for Gustavus to make his escape. In the interval, however, he was gone, being warned by Peterson's wife of the treachery of her husband, and by her direction fled to the house of a clergyman, her friend. By him Gustavus was received with all the respect due to his own birth and merit; and left the domestic who conducted him should follow the treacherous example of his master, he removed him to the church, and conducted him to a small closet, of which he kept the key. Having lived for some time in this manner, Gustavus began to consult with his friend concerning the most proper method of putting their schemes in execution. The priest advised him to apply directly to the peasants themselves; told him that it would be proper to spread a report, that the Danes were to enter Dalecarlia in order to establish new taxes by force of arms; and as the annual feast of all the neighbouring villages was in a few days to be held, he could not have a more favourable opportunity: at the same time he promised to engage the principal persons of the diocese in his interest.

Agreeable to this advice Gustavus set out for Mora, where the feast was to be held. He found the peasants already informed of his designs, and impatient to see him. Being already prepossessed in his favour, they were soon excited to an enthusiasm in his cause, and instantly resolved to throw off the Danish yoke. In this design they were more confirmed by their superstitious; some of their old men having observed that the wind had blown from the north while Gustavus was speaking, which among them was reckoned an infallible omen of success. Gustavus did not give their

ardour time to cool, but instantly led them against the governor's castle; which he took by assault, and put the garrison to the sword. This inconsiderable enterprise was attended with the most happy consequences. Great numbers of the peasants flocked to his standard; some of the gentry openly espoused his cause, and others supplied him with money. Christian was soon acquainted with what had passed; but despising such an inconsiderable enemy, he sent only a slender detachment under the command of one Soren Norby, to assist his adherents in Dalecarlia. Gustavus advanced with 5000 men, and defeated a body of defeated. Danes commanded by one Meleen; but he was strenuously opposed by the archbishop of Upsal, who raised numerous forces for king Christian. The fortune of Gustavus, however, still prevailed, and the archbishop was defeated with great loss. Gustavus then laid siege to Stockholm; but his force being too inconsiderable for such an undertaking, he was forced to abandon it with loss.

This check did not prove in any considerable degree detrimental to the affairs of Gustavus; the peasants from all parts of the kingdom flocked to his camp, and he was joined by a reinforcement from Lubeck. Christian, unable to suppress the revolt, wreaked his vengeance on the mother and sisters of Gustavus, whom he put to death with the most excruciating torments. Several other Swedish ladies he caused to be thrown into the sea, after having imposed on them the inhuman task of making the facks into which they were to be inclosed. His barbarities served only to make his enemies more resolute. Gustavus having assembled the states at Waditena, he was unanimously chosen regent, the diet taking an oath of fidelity to him, and promising to assist him to the utmost. Having thus obtained the sanction of legal authority, he pursued his advantages against the Danes. A body of troops appointed to throw succours into Stockholm were totally cut in pieces; and the regent sending some troops into Finland, struck the Danes there with such terror, that the archbishop of Upsal, together with Slahog and Baldenacker the Danish governors, fled to Denmark. Christian received them but very coldly, apprehending that their flight might be prejudicial to his affairs; and in a short time the two governors were put to death, that the king might have an opportunity of charging them with being guilty of the cruelties which they had committed by his order. He then sent express orders to all his governors and officers in Finland and Sweden to massacre the Swedish gentry without distinction. The Swedes made reprisals for massacring all the Danes they could find; so that the whole country was filled with bloodshed and slaughter.

In the mean time Gustavus had laid siege to the towns of Calmar, Abo, and Stockholm; but Norby found means to oblige him to raise all of them with great loss. Gustavus, in revenge, laid siege to the capital a third time, and petitioned the regency of Lubeck for a squadron of ships and other succours for carrying on the siege. This was complied with, but on very hard conditions, viz. that Gustavus should oblige himself, in the name of the states, to pay 60,000 merks of silver as the expence of the armament; that, until the kingdom should be in a condition to pay that

sum,

Sweden.

25
Gusta-The Dane26
Horrid
cruelty of
king Christi-
an.27
Success of
Gustavus23
Has a very
narrow es-
cape from
the Danes.24
His cause
espoused by
the peasants
of Dalecar-
lia.

Sweden.

sum, the Lubec merchants trading to Sweden should be exempted from all duties on imports or exports; that all other nations should be prohibited from trading with Sweden, and that such traffic should be deemed illicit; that Gustavus should neither conclude a peace, nor even agree to a truce, with Denmark, without the concurrence of the regency of Lubec; and that in case the republic should be attacked by Christian, he should enter Denmark at the head of 20,000 men. Upon these hard terms did Gustavus obtain assistance from the regency of Lubec; nor did his dear-bought allies prove very faithful. They did not indeed go over to the enemy; but in a sea-fight, where the Danes were entirely in the power of their enemies, they suffered them to escape, when their whole force might have been entirely destroyed. This treachery had well nigh ruined the affairs of Gustavus: for Norby was now making preparations effectually to relieve Stockholm; in which he would probably have succeeded: but at this critical period news arrived that the Danes had unanimously revolted, and driven Christian from the throne; and that the king had retired into Germany, in hopes of being restored by the arms of his brother-in-law the emperor. On hearing this news, Norby retired with his whole fleet to the island of Göthland, leaving but a slender garrison in Calmar. Gustavus did not fail to improve this opportunity to his own advantage, and quickly made himself master of Calmar. Mean time Stockholm continued closely invested; but Gustavus thought proper to protract the siege until he should get himself elected king. Having for this purpose called a general diet, the first step was to fill up the vacancy in the senate occasioned by the massacres of Christian. Gustavus had the address to get such nominated as were in his interest; and of consequence the assembly was no sooner met, than a speech was made, containing the highest encomiums on Gustavus, setting forth in the strongest light the many eminent services he had done for his country, and concluding that the states would show themselves equally ungrateful and blind to their own interest if they did not immediately elect him king. This proposal was acceded to by such tumultuous acclamations that it was impossible to collect the votes; so that Gustavus himself acknowledged, that their affection exceeded his merit, and was more agreeable to him than the effects of their gratitude. He was urged to have the ceremony of his coronation immediately performed; but the king having some designs on the clergy, did not think proper to comply with their request, as he would have been obliged to take an oath to preserve them in their rights and privileges.—Indeed he had not been long seated on the throne before he incurred the displeasure of that body; for having large arrears due to the army, with several other incumbrances, Gustavus found it necessary to raise large contributions on the clergy. On this he was accused of avarice and hereby before the pope's nuncio. Gustavus took the proper methods for defending himself against these accusations; and in a short time after showed a great partiality for the doctrines of Luther, which by this time had been preached and been received by many people in Sweden. This embroiled him more than ever with the ecclesiastics; and it soon appeared, that either Gusta-

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vus must resign his throne, or the clergy some part of the power they had assumed. Matters were driven to extremities by the king's allowing the scriptures to be translated into the Swedish language. In 1526, the king, finding them entering into a combination against the reformists, went to Upsal, and publicly declared his resolution of reducing the number of oppressive Popish and idle monks and priests, who, under pretence of religion, fattened on the spoils of the industrious people. At last, taking advantage of the war between the pope and Charles V. of Spain, he declared himself to be of the reformed religion, and established it throughout his dominions; and at the same time, to humble the arrogance of the ecclesiastics, he gave the senators the precedence of them, and in many other respects degraded them from the dignities they formerly enjoyed. For some time the states hesitated at supporting the king in his work of reformation; inasmuch, that at last he threatened to resign the kingdom, which, he said, was doomed to perpetual slavery either to its temporal or spiritual tyrants. On this the states came into his measures, and retrenched the privileges of the ecclesiastics in the manner he proposed. Several disturbances, however, ensued. An impostor, who pretended to be of the family of Sture the former regent, having claimed the throne, the Dalecarlians revolted in his favour; but on the approach of a powerful army sent by Gustavus, they submitted to his terms. Soon after, Lutheran professors were established in every diocese; upon which a new rebellion ensued. At the head of this, was Thure Johanfon, who had married the king's sister. Several of the nobility joined him; and the king of Denmark also acceded to their cause, thinking, by means of these disturbances, to reunite the three kingdoms of Sweden, Denmark, and Norway, as they had formerly been. But Gustavus prevailed, and the rebels were obliged to take refuge in Denmark. A fresh accident, however, had like to have embroiled matters worse than before. The subsidy granted to the regency of Lubec was still due; and for the payment of it the states granted to the king all the useless bells of the churches and monasteries. The people were shocked at the sacrilege; and the Dalecarlians again betook themselves to arms. Intimidated, however, by the courage and vigorous conduct of the king, they again submitted, and were taken into favour. Tranquillity was not yet restored. Christian having established a powerful interest in Norway, once more made an attempt to recover his kingdoms, and was joined by the Dalecarlians; but being defeated by the Swedish forces, he was forced to return to Norway, where, being obliged to capitulate with the Danish generals, he was kept prisoner all his life.

In 1542, Gustavus having happily extricated himself out of all his troubles, prevailed on the states to make the crown hereditary in his family; after which he applied himself to the encouragement of learning and commerce. A treaty was set on foot for a marriage between his eldest son Eric and Elizabeth queen of England. The prince's brother, duke John, went over to England, and resided for some time at the court of London with great splendour. He returned, full of expectations of success; but bringing with him no sort of proofs in writings, his father soon perceived

42 M

that

Sweden.

30
Remnants
religion and
establishes
Protestant-
ism.

31
Disturbances
in consequence
of this.

32
Unsuccessful
attempt
of Christian

33
The crown
becomes
hereditary.

34
Unsuccessful
negotiation
for a marriage
with queen
Elizabeth.

38
He is chosen
king of
Sweden.

39
Displeases
the clergy,
and favours
the reformed
doctrines

Sweden.

that he had been the dupe of Elizabeth's superior policy. However, at last he allowed Prince Eric to go in person to England; but before he could embark, the death of Gustavus made him lay aside all thoughts of the voyage and marriage.

³⁵ Gustavus dies, and is succeeded by Eric a weak and imprudent prince.

Gustavus Vasa died in 1560, and was succeeded by his son Eric XIV. The new king was a man possessed of all the exterior ornaments which give an air of dignity to the person; but he had neither the prudence nor the penetration of his father. He created the first nobility that were ever known in Sweden; which he had no sooner done than he quarrelled with them, by passing some acts which they thought derogatory to their honour and dignity. The whole course of his reign was disturbed by wars with Denmark, and disputes with his own subjects. In the former he was unfortunate, and towards the latter he behaved with the greatest cruelty. At last, by the torments of his own conscience, it is said, he run mad. He afterwards recovered his senses, but was thereupon dethroned by his brothers; of whom Duke John, who had been hitherto kept prisoner by Eric, succeeded him in the kingdom.

³⁶ Eric deposed, and succeeded by his brother John.

This revolution took place in the year 1568, but with no great advantage to Sweden. Disputes about religion between the king and his brothers, and wars with Muscovy, threw matters into the utmost confusion. At last prince Sigismund, the king's son, was chosen king of Poland, which proved the source of much trouble to the kingdom. He was elected on the following conditions, viz. That there should be a perpetual peace between the states of Poland and Sweden; that, on the death of his father, prince Sigismund should succeed to the throne of Sweden; that, on urgent occasions, he might, with the consent of the states, return to Sweden; that he should maintain, at his own expence, a fleet for the service of Poland; that he should cancel a debt which had been long due from the crown of Poland to Sweden; that, with the consent of the states, he should build five fortresses on the frontiers of Poland; that he should have liberty to introduce foreign soldiers into the kingdom, provided he maintained them at his own expence; that he should not make use of Swedish counsellors in Poland; that he should have his body-guard entirely of Poles and Lithuanians; and that he should annex to Poland that part of Livonia now subject to Sweden. In 1590 king John died; and as Sigismund was at a distance, every thing fell into the utmost confusion: the treasury was plundered, and the wardrobe quite spoiled, before even duke Charles could come to Stockholm to take the administration into his hands until king Sigismund should return. This, however, was far from being the greatest disaster which befel the nation at this time. It was known that the king had embraced the Popish religion, and it was with good reason suspected that he would attempt to restore it upon his arrival in Sweden. Sigismund also was obliged, on leaving Poland, to promise that he would stay no longer in Sweden than was necessary to regulate his affairs. These circumstances served to alienate the minds of the Swedes from their sovereign even before they saw him; and the universal dissatisfaction was increased, by seeing him attended, on his arrival in Sweden in 1593, by Malaspina the pope's nuncio,

³⁸ Succeeds to the crown of Sweden.

to whom he made a present of 30,000 ducats to defray the expences of his journey to Sweden.

Sweden.

What the people had foreseen was too well verified: the king refused to confirm the Protestants in their religious privileges, and showed such partiality on all occasions to the Papists, that a party was formed against him; at the head of which was duke Charles his uncle. Remonstrances, accompanied with threats, took place on both sides; and at an interview between the king and Charles, the dispute would have ended in blows, had they not been parted by some of the nobility. This, however, made such an impression upon Sigismund, that he was apparently reconciled to his brother, and promised to comply with the inclinations of the people in every respect, though without any inclination to perform what he had promised. The agreement, indeed, was scarce made, before Sigismund conceived the horrid design of murdering his uncle at the Italian comedy acted the night after his coronation. The duke, however, having notice of the plot, found means to avoid it. This enraged the king so much, that he resolved to accomplish his designs by force; and therefore commanded a Polish army to march towards the frontiers of Sweden, where they committed all the ravages that could be expected from an enraged and cruel enemy. Complaints were made by the Protestant clergy to the senate: but no other reply was made them, than that they should abstain from these bitter invectives and reproaches, which had provoked the catholics, until the king's departure; at which time they would be at more liberty.

⁴⁰ Forms a design of murdering his uncle.

In 1595 Sigismund set sail for Dantzic, leaving the administration in the hands of duke Charles. The consequence of this was, that the dissensions which had already taken place being continually increased by the obstinacy of the king, duke Charles assumed the sovereign power; Sigismund and in 1604 Sigismund was formally deposed, and his uncle Charles IX. raised to the throne. He proved a wife and brave prince, restoring the tranquillity of the kingdom, and carrying on a war with vigour against Poland and Denmark. He died in 1611, leaving the kingdom to his son, the celebrated Gustavus Adolphus.

⁴⁷ State of Sweden on the accession of Gustavus Adolphus.

Though Charles IX. by his wife and vigorous conduct had in a great measure retrieved the affairs of Sweden, they were still in a very disagreeable situation. The finances of the kingdom were entirely drained by a series of wars and revolutions; powerful armies were preparing in Denmark, Poland, and Russia, while the Swedish troops were not only inferior in number to their enemies, but the government was destitute of resources for their payment.

Though the Swedish law required that the prince should have attained his 18th year before he was of age, yet such striking marks of the great qualities of Gustavus appeared, that he was allowed by the states to take upon him the administration even before this early period. His first act was to resume all the crown-grants, that he might be the better able to carry on the wars in which he was unavoidably engaged; and to fill all places, both civil and military, with persons of merit. At the head of domestic and foreign affairs was placed chancellor Oxenstiern, a person every way equal to the important trust, and the choosing of whom impressed mankind with the highest opinion of the young monarch's penetration and capacity.

⁴³ He is allowed to assume the administration while yet a minor.

Sweden.

Sweden.

Soon after his accession, Gustavus received an embassy from James I. of Britain, exhorting him to make peace with his neighbours. This was seconded by another from Holland. But as the king perceived that the Danish monarch intended to take every opportunity of crushing him, he resolved to act with such vigour, as might convince him that he was not easily to be overcome. Accordingly he broke into Denmark with three different armies at once; and though the enemy's superiority at sea gave them great advantages, and the number of the king's enemies distracted his attention, he carried on the war with such spirit, that in 1613 a peace was concluded upon good terms. This war being finished, the king applied himself to civil polity, and made some reformatiions in the laws of Sweden. In 1615, hostilities were commenced against Russia, on account of the refusal of that court to restore some money which had been formerly lent them. The king entered Ingria, took Kexholm by storm, and was laying siege to Pleseow, when, by the mediation of James I. peace was concluded, on condition of the Russians repaying the money, and yielding to Sweden some part of their territory. In this and the former war, notwithstanding the shortness of their duration, Gustavus learned the rudiments of the military art for which he soon became so famous. He is said indeed to have caught every opportunity of improvement with a quickness of understanding seemingly more than human. In one campaign, he not only learned, but improved, all the military maxims of La Gardie, a celebrated general, brought the Swedish army in general to a more steady and regular discipline than had formerly been exercised, and formed and seasoned an invincible body of Finlanders, who had afterwards a very considerable share in the victories of the Swedes.

Peace was no sooner concluded with Russia, than Gustavus was crowned with great solemnity at Upsal. Soon after this, Gustavus ordered his general La Gardie to acquaint the Polish commander Codekowitz, that as the truce between the two kingdoms, which had been concluded for two years, was now expired, he desired to be certainly informed whether he was to expect peace or war from his master. In the mean time, having borrowed money of the Dutch for the redemption of a town from Denmark, he had an interview on the frontiers with Christian the king of that country. At this interview, the two monarchs conceived the utmost esteem and friendship for each other; and Gustavus obtained a promise, that Christian would not assist Sigismund in any designs he might have against Sweden. In the mean time, receiving no satisfactory answer from Poland, Gustavus began to prepare for war. Sigismund entered into a negotiation, and made some pretended concessions, with a view to seize Gustavus by treachery; but the latter having intimation of his design, the whole negotiation was changed into reproaches and threats on the part of Gustavus.

Immediately after this, Gustavus made a tour in disguise through Germany, and married Eleonora the daughter of the elector of Brandenburg. He then resolved to enter heartily into a war with Poland; and with this view set sail for Riga with a great fleet, which carried 20,000 men. The place was well fortified, and defended by a body of veterans

enthusiastically attached to Sigismund. A dreadful bombardment ensued; the streets were raked by the cannon, and the houses laid in ashes by the bombs; the moat was filled up, one of the half-moons taken by storm, and the strong fortrefs of Dunamund was reduced. The cannon having now effected a breach in another part of the walls, Gustavus resolved to make a general assault. For this purpose a flying bridge over the moat was contrived by his majesty; for tho' the ditch was filled with fascines and rubbish, it still contained too much water to admit the passage of a large body of men. The soldiers, however, crowded on to the attack with so much impetuosity, that the bridge gave way, and the attempt proved unsuccessful. Next day the Swedes were repulsed in attempting to storm another half-moon; and the king was obliged to proceed more slowly. By the middle of September, at which time the town had been invested for six weeks, two bridges were thrown over the river together with a strong boom, while the Swedes had formed their mines under the ditch. The garrison being now reduced to extremity, were obliged to capitulate; and Gustavus treated the inhabitants with great clemency.

After the reduction of Riga, the Swedish monarch entered Courland, where he reduced Mittau; but ceded it again on the conclusion of a truce for one year. Sigismund, however, no sooner had time to recover himself, than he began to form new enterprises against the Swedes in Prussia; but Gustavus setting sail with his whole fleet for Dantzic, where the king of Poland then resided, so broke his measures, that he was obliged to prolong the truce for another year. Sigismund, however, was not yet apprised of the danger he was in, and refused to listen to any terms of accommodation: upon which Gustavus entering Livonia, defeated the Polish general, and took Derpt, Hockenhafen, and several other places of less importance; defeated, after which, entering Lithuania, he took the city of Birsen.

Notwithstanding this success, Gustavus proposed peace on the same equitable terms as before; but Sigismund was still insatuated with the hopes that, by means of the emperor of Germany, he should be able to conquer Sweden. Gustavus finding him inflexible, resolved to push his good fortune. His generals Horn and Thurn defeated the Poles in Semigalia, again defeated Gustavus himself with 150 ships set sail for Prussia, and where he landed at Pillaw. This place was immediately delivered up to him; as were also Braunfberck, Frawenberg, Elbing, Marienberg, Mew, Dirschau, Stnm, Christburg, &c. Sigismund, alarmed at the great successes of Gustavus, sent a body of forces to oppose him, and to prevent Dantzic from falling into his hands. In this he was attended with as bad success as before. His troops were defeated before Marienberg, Mew, and Dirschau; and in May 1627, Gustavus arrived with fresh forces before Dantzic, which he would probably have carried, had he not been wounded in the belly by a cannon-shot. The Poles in the mean time recovered Mew; and the States of Holland sent ambassadors to mediate a peace between the two crowns. Sigismund, however, depending upon the assistance of the emperor of Germany and king of Spain, determined to hearken to no terms,

44
He invades
Denmark,
and obliges
the king to
conclude a
peace.

45
Russia in-
vaded with
success.

46
Extraordi-
nary mili-
tary genius
of the king.

47
Has a
friendly in-
terview
with the
king of
Denmark,
and pre-
pares for
war with
Poland.

47
Marries
Eleonora
daughter of
the elector
of Branden-
burg.

49
Riga be-
sieged and
taken.

50
The Poles
defeated;
and several
places taken

51
The Poles
defeated,
a great
number of
towns re-
duced by
Gustavus.

52
The Poles
defeated a
third time.

Sweden.

and resolved to make a winter-campaign; but Gustavus was so well entrenched, and all his forts were so strongly garrisoned, that the utmost efforts of the Poles were to no purpose (A). The city of Dantzic in the mean time made such a desperate resistance as greatly irritated Gustavus. In a sea-engagement the Swedish fleet defeated that of the enemy; after which Gustavus, having blocked up the harbour with his fleet, pushed his advances on the land-side with incredible vigour. He made a surprising march over a morass 15 miles broad, assisted by bridges of a peculiar construction, over which he carried a species of light cannon invented by himself. By this unexpected manœuvre he got the command of the city in such a manner, that the garrison were on the point of surrendering, when, by a sudden swell of the Vistula, the Swedish works were ruined, and the king was obliged to raise the siege. In other respects, however, the affairs of Gustavus went on with their usual good fortune. His general Wrangel defeated the Poles before Brodnitz, of whom 3000 were killed, and 1000 taken prisoners, with five pieces of cannon and 2000 waggon loads with provisions. At Stum the king gained another and more considerable victory in person. The emperor had sent 5000 foot and 2000 horse under Arnheim, who joined the main army commanded by the Polish general Coniecpolski, in order to attack the Swedish army encamped at Quidzin. The enemy were so much superior in number, that the friends of Gustavus represented to him the imminent danger of attacking them. But the king being determined, the engagement began. The Swedish cavalry charged with such impetuosity, contrary to their sovereign's express order, that they were almost surrounded by the enemy; but Gustavus, coming up to their assistance, pushed the enemy's infantry with so much vigour, that they gave way, and retreated to a bridge they had thrown over the Werder. But here they were disappointed; for the Swedes had already taken possession of the bridge. On this a new action ensued more bloody than the former, in which the king was exposed to great danger, and thrice narrowly escaped being taken prisoner; but at last the Poles were totally defeated, with the loss of a great many men, 22 pair of colours, five standards, and several other military trophies. The slaughter of the German auxiliaries was so great, that Arnheim scarce carried off one half of the troops he brought into the field. This defeat did not hinder the Polish general from attempting the siege of Stum; but here again he was attended by his usual bad fortune. The garrison sallied out, and he was defeated with the loss of 4000 men. The blame of this misfortune was laid upon Arnheim; who was recalled, and succeeded by Henry of Saxe Lawenburg and Philip count Mansfeldt. The change of general officers, however, produced no good consequences to the Poles; a fa-

53
The Poles
defeated by
sea, and
Dantzic in-
vested.

54
The king
obliged by
an inunda-
tion of the
Vistula to
raise the
siege.

55
The Poles
and Ger-
mans de-
feated with
great
slaughter in
two engage-
ments.

56
They are
again de-
feated, and
obliged to
surrender
to the king
of Saxony.

mine and plague raged in their camp, so that they were at last obliged to consent to a truce for six years, to expire in the month of June 1635. The conditions were, that Gustavus should restore to Sigismund the towns of Brodnitz, Stum, and Dirschau; that Marienberg should remain sequestered in the hands of the elector of Brandenburg, to be restored again to Sweden in case a peace was not concluded at the end of the six years. Gustavus, on his side, kept the port and citadel of Memel, the harbour of Pillau, the town of Elbing, Brunsberg, and all that he had conquered in Livonia.

Gustavus having thus brought the war with Poland to an honourable conclusion, began to think of restoring the conduct of the emperor in assisting his enemies and oppressing the Protestant states. Before embarking in such an important undertaking, it was necessary that he should consult the diet. In this the propriety of engaging in a war with Germany was warmly debated; but, after much altercation, Gustavus in a very noble speech determined the matter, and set forth in such strong terms the virtuous motives by which he was actuated, that the whole assembly wept and every thing was granted which he could require.

It was not difficult for Gustavus to begin his expedition. His troops amounted to 60,000 men, hardened by a succession of severe campaigns in Russia, Finland, Livonia, and Prussia. His fleet exceeded 70 sail, carrying from 20 to 40 guns, and manned with 6000 mariners. Embarking his troops, he landed at Usedom on the 24th of June 1630, the Imperialists having evacuated all the fortresses they possessed there; and the isle of Rugen had been before reduced by general Lelzy, in order to secure a retreat if fortune should prove unfavourable. Passing the frith, Gustavus stormed Wolgast and another strong fortress in the neighbourhood, leaving general Banner with a garrison for the defence of these conquests. He then proceeded to Stetin, which was no sooner invested than it consented to receive a Swedish garrison, and the king persuaded the duke of Pomerania to enter into an alliance with him. In consequence of this the Swedish troops were received into several towns of Pomerania; and the most bitter enemy took place between the Imperialists and Pomeranians, each refusing the other quarters.

These successes of Gustavus struck the empire with consternation; for being already overwhelmed with civil dissensions, they were in no condition to resist so impetuous an enemy. At this time also the Imperialists were without a general, the command of the army being disputed by a number of candidates of very unequal merit; but at last count Tilly was fixed upon as the most proper person, and invested with the dignity of Veldt Marshal. In the mean time the king, being reinforced by a considerable body of troops in

Sweden.

57
Gustavus
resolves on
a war with
the emper-
or.

58
Reduces
Wolgast,
Stetin, &c.

59
Count Tilly
chosen
general by
the emper-
or.

(A) In this campaign the practice of duelling became so prevalent in the Swedish army, as to engage the king's attention, and to oblige him to suppress it by very rigorous edicts. Soon after these were passed, a quarrel arose between two general officers, who asked his majesty's permission to decide their difference by the laws of honour. The king consented, and wished to be a spectator of their courage. He went to the place appointed, attended by a body of guards: and having ordered the executioner to be called, "Now gentlemen, said he to the officers, fight until one dies;" adding to the executioner, "Do you immediately cut off the head of the other." On this the quarrel was dropped, and no more challenges were heard of in the camp.

Sweden.

Sweden.

60
Cuts off
2000
Swedes.61
Frankfort
and Land-
sberg taken
by Gusta-
vus.

Finland and Livonia under the conduct of Gustavus Horn, defeated the Imperialists before Griffenhagen; taking the place soon after by assault. By this and some other conquests he opened a passage into Lusatia and Silesia; but in the mean time count Tilly cut off 2000 Swedes at New Brandenburg, owing to the obstinacy of their commander Kniphhausen, who had orders to evacuate the place and join the main army. This advantage, however, was soon overbalanced by the conquest of Frankfort on the Oder, which Gustavus took by assault, making the whole garrison prisoners. Thus he commanded the rivers Elbe and Oder on both sides, and had a fair passage not only to the countries already mentioned, but also to Saxony and the hereditary dominions of the house of Austria. Soon after this, Gustavus laid siege to Landsberg, which he took by assault; though the number of soldiers he had with him was so inconsiderable, that he had thoughts of sending to the main army for a reinforcement before the prisoners should march out, being apprehensive that they might give him battle in the open field, though they could not defend themselves behind walls.

62
He reduces
Pomerania,
and restores
the dukes of
Mecklen-
burg.

About this time the Protestant princes held a diet at Leipzig; to which Gustavus sent deputies, and conducted his negotiations with such address, as tended greatly to promote his interests. Immediately after this he reduced Gripwald, and with it all Pomerania. Then marching to Gultrow, he restored the dukes of Mecklenburg to their dominions. Here the Imperialists had tyrannized in such a manner that Gustavus was received as the deliverer of the people, and the ceremony of the duke's inauguration was in a short time performed with great solemnity.

63
Magdeburg
taken by the Im-
perialists, and
the inhabi-
tants cruel-
ly used.

All this time count Tilly was employed in the siege of Magdeburg; but now, being alarmed at the repeated successes of the Swedes, he left Pappenheim with part of the army before that city, while he marched with the rest into Thuringia, to attack the landgrave of Hesse-Cassel and the elector of Saxony.

After a most obstinate defence, Magdeburg fell into the hands of Pappenheim, where he committed all imaginable cruelties. Gustavus formed a plan of recovering the city; but was obliged to abandon it, by Pappenheim's throwing himself into the place with his whole army, and by the progress which Tilly was making in Thuringia. Relinquishing this enterprise, therefore, he ordered Bannier to attack Havelsburg; which was done with such resolution, that the place was forced in a few hours, and all the garrison made prisoners. Werben was next obliged to submit after an obstinate conflict, in which many fell on both sides.

64
Havelsburg
and Wer-
hen re-
duced, and
the cavalry
of the Im-
perialists
defeated by
the Swedes.

—These successes obliged count Tilly to attempt in person to check the progress of the Swedes. He detached the vanguard of his army, composed of the flower of the Imperial cavalry, within a few miles of the Swedish camp. An action ensued, in which Bernstein the Imperial general was defeated and killed, with 1500 of his men. Gustavus, after this advantage, placed himself in a situation so much superior to his enemies, that count Tilly was fired with indignation, and marched up to the Swedish lines to give him battle. Gustavus kept within his works, and Tilly attacked his camp, though almost impregnable fortified, keeping up a most terrible fire from a battery of 32 pieces of

cannon; which, however, produced no other effect, than obliging the Swedish monarch to draw up his army behind the walls of Werben. Tilly had placed his chief hopes in being able to nail up the enemy's cannon, or set fire to their camp in divers quarters; after which he proposed making his grand attack. With this view he bribed some prisoners; but they betrayed him, and told his design to Gustavus. The king ordered fires to be lighted in different parts of his camp, and his soldiers to imitate the noise of a tumultuous disorderly rabble. This had the desired effect. The count led his army to the breach made by the cannon; where he was received with such a volley of grape-shot as cut off the first line, and put the whole body in disorder, so that they could never be brought back to the charge. In this confusion the Imperial army was attacked by Bauditzen, and, after an obstinate conflict, obliged to quit the field.

Soon after this action the queen arrived at the camp with a reinforcement of 8000 men; at the same time a treaty was concluded with Charles I. of England, by which that monarch allowed the marquis of Hamilton to raise 6000 men for the service of Gustavus. These auxiliaries were to be conducted to the main army by a body of 4000 Swedes; and were in every thing to obey the king while he was personally present, but in his absence were to be subject to the orders of the marquis. With these troops the king had resolved to make a diversion in Bremen; but the marquis finding it impossible for him to effect a junction with the Swedish army, resolved, without debarking his troops, to steer his course for the Oder, and land at Usedom. Gustavus was very much displeased at finding his project thus disconcerted; however, making the best of the present circumstances, he commanded the British troops to act on the Oder instead of the Weser. The number of this little army was magnified exceedingly by report, inasmuch that count Tilly had some thoughts of marching against them with his whole force; but on the departure of the marquis for Silesia, he reinforced the army in that country with a large detachment, which was thought to contribute not a little to the defeat he soon after received.

Ever since the late action Gustavus had kept within his intrenchments, where his army was well provided with every thing. Tilly made several attempts to surprise or draw him to an engagement; but finding all his endeavours fruitless, he marched into Saxony, and laid siege to Leipzig. This precipitate measure proved highly advantageous to the Swedish monarch; as thus the elector, who had been wavering in his resolutions, was now obliged to have recourse to the Swedes, in order to preserve himself from utter destruction. A treaty offensive and defensive was immediately concluded with Gustavus: and the elector willingly promised every thing that was required of him; and among the rest, that not only the prince his son, but he himself, should reside in the Swedish camp, and engage his life and fortune in the common cause. Tilly, in the mean time, carried fire and sword into the unhappy electorate. At the head of an army of 44,000 veterans, he summoned the city of Leipzig to surrender; denouncing the same vengeance against it as had been executed on Magdeburg, in case of a refusal. By this the governor was so much intimidated, that he instant-

65
Count Til-
ly defeated
by Gusta-
vus.66
A body of
British fol-
diers comes
to the as-
sistance of
the Swedes.69
In Saxony ra-
vaged by
count Tilly,
who takes
Leipzig.

Sweden.

68
Battle of
Leipfic.

ly submitted; and also surrendered the castle of Paffenberg, which was in a condition to have stood out till the arrival of the Swedish army. The elector, enraged at the loss of these valuable places, ordered his army to join the Swedes with all expedition, and pressed the king to warmly to engage, that at last he yielded to his desire. On the 7th of September 1631, Gustavus led out his army in the most beautiful order, the Swedes forming one column on the right, and the Saxons another on the left; each amounting to 15,000 men. Tilly drew up his men in one vast column, possibly with a view of surrounding the flanks of the king's army; but every officer of experience in his army, from the excellency of the Swedish disposition, prognosticated the event of the engagement. Gustavus led on the troops against that wing of the Imperialists commanded by Pappenheim, whom he drove back to such a distance, that he gained a point of the wind; by which the smoke fell upon their enemies and considerably embarrassed them, at the same time that the Swedes were got without the reach of a battery which played furiously on their flank. General Banner in the mean time cut in pieces the troops of Holstein, and mortally wounded the duke who commanded them. Pappenheim led on his troops seven times to the charge, in hopes of regaining his former situation; but was as often repulsed by the Swedes. Tilly all this while was engaged with the Saxons; but having at last driven them off the field, the whole strength of the Imperial army was turned upon the Swedish left wing commanded by General Horn. The Swedes sustained the attack with the greatest firmness, until the king detached general Teuffel with the centre to assist them. The Imperialists then were no longer able to stand their ground; but gave way every where except in the centre, which was composed of 18 regiments of veterans accustomed to victory, and deemed invincible. They made incredible efforts to maintain the reputation they had acquired; and, though swept off in great numbers by the Swedish artillery, never shrunk or fell into confusion. Four regiments, after their officers had been killed, formed themselves, and retired to the skirt of a wood; where they were all to a man cut in pieces, without demanding quarter. Tilly retired at the head of 600 men, and escaped by the coming on of the night. Seven thousand Imperialists lay dead on the field of battle; 4000 were taken prisoners; a fine train of artillery was lost, with upwards of 100 standards, ensigns, and other military trophies.—On this occasion it was that the Scots regiment in the Swedish service first practised the method of firing in platoons; to which some ascribe the astonishment and confusion that appeared in the Imperial army. It is thought, however, that the Swedish monarch displayed greater abilities in gaining this victory than improving it afterwards; for had he marched immediately to Vienna, before his enemies had time to recover their consternation, it is supposed that the emperor would have been obliged to abandon his capital, and leave his hereditary dominions to the mercy of the conqueror. But Gustavus apprehended that Tilly might fall upon the Saxons while he was ravaging the Austrian hereditary dominions; which would have deprived him not only of an ally, but of the free quarters which the elector had promised to his troops in case of a retreat.

69
The Imperialists defeated with great slaughter.70
Conduct of Gustavus censured.

For this and some other reasons he determined to penetrate into Franconia, where he reduced several places, particularly the fortrels of Workburg. Tilly, having collected his scattered troops, which formed an army still superior in number to that of Gustavus, marched to the relief of this place; but came too late. He then directed his march towards Rottenberg, where four regiments were cut in pieces by a Swedish detachment. After this the king reduced Hanau, Franckfort on the Maine, and Mentz; destroying a body of Spaniards, who had thrown themselves in his way to obstruct his passage.

The court of Vienna was now thrown into the utmost confusion; and sent every where begging assistance, and soliciting the Catholic princes to arm in defence of their religion. The emperor was most embarrassed in finding out a general capable of opposing Gustavus in the field; for the late misfortunes of count Tilly had entirely sunk his reputation. Wallestein, an old experienced officer, was made choice of; but as he had formerly been disgraced, it was apprehended that he would not accept of the command of which he had once been deprived. This objection, however, was got over; and Wallestein not only accepted of the command, but, at his own expence, augmented the army to 40,000 men.

During the whole winter the Swedish army kept the field; and before the approach of summer had reduced Crantzach, Bobenhafen, Kirchberg, Magdeburg, Gozlar, Northeim, Gottingen, and Dunderstadt; while the landgrave William made great progress in Westphalia. Gustavus Horn was repulsed before Bamberg; but soon had his revenge, by entirely destroying two regiments of Imperialists. To prevent the troops from being affected by the loss before Bamberg, the king resolved to give battle to Tilly, who was marching into Bavaria to prevent the Swedes from gaining a footing in that electorate. He pursued the Imperial general through a vast tract of country, defeated his rear-guard, and, having reduced a variety of towns and fortresses on the Danube, penetrated as far as Ulm. Advancing to the river Leck, count Tilly posted himself in a wood on the opposite side, to dispute his passage. Gustavus endeavoured to dislodge him by a regular fire from 70 pieces of cannon. The slaughter was dreadful; and Tilly himself, being wounded by a cannon-ball in the knee, died a few days before he was to have been superseded by Wallestein. The following night the Imperial army evacuated the post; part retiring to Ingoldstadt, and others to Newburg. Gustavus immediately crossed the river, and seized the towns of Rain and Newburg, which the enemy had abandoned. Augsborg next submitted; and from the inhabitants of this place Gustavus exacted an oath of fidelity, not only to himself but to the crown of Sweden. This measure gave the greatest offence to many of the Germanic body, and made them imagine that the king of Sweden had other views than the defence of the Protestant cause.

From Augsborg the Swedes advanced towards Ratibon; but were disappointed in their design of getting possession of that city by reason of the Bavarians having thrown a very numerous garrison into the place.—In the mean time ambassadors arrived from Denmark, offering the mediation of that crown for obtaining

Sweden.

71
The Swedes take a number of towns and cut off four regiments of the enemy.72
Wallestein chosen general by the emperor.73
A great number of towns taken by the Swedes.74
Count Tilly defeated and killed.

Sweden.

a lasting peace between the contending powers. Gustavus, however, replied, that no such peace could take place till the Catholic princes thought proper to grant the Protestants full and ample security for their enjoyment of future tranquillity. But the ambassadors had no instructions to propose any thing farther; and thus the negotiation vanished. Gustavus now, resolving to retort upon themselves the cruelties which the Bavarians had inflicted on the Protestants, laid the towns of Morzburg, Friefengen, and Landshut, in ashes. The inhabitants of Munich saved their city by submission; but, as the peasants in that neighbourhood had collected themselves into bodies in order to murder the stragglers from the Swedish army, Gustavus burnt their houses, and defeated the forces of the elector, who had been joined by a considerable body of militia.

While Gustavus was thus employed, Wallestein had assembled a vast army. He was strongly solicited by the elector of Bavaria to come to his assistance; but, in revenge of the electors having formerly obtained the command for count Tilly in preference to himself, he drew off towards Bohemia to encounter the Saxons. Arnheim, who commanded the Saxon forces in that place, was the enemy of Gustavus, who had formerly rallied him for his cowardice. He therefore permitted Wallestein to gain an easy victory, in hopes that his master the elector of Saxony, a prince entirely devoted to his pleasures, might be induced to relinquish the friendship of such a restless and warlike ally as Gustavus; with whom indeed he used all the eloquence of which he was master, to detach him from the Swedish cause. Several advantages in the mean time were gained by the Imperialists. Pappenheim defeated the archbishop of Bremen's cavalry at Werdien; and three Swedish regiments were cut off near Kadringen. Pappenheim, however, was forced to retire, and withdraw his garrison from Stade; of which the Swedes took possession. Wallestein and the elector of Bavaria, who had now joined their forces, threatened Gustavus with greatly superior numbers. At last, however, the king, being reinforced with 15,000 men, no longer declined the engagement; but Wallestein was too wise to trust the fate of the empire to a single engagement against such an enemy as the king of Sweden. Gustavus attacked his camp, but was repulsed with the loss of 2000 men; which caused a general murmuring and discontent against his rashness. Several other misfortunes happened to the Swedes; and at last, after various manœuvres, Wallestein bent his course towards Misnia, in order to oblige the elector of Saxony to declare against the Swedes, and to draw them out of Bavaria. Gustavus, notwithstanding the inconstancy of Augustus, immediately set out to assist him. With incredible diligence he marched to Misnia, where the Imperialists were assembling their whole strength. Hearing that the enemy were encamped at Weisenfels, and that Pappenheim had been detached with a strong corps, Gustavus resolved to engage them before they could effect a junction. With this view he marched to Lutzen, where he attacked Wallestein with incredible fury. The Swedish infantry broke the Imperialists in spite of their utmost efforts, and took all their artillery. The cavalry not being able to pass the river so expeditiously as the king thought necessary, he led the way, attended only by the regiment

of Smaaland and the duke of Saxe-Lawenburg. Here, after charging impetuously, he was killed, as Puffendorf alleges, by the treachery of the duke; who, being corrupted by the emperor, shot him in the back during the heat of the action. The news of his death was in an instant spread over both armies. The courage of the Imperialists revived, and they now made themselves sure of victory. But the Swedes, eager to revenge the death of their beloved monarch, charged with such fury that nothing could resist them. The Imperialists were defeated a second time, just as Pappenheim, with his fresh corps, came up to their assistance. On this the battle was renewed, but the Swedes were still irresistible. Pappenheim was mortally wounded, and his army finally routed, with the loss of 9000 killed in the field and in the pursuit.

The victory of Lutzen proved more unfortunate to Sweden than the greatest defeat. The crown devolved upon Christina, an infant of six years old; the nation was involved in an expensive foreign war, without any person equal to the arduous task of commanding the armies, or regulating domestic affairs, as Gustavus had done. However, Christina, the daughter of Gustavus, was immediately proclaimed queen. The regency devolved on the grand bailiff, the marshal, the high admiral, the chancellor, and the treasurer of the crown. Oxenstiern was invested with the chief management of affairs, and conducted himself with the greatest prudence. He was greatly embarrassed indeed by the divisions among the Protestant princes, which became more violent after the death of Gustavus; but, in spite of all difficulties, he went on pursuing the interest of his country, and planning the means of retaining the Swedish conquests. Matters went on pretty successfully till the year 1634, when, through the rashness of the Swedish soldiers, they were defeated at Nordlingen, with the loss of 6000 men killed on the spot, a number of prisoners, and 130 standards with other military trophies, taken by the enemy. Oxenstiern's constancy was shaken by this dreadful blow; but he applied himself diligently to repair the loss, by recruiting the army, and rendering the allies faithful. The latter proved the most difficult task. The death of Gustavus, and the defeat at Nordlingen, had thrown them into despair; and every one was desirous of making the best terms he could with the emperor. The Saxons not only renounced their alliance with Sweden, but openly commenced war against it; and the regency would gladly have consented to an honourable peace, the enemy were now too much flushed with success to grant it. Oxenstiern had no other resource than an alliance with France, and the bravery of his generals. In 1635, he went in person to the court of Lewis, and concluded a treaty; which, however, answered no purpose, as it was never observed. The enemy, in the mean time, pushed their good fortune. They surprised Philippsburg, where the French had laid up vast magazines; and reduced Spire, Augsbourg, Treves, Wurtzburg, Coburg, and some other places. To complete the misfortunes of Sweden, it was expected that the Poles would immediately invade Prussia. To prevent this, La Gardie was dispatched thither with a powerful army; but as it was impossible to resist so many enemies at once, the chancellor purchased the friendship of Poland for 26 years by ceding that duchy to the republic. Thus

Sweden.

79
Gustavus killed.80
The Imperialists totally defeated.81
Christina, was involved in an infant, proclaimed queen of Sweden.82
The Swedes receive a great overthrow at Nordlingen83
The Saxons declare against Sweden.84
The Success of the Imperialists.75
Three towns laid in ashes by the Swedes.76
The Saxon troops defeated by Wallestein.77
Gustavus attacks his camp, and is repulsed with loss.78
Battle of Lutzen.

Sweden. he got rid of a powerful enemy; and the Swedish affairs began to revive by a victory which general Bannier gained over the Saxons, in consequence of which they were driven beyond the Elbe.

Early in the spring of 1636, the Saxons made some motions as if they intended to cut off Bannier's communication with Pomerania. This he prevented by a stratagem; defeated a body of the enemy, and obliged the Saxons to retire. Soon after this he drove them out of their winter-quarters with considerable loss, at which time also a considerable body of Imperialists who came to their assistance were dispersed. In Westphalia general Kniphausen beat the Imperialists with the loss of 1500 men; but he himself was killed in the pursuit, and his army obliged to repossess the Weser. Some advantages were also gained in the neighbourhood of Minden by general Lessly who had assembled a considerable army. In Alsace, Bernard duke of Saxe-Weymar defeated count Gallas the Imperial general, and dispersed his army. But when every thing seemed thus successful for the Swedes, the city of Magdeburg, contrary to the expectation of every body, surrendered for want of powder, which the garrison had wantonly consumed. The Saxons also made some conquests on the Elbe, which obliged Bannier to recall general Lessly from Westphalia to march against them. The Saxons fixed on a most convenient situation, whence they hoped to destroy the Swedish army without coming to a battle. But Bannier, resolving to hazard every thing rather than suffer his army to be wasted by famine, advanced towards Perleberg, a place closely blocked up by the enemy. Here he drove from an advantageous post four regiments of Saxon cuirassiers, having killed or taken prisoners 400 men; after which he soon forced them to a general engagement. The numbers were very unequal, Bannier's army amounting to 9000 horse and 7000 foot, and the Saxons to 15,000 horse and 13 battalions of foot. The battle began with great fury; the right wing of the Swedes was almost oppressed by numbers before the left could come to their assistance. They were ten times driven back, and as often returned to the charge. At the last time they made such a desperate effort, that the enemy were entirely broken and defeated. Five thousand were killed on the spot, 3000 wounded, and as many taken prisoners, together with 150 colours and standards, and several pieces of cannon.

Thus ended the campaign of 1636, in a manner highly honourable to the Swedes. Some fruitless negotiations were set on foot during the winter; but these coming to nothing, Bannier quitted his winter-quarters very early in the season; and falling upon eight regiments of Saxons cantoned at Eulenburg, pursued them to Torgau, where he obliged them to surrender at discretion. Another party of Saxons was defeated in the neighbourhood of Leipzig; after which he proposed investing that city. But in this project he was disappointed by the Imperialists penetrating into Thuringia. He then called in all his detachments, with a view to prevent them from crossing a river named *Sala*; but in this also he was disappointed; however, he had the good fortune to defeat 2000 imperialists near Pegau, and destroy several detachments that attempted to obstruct his march.

Sweden. Yet, notwithstanding all these successes, Bannier found his situation every day more straitened, from the continual increase of the enemy's forces; which obliged him at last to retreat into Pomerania, out of which he soon drove out count Gallas.

The affairs of the Swedes were now once more reduced to the brink of ruin through the unguarded conduct of General Wrangel, who had also an army in Pomerania. After Bannier had driven count Gallas out of the province as above-mentioned, Wrangel, imagining himself perfectly secure, cantoned his troops and extended his quarters, the better to accommodate his army. But Gallas being informed of this proceeding, suddenly returned, ravaged all Upper Pomerania, and reduced the towns of Ustedom, Dornmin, and Wollin; after which, leaving garrisons in the fortresses, he returned to his winter-quarters in Saxony.

This unfortunate campaign counterbalanced all the advantages of the former. Wrangel was so struck with the suddenness of the blow, that he could take no measures for opposition. Some of the Swedish allies again fell off, and took up arms against them. In 1638, the Swedish affairs again began to revive in this quarter, through the excellent conduct of Bannier, who defeated count Gallas with the loss of 3000 men killed and taken prisoners. Pursuing his good fortune, he so harassed the count, that he obliged him in great haste to repossess the Elbe, and take shelter in the hereditary dominions of Austria. Great as Bannier's exploits had been, however, they were eclipsed by those of duke Bernard. That general had so increased his army in the Protestant cantons of Switzerland, and in Franche Comte, that he found himself in a condition to act without the assistance of the French, who indeed were but treacherous allies. Advancing to the Rhine, he seized on Seckingen and Laßburg, and laid siege to Rheinfeld. The Imperialists, in conjunction with the troops of Bavaria, advanced to the relief of the place. An engagement ensued; in which the victory was disputed: the enemy threw succours into the city, and the duke withdrew his army. Within a month he gave them battle a second time; and so completely defeated them, that only one Imperial officer above the rank of a captain escaped being killed or taken prisoner. He then renewed the siege of Rheinfeld; which he reduced, as well as several other important places. Advancing to Brisach, he blocked it up with a design of forcing the garrison to surrender by famine. General Gotz, with 12,000 men, attempted to throw in 1000 waggons of provision; but he was defeated, with the loss of all his men except 2500. Duke Charles of Lorraine, with 4000 men, joined the remains of Gotz's army, in order to relieve the town; but being surprised by Bernard, his whole army was cut in pieces. A third attempt was made by Gotz, but it proved as unsuccessful as the former; and the place being reduced to great straits, was obliged to capitulate.

In January 1639, the two victorious generals Bernard and Bannier prepared to attack the enemy on their own ground. Bannier made an irruption into the territories of Anhalt and Halberstadt. Leaving his infantry behind, he pushed on with his cavalry, and surprised Salis, grand-master of the Imperial artillery.

Sweden. The Imperialists defeated by Bannier.

Sweden.

91 Pomerania ravaged by the Imperialists.

92 The Imperialists defeated by Bannier.

93 Exploits of the duke of Saxe-Weymar.

86 The Imperialists defeated by Kniphausen.

87 And by the duke of Saxe-Weymar.

88 The Saxons entirely defeated by Bannier.

89 Eight regiments of Saxons taken prisoners.

90 Bannier defeats the Imperialists but is obliged to retire.

Sweden.

94
Banner de-
feats the
enemy in
several en-
gagements.

tilery. After a bloody conflict, the Swedes gained a complete victory, seven regiments of the enemy being cut in pieces. Next entering Saxony, he defeated four regiments of the enemy, obliging a much larger body to take shelter under the cannon of Dresden. Hearing that the Saxons were encamped near Chemnitz, where they waited to be joined by the Imperialists, he resolved to attack them before this junction could be effected. The same good fortune still attended his arms, and the Saxons were almost all killed or taken. Banner next entering into Bohemia, laid the country under contribution; after which, returning across the Elbe, he fell on general Hofskirk, who was encamped near Brandeiz with 10 regiments of horse and several battalions of foot. Him he defeated with the loss of 2000 men. The remains of the Imperial forces were pursued to the walls of Prague, and the generals Hofskirk and Montecuculi were taken prisoners. Yet, notwithstanding these constant successes, the enemies of Banner multiplied daily. He had expected an insurrection in his favour in Silesia or Bohemia; but no such event took place. The Protestant princes, overawed by the enemy, did not send him the necessary assistance. Undismayed, however, by difficulties or danger, Banner performed wonders. He defeated a body of Imperialists at Glatz: three times he drove the Saxons from their camp at Firn; and yet was forced to evacuate the place, because he could not spare a garrison. His army being destitute of the means of recruiting, was considerably diminished in number; yet with it he reduced a number of towns, and obtained a variety of other important advantages, when on a sudden all his hopes were blasted by the death of the duke of Saxe-Weymar; poisoned, as was supposed, by the French, who were desirous of getting the town of Brisac into their hands, from which the duke prevented them.

95
Death of the
duke of Saxe-
Weymar.

96
Treachery
of the
French.

The difficulties to which Banner was now reduced proved extreme. The French monarch took upon him to dispose of the army and conquests of Bernard as he thought proper. Brisac, and other places of importance, he kept to himself; after getting possession of which, the French endeavoured, as much as possible, to ruin the army. In the mean time the Imperial army under Piccolomini, in the Netherlands, was prodigiously augmented; and the archduke Leopold-William, in quality of generalissimo, was assembling his whole strength to crush the Swedes at once. Banner, however, did not despair. George duke of Lunenburgh having conceived some disgust at the emperor, Banner hoped to gain him over; he therefore approached nearer to his country; by which also he drew towards the armies of Weymar and Hesse. In his way he cut in pieces a body of 3000 Croats. General Konigsmark routed the Imperialists at Gera; a second time at Scholen; and a third time entirely defeated them near Leipzig. Banner was very pressing on the allies to join him; and at last, in 1640, he was joined by the Weymar army under the dukes of Longueville and Gubrien, a body of Russians led by general Melander, and the troops of Lunenburgh commanded by general Klitzing. The army now amounted to 22 battalions of infantry and 22,000 horse; so that they were much more than a match for their enemies, had they been under the sole direction

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97
Imperial-
ists defeated
by Konigsmark.

of Banner. But unanimity was wanting; every one would be supreme in the command; and Banner, the best general of them all, had the least influence. Instead of those manly and decisive strokes by which the Swedes had hitherto distinguished themselves, the armies continued looking at one another, each suffering the rigours of famine. At last Banner, resolving to expose his troops no longer, set out for Thuringia, through Franconia, to seize an advantageous post on the Maine; but as he advanced to the Sala, he found the Imperialists entrenched on the other side. Finding it impossible to force a passage, he took the road through Hesse, where his troops suffered greatly by famine. Here he proposed to fight the enemy; but the Landgrave and duke of Lunenburgh refused their consent. Upon this he threatened to leave them to the mercy of the confederates, and thus obliged them to be somewhat more pliant. None of those brilliant successes, however, now attended the operations of the Protestant allies: the campaigns of 1640 and 1641 were spent in useless marches and countermarches; serving only to bring the army into the greatest dangers, from which they were as constantly relieved by the active and intrepid Banner. At last this brave general, worn out with perpetual fatigues, died of a fever in the year 1641, leaving the Swedish army in a worse situation than ever.

98
Death of
Banner.

The Imperialists were too well acquainted with the abilities of Banner not to take advantage of the opportunity offered by his death. A Swedish detachment was cut in pieces at Quidlenberg. The Swedish army, accustomed only to be obedient to Banner, became mutinous, and Piccolomini resolved to fall upon them with his whole force. But the four generals, Wrangel, Konigsmark, Wittemberg, and Pihul, having convinced the soldiers of the necessity of defending themselves, made such excellent dispositions, that the Imperialists durst not attack them. Piccolomini then detached part of his army to attack the Hessians in their quarters; but Wrangel and Konigsmark threw themselves in their way, and defeated them with the loss of 2000 men. This victory, however, did not retrieve the Swedish affairs. Dissensions and mutiny began again to take place in the army to such a degree as threatened its dissolution. In 1642 General

99
A Swedish
detachment
cut in pieces.

100
The Imperialists
defeated.

Torstenlen was sent from Sweden, with a large sum of money and a strong reinforcement, to take upon him the supreme command. This general was inferior in abilities to none of his predecessors, and despatched without loss of time to come to an engagement; but the Weymar army separating from him, put an end to that design, and obliged him to remain for a considerable time inactive. He was also confined to his chamber for some time by a dangerous gout; and thus a report of his death being spread, the Imperialists were encouraged to begin a long march through roads scarce passable, in hopes of surprising the Swedish army without a general. Torstenlen having intelligence of this, seized an advantageous post which could not be forced; and thus obliged the enemy to retreat, after having suffered as much by their fatiguing march as if they had fought a bloody battle. Then joining general Stalhanck, who had been driven by the Imperialists out of Silesia, he reduced the town of Glogau, with a number of other important places;

101
General
Torstenlen
takes the
command
of the Swe-
dish army.

102
Reduces fe-
veral towns.

42 N

after

Sweden.

after which he laid siege to Schweidnitz. The duke of Saxe-Lawenburgh, at the head of all his cavalry, endeavoured to throw in fuccours; but was defeated with the loss of 3000 men. He himself was taken prisoner, and died of chagrin a few days after. In consequence of this defeat Schweidnitz surrendered at discretion; and Torstenson having sent a detachment to invest the city of Neisse, proceeded with the rest to drive the enemy entirely out of Silesia. This he effected actually performed; obliging them to retire over barren mountains, almost famished for want of provision, and harassed by his light troops; so that this lately formidable army was almost entirely ruined. With his victorious troops the Swedish general then poured into Moravia; where, in five days, he reduced the strong town of Olmutz (which not long ago sustained a siege of as many weeks by the king of Prussia.) Litta and Newstadt shared the same fate; after which the Swedes, returning suddenly to Silesia, made themselves masters of Oppelen, Brieg, and laid siege to Breslau. Here the garrison made such an obstinate defence, that the Imperialists had time to assemble under the conduct of the archduke Leopold, and come to their relief. As Torstenson was greatly inferior in number, he raised the siege; but appeared so formidable in his retreat, that the enemy durst neither attack him, nor attempt to prevent his encamping in a very advantageous situation. The Imperialists took this opportunity of laying siege to Glogau: but after having lost a great number of men, they were forced to abandon the enterprise on the junction of Wrangel with Torstenson; by which means the Swedes were once more in a condition to face their enemies in the field.

Torstenson now projected an irruption into Bohemia, and putting his army into winter-quarters in that country; but in this he was prevented by the vigilance of the enemy: however, he reduced the city of Zittau, where, for the first time, a cartel for prisoners was established; by which means the Swedish army was considerably augmented. Thus disappointed in his designs on Bohemia, Torstenson directed his course to Leipzig, which he intended to invest. The Imperial generals assembled their whole force, and set out to relieve that important place. The two armies soon came in sight of each other; and a furious cannonading was the prelude to a general engagement. A single bullet had almost proved fatal to the Swedish cause. It carried away the furniture of Torstenson's horse, killed the count Palatine's horse, pierced general Rabenau through the body, took off the head of a celebrated counsellor named *Gräbe*, and carried away the leg of a private soldier. The Swedes, as soon as the armies came up, behaved with their wonted resolution, and after an obstinate conflict obtained a complete victory; 5000 of the enemy being killed on the spot, 3000 wounded, and as many taken prisoners. This victory was followed by the immediate surrender of Leipzig; and in all probability the Swedes would have finally triumphed over all their enemies, had not a rupture with Denmark ensued. Torstenson and Horn behaved with their usual valour in Holstein and Schoonen, while general Königsmark distinguished himself in Germany; but the ruin of the Weymar army, which was totally defeated with the

loss of one half its number at Dettingen by the Bavarians, proved a dreadful blow, from which the Swedes could scarce recover themselves. Indeed, notwithstanding the valour and success of the Swedes, their affairs in Germany must have gone to wreck in the campaigns of 1643 and 1644, had not the French under Conde and Turenne made a most powerful diversion, and performed such exploits as immortalized the names of these two generals.

In 1645, the war against Denmark was pushed with such vigour, that a peace, very honourable and advantageous for Sweden, was concluded; and thus Torstenson was again at liberty to act against the Imperialists. He now took measures for carrying the war into the heart of the Austrian dominions. Hatfield assembled a considerable army to oppose the Swedes; and the emperor came in person to Prague to animate his troops. The two armies came in sight at Jancowitz, and both prepared for an engagement. The valour of the Swedes once more prevailed; and they totally defeated their enemies. Four thousand of the Imperialists were killed on the spot, among whom were general Hatfield and a great number of officers; and near 5000 were taken prisoners. No great advantages, however, were derived from this victory. Some towns indeed were reduced; but at last Torstenson was obliged to retire into Moravia, where he put his army into winter-quarters; and in the beginning of the year 1646 resigned the command to Wrangel.

The new general conducted the Swedish affairs with great ability and success; till at last the Imperialists, finding themselves finally unable to drive the Swedes out of Germany, concluded a peace with them in 1648. This was the memorable treaty of Westphalia, by which the Germanic constitution was settled upon its ancient principles, and those implacable disputes which had long torn the empire were ended; the duchies of Bremen and Verden, all the Upper and part of Lower Pomerania, the city of Wismar and the isle of Rugen, were assigned to Sweden, and a gratification of five millions of crowns was given to the army.

Sweden now enjoyed some years of repose. Charles Gustavus, count Palatine, having gained the favour of Christina, was appointed generalissimo of the forces, heir to the and heir-apparent to the crown. A marriage was proposed between them; but the queen would never listen to this or any other proposal of the kind. In 1650, the ceremony of the queen's coronation was performed; but in four years thereafter, she resigned the crown in favour of Gustavus. (See the article *CHRISTINA*.)

The new king found himself involved in considerable difficulties on his accession to the throne. The treasury was quite exhausted; great part of the revenue was appointed for the support of Christina's household; the people were oppressed with taxes; and the nation having been disarmed for several years, began to lose its reputation among foreigners. To remedy these evils, Charles proposed to reimburse all the crownlands which had been alienated by grants to favourites during the late reign; to repeal a duty which had been laid upon salt; to put the kingdom in a posture of defence; and to enter upon a war with some neighbouring state. Under pretences, therefore, that Casimir king of Poland had questioned his title to the throne,

103
Drives the Imperialists out of Silesia, and takes Olmutz, &c.

104
Entirely defeats them at Leipzig.

105
War with Denmark.

Sweden.
106
The Swedes defeated at Dettingen.

107
An advance and peace with Denmark.

108
The Imperialists entirely defeated at Jancowitz.

109
Torstenson resigns the command to Wrangel.

110
Treaty of Westphalia.

111
Charles Gustavus appointed heir to the crown of Sweden.

112
State of Sweden on the accession of Charles.

Sweden.

113
War with
Poland re-
solved on.

throne, he began to make preparations for invading that kingdom. Several embassies were sent from Poland to Stockholm; but some point of ceremony always disappointed them of an audience of the king; so that they were obliged to return without their errand. As soon as matters were in readiness, General Wittenberg made an irruption into Poland from the side of Pomerania. The Poles opposed him with an army of 15,000 men; but instead of fighting, they began to negotiate, and in a short time entirely dispersed themselves. Charles himself soon followed with a powerful army, and pursued his march without obstruction, all the cities throwing open their gates to him as he approached, and offering to supply him with necessaries. As he advanced to Cracow, Casimir resolved to make one effort to save his capital. His army amounted only to 10,000 men; and these were unfortunately such as had never stood fire. After a feeble resistance they fled with precipitation, having lost 1000 men killed and taken prisoners. A few days after this Charles defeated the Poles a second time about eight leagues from Cracow; upon which Casimir fled with his family to Oppelen in Silesia. The capital was then invested; and, though defended with the utmost valour by Stephen Czarneski, was in a short time obliged to capitulate. Thus in less than three months Charles apparently became master of Poland; but it soon became evident that the Poles had no intention of abandoning their former sovereign.

114
The Poles
defeated,
and the
kingdom
reduced.

115
War with
the Elector
of Branden-
burg.

In 1656 a war took place with the elector of Brandenburg. While Charles was employed in the conquest of Poland, that prince had invaded the Royal and Ducal Prussia, and reduced the most considerable towns with little opposition. The king of Sweden took umbrage at his progress; and having marched against him, defeated his forces in several slight encounters, and obliged him to own that he was a vassal of Sweden. These rapid conquests alarmed all Europe; and the different powers sought for means of driving the Swedes out of Poland, which they had so unexpectedly and unjustly seized. The Poles were no sooner assured that they should be assisted, than they every where revolted and massacred the Swedes. Casimir returned from Silesia; and those very troops and generals who had before submitted to Charles without opposition, now ranged themselves under the banners of his antagonist. Charles immediately marched from Prussia to challenge the insolence of the Poles, and totally defeated a body of 12,000 men under the command of Czarneski. This did not hinder all the Poles incorporated with his troops to desert; which considerably reduced his army; and the campaign being performed in the depth of winter, he was at last obliged to retreat to Prussia. In his march he was harassed by the Poles; and a body of 4000 Swedes was surprised and defeated by them at Warka. This loss, however, was soon after recompensed by a complete victory gained by Adolphus the king's brother and General Wrangel over Czarneski. In the mean time the king was taking measures for laying siege to Dantzic; but was prevented by the Dutch, who threatened to oppose him, unless a proper regard was paid to their interest. Charles accordingly granted them advantageous terms; and afterwards gained over the elector of Brandenburg, by ceding to him the fove-

116
The Poles
revolt.

117
Charles gains a vic-
tory, but is
obliged to
retire.

118
Concludes
a treaty
with the
Dutch and
the Elector
of Branden-
burg.

reignty of Prussia, that he might be at liberty to turn his whole strength against Poland.

Sweden.

By the treaty just concluded with the elector, the latter was to assist Charles in his war with Poland; but the elector had so procrustean matters, that the Poles, having obtained assistance from the Tartars, had reduced the city of Warfaw. The two princes, however, now marched in concert against their enemies, who were encamped in a strong situation in the neighbourhood of the city abovementioned, their camp being fronted by the Vistula. The Poles were driven from their entrenchments with prodigious slaughter, and a vast number taken prisoners. The Poles and Tartars then laboured to break the alliance; with which view they entered Ducal Prussia, and defeated the electoral army, taking prince Radzivil and other persons of distinction prisoners. The Swedes soon had their revenge. General Steinboeck attacked the same Polish army at Philippowa, and overthrew it with such slaughter as obliged the Poles for that season to quit the field. A more formidable enemy than the Poles now began to make their appearance. The Russians invaded the provinces of Carelia, Ingermania, and Livonia; while the elector of Brandenburg began to waver in his fidelity. To preserve this only ally at such a critical juncture, Charles was obliged to give him more advantageous terms than those already mentioned; while the Russians were repelled in the provinces of Carelia and Ingermania. But in Livonia they had better success, two important fortresses falling into their hands; after which they laid siege to Riga. For seven months they battered the walls of this city, without once venturing to pass the ditch or storm the practicable breaches. The besieged, under the command of Magnus de la Gardie and Simon Helmfeld, defended themselves with the greatest intrepidity; cutting off many thousands of the enemy in the sallies they made. At last they attacked the Russian camp, drove them out of it with great slaughter, and obliged them to raise the siege with precipitation.

119
The Poles
and Tartars
defeated
with great
slaughter.

120
The Rus-
sians invade
the Swedish
dominions.

Charles, notwithstanding the number of his enemies, was now become so formidable by the valour and discipline of his troops, that whole armies often fled on the very news of his approach. At last, in 1657, the Poles, finding they could not resist him in the field, contented themselves with harassing the Swedes on their march, and cutting off the foragers and convoys. This proved much more destructive to the Swedes than their former method; so that Charles was obliged to enter into an alliance with Ragotzki prince of Transylvania, by assigning him certain provinces in his neighbourhood, in order to furnish himself with irregular troops, who might fight the Poles in their own way. This, however, proved of no real advantage; for the confederates, after spending a whole campaign in Lithuania, were obliged to return without accomplishing more than the reduction of a single fortress; upon which Charles returned with the Swedish army to Prussia.

121
Are defeated
before
Riga.

122
Charles en-
ters into an
alliance with
Ragotzki
Prince of
Transylva-
nia.

Leopold, the young king of Hungary, having been held for a long time the Swedes with a jealous eye, now resolved to declare for Poland. The more effectually to curb the ambition of the Swedish monarch, he solicited the king of Denmark to come to a rupture.

123
Leopold
king of
Hungary
declares a-
gainst Swe-
den.

Sweden.

124
Ragotzki's
army de-
stroyed by
the Poles
and Tar-
tars.

125
He is defea-
ted and
killed by
the Turks.

126
Bravery and
success of
general
Wrangel.

127
The house
of Austria
declares
against
Sweden.

128
Charles in-
vades Den-
mark with
great suc-
cess.

ture with him. This was instantly complied with, and the Danes invaded Bremen. Charles hastened to oppose this new enemy; which gave such offence to Ragotzki, that he neglected to take the proper measures for his own defence in the absence of the Swedes, and suffered his army to be destroyed by the Poles and Tartars. At the same time the Turks invaded Transylvania, under pretence that Ragotzki, being a vassal of the Grand Signior, had no right to invade Poland without his leave. Ragotzki opposed them in the field; where he was defeated and killed, leaving Charles destitute of the only ally on whom he could have depended.

The king, however, not dismayed by this misfortune, traversed Pomerania and the duchy of Mecklenburg; after which he fell upon Holstein, while general Wrangel with another corps entered the duchy of Bremen. The latter executed his measures with the utmost vigour and intrepidity. In 15 days he retook all the towns which the enemy had reduced; defeated and drove the Danish army out of the country, killing 3000 of their best soldiers. In Holstein the king reduced several fortresses, laid Itzehoe in ashes, defeated a body of Danes, and laid siege to Frederic-Udda, into which the Danes had thrown a strong garrison. The conduct of this siege he left to Wrangel, he himself retiring to Wismar in order to observe the situation of affairs in Poland; but no sooner was he gone than Wrangel attacked the place with such fury, that he became master of it in two hours. In the province of Halland the Swedes were defeated; but the enemy derived no advantage from their victory: at sea the fleets met, and maintained a hot engagement for two days, without any considerable advantage on either side. In Poland matters went on much worse. The house of Austria had now declared for Casimir; a German army entered Poland, and reduced Cracow, though not without great loss to themselves. Czarnecki entered Pomerania, where he butchered the unhappy peasants without mercy; but on the approach of Charles he fled as usual, having gained nothing by his expedition but the character of a cruel barbarian.

The king of Sweden was now surrounded by enemies. The elector of Brandenburg had declared against him; and he had besides to engage the armies of Austria, Poland, Russia, and Denmark, in the field. In this dangerous situation he resolved to attack Denmark, in such a manner as should oblige that power to come to a speedy accommodation. His designs were forwarded by a very early frost, which enabled him to transport his troops without the expence and trouble of shipping. Having passed over on the ice to the island of Funen, he cut in pieces a body of 4000 Danish soldiers and 500 peasants. The whole island was reduced in a few days; after which he passed to Langeland, then to Laaland, after that to Falster, and lastly to Zealand. The Danes were terrified at this unexpected invasion, and were giving themselves up to despair, when Charles offered to conclude a peace upon equitable terms. The king of Denmark very gladly consented; but with a design to renew the war as soon as he thought it could be done with safety. By this treaty, called the *treaty of Roschild*, concluded on the 22th of March 1658, the provinces of Schonen, Hal-

land, and Bickling; Lyfter, and Huwen, the isle of Borkholm, the baillages of Balus and Drontheim in Norway, were yielded to Sweden, and a free passage through the Sound was granted to the Swedish ships.

No sooner was Charles retired, than the king of Denmark began to act against him in an underhand manner; on which, resolving to anticipate him in his designs, he appeared unexpectedly with a fleet before Copenhagen. Had he given the assault immediately, before the inhabitants had time to recover from their surprize, it would probably have surrendered at once; but, by landing at the distance of 17 miles, he gave them time to prepare for their defence: the siege proved extremely tedious, and at last the place was relieved by a Dutch fleet. On this Charles converted the siege into a blockade, which continued till the end of the war. Wrangel reduced the strong fortresses of Cronenburg; and the Swedish forces were so judiciously posted, that all Denmark was in a manner blocked up; when, in 1660, king Charles died of an epidemical fever; and thus an end was put, for that time, to all the staves, ambitious designs of Sweden.

The new king Charles XI. was a minor at the time of his father's death; and as the kingdom was involved in a dangerous war with so many enemies, the regency determined to conclude a peace, if it could be obtained on reasonable terms. A treaty was accordingly concluded at Oliva; by which Casimir renounced his pretensions to the crown of Poland, and that republic gave up all pretensions to Livonia. Bornholm and Drontheim were ceded to Denmark; and an equivalent in Schonen remained with Sweden. During the minority of the king, nothing remarkable occurs in the history of Sweden. In 1672 he entered into an alliance with Lewis XIV. which, two years after, involved him in a war with the elector of Brandenburg. At first the Swedes carried all before them; but general Wrangel having fallen sick, they continued their conquests under another named *Mardenfeldt*. Almost all the towns in Brandenburg were reduced, when the elector arrived with an army to the relief of his distressed subjects. He retook several towns, defeated Mardenfeldt in a general engagement, and soon after forced them to abandon all their conquests. In conjunction with the Danes, he then invaded the Swedish dominions: many places of importance were reduced, and, in 1676, Sweden received a most destructive blow by the defeat of her fleet in an engagement with the combined fleets of Denmark and Holland. Soon after this the king took the government into his own hands, and in some degree restored the fortune of Sweden; but though matters went on in a more prosperous way where the king commanded in person, the same losses and disgrace attended the Swedish arms in every other quarter. In Pomerania, count Konigsmark lost every place of importance excepting Stralsund, Stetin, and Gripsholm. In 1678, the Swedish fleet was defeated in two engagements. At Landskrona a most obstinate battle was fought from ten in the morning till six at night; when both parties were obliged, by their fatigue, to retire to their respective camps. At Oldeval in Norway, the Swedes were defeated; and the Danes laid desolate the islands of Oeland, Smaaland, Unno, and Kuno; while the electoral troops and Imperialists reduced count Konigsmark.

Sweden.
19
Peace con-
cluded.

130
The war
renewed,
and Copen-
hagen be-
sieged.

131
Death of
Charles Gu-
staf.

132
Charles XI.

133
Treaty of
Oliva.

134
War with
Branden-
burg.

135
The Swedes
defeated by
the Danes
and
Swedes.

136
Their af-
fairs every
where go
to wreck.

Sweden. mark to the utmost distress in the neighbourhood of Stralsund.

In this deplorable situation of affairs count Konigsmark found an opportunity of attacking his enemies to such advantage, that he obtained a complete victory; after which he ravaged the duchy of Mecklenburg. Yet notwithstanding this success, he could not prevent the elector from reducing Stralsund; after which he was obliged to evacuate Pomerania; and, to complete his distress, the fleet which transported the Swedish army from Pomerania was wrecked on the coast of Bornholm; by which accident 2000 persons were drowned, and the remainder plundered and taken prisoners by the Danes, though they had been furnished with passports from king Frederic.

In this unprosperous situation of affairs a peace was concluded at St Germain's between France and her enemies, by which the Swedes and Danes were left to decide their quarrel by themselves. Denmark was by no means a match for Sweden, even in the distressed situation to which she was reduced: for which reason a treaty was instantly concluded, on terms much more favourable to Sweden than could have been expected; and the peace was confirmed by a marriage between Charles and Ulrica Eleonora, daughter to the king of Denmark. From this time the Swedish monarch applied himself to the reformation of the state; and by artfully managing the disputes between the nobility and peasants, he obtained a decree of the states empowering him to alter the constitution as he pleased. Being thus invested with absolute power, he proceeded to take some very extraordinary measures. In 1685 it was projected to liquidate the public debts by raising the nominal value of money, without adding any thing to its intrinsic value. This was put in execution the following year, by which the creditors of the government lost upwards of nine millions of crowns. This, with some other arbitrary steps taken about the same time, disgusted all the nobility, merchants, and crown-creditors. In Livonia they were highly offended; and remonstrances were repeatedly sent by the hands of deputies, who had orders to insist upon their privileges confirmed by many acts of the king's predecessors. The deputies could obtain nothing, so that the diet was refused. On their report the body of nobility resolved to draw up a stronger remonstrance than any of the former, to be presented to the king by captain Patkul one of the deputies, who had already distinguished himself by his boldness and attachment to liberty. His public spirit, however, produced no other effect than to procure his own destruction. An accusation was drawn up against all the remonstrants, but especially Patkul. He was sentenced to lose his right-hand, then to be deprived of his life, honours, and estates; to have the latter confiscated to the crown, and his papers burnt by the hands of the common executioner. The accusation was declared unjust by the university at Leipzig: but notwithstanding this, Patkul was obliged to fly his country, to avoid the execution of his rigorous sentence; which, however, fell upon him with redoubled fury in the subsequent reign, of which an account is given under the article PATKUL.

On the 15th of April 1697, died Charles XI. leaving his crown to his son, the celebrated Charles XII.

at that time a minor. On his accession he found himself under the tuition of his grandmother Eleonora, who had governed the kingdom during the minority of the late king. Though Charles was at that time only 15 years of age, he instantly showed a desire of taking the government into his own hands. His counsellors, count Piper and Axel Sparre, signified his desire to the queen-regent. They were by her referred to the states; and there all were unanimous: so that the queen, finding that opposition would be vain, resigned her power with a good grace; and Charles was invested with absolute authority, in three days after he had expressed his desire of reigning alone. He was scarce seated on the throne, when a powerful combination was formed against him. King Augustus of Poland formed designs on Livonia; the king of Denmark revived the disputes he had with the duke of Holstein, as a prelude to a war with Sweden; and Peter the Great of Moscow began to form designs upon Ingria, formerly a province of Russia. In 1699 the king of Denmark marched an army into Holstein. Charles sent a considerable body of troops to the duke's assistance; but before their arrival the Danes had ravaged the country, taken the castle of Gottorp, and laid close siege to Tonningen. Here the king of Denmark commanded in person; and was assisted by the troops of Saxony, Brandenburg, Wolfenbuttle, and Hesse-Cassel. England and Holland, as guarantees of the last treaty with Denmark, in concert with Sweden, joined Charles against this confederacy, and sent fleets to the Baltic. They proposed a termination of the war upon equitable terms; but these were haughtily refused by the Danish monarch, who despised the youth and inexperience of Charles, and relied too much upon the alliance he had formed with Saxony, Brandenburg, Poland, and Russia. The town of Tonningen, however, resisted all his efforts; and when he ordered the place to be stormed, he had the mortification to see his troop driven headlong from the walls, by a handful of Swedes under general Banier.

In the year 1700, Charles, having entrusted the affairs of the nation with a council chosen out of the senate, set out on the 8th May from his capital, to which he never after afterwards returned. He embarked at Carlscroon, and defeated the fleet of the allies. Having made a descent on the island Zealand, he defeated a body of cavalry that opposed his march, and then proceeded to invest Copenhagen by sea and land. The king of Denmark then saw the necessity there was either of having his capital destroyed, or of doing justice to the duke of Holstein. He chose the latter; and a treaty was concluded in eleven days, upon much the same terms as formerly. Charles, being thus at liberty to turn his arms against the other princes who had conspired his destruction, resolved to lead his army against Augustus king of Poland; but on his way he received intelligence that the czar of Moscow had laid siege to Narva with 100,000 men. On this he immediately embarked at Carlscroon, though it was then the depth of winter, and the Baltic scarce navigable; and soon landed at Pernaw in Livonia with part of his forces, the rest being ordered to Revel. His army did not exceed 20,000 men; but they were the best soldiers in Europe, while the Russians were only an undisciplined

Sweden.

142
He takes the govern-ment into his own hands at the age of 15.

143
A powerful combination formed against him.

144
Holstein ravaged by the Danes.

145
They are repulsed at Tonningen.

146
Charles sets out from Stockholm, and defeats the fleet of the allies.

147
Obliges the Danes to make peace.

148
Marches against the Russians.

137
Peace con-cluded.

138
Charles be-comes ab-solute.

139
Difficulties many of his subjects.

140
Boldness and misfor-tunes of captain Pat-kul.

141
Charles XI. dies, and is succeeded by his son Charles XII.

mul.

Sweden.

multitude. The czar, however, had thrown every possible obstruction in the way of his antagonist. Thirty thousand men were posted in a defile on the road, to oppose his passage; and this corps was sustained by a body of 20,000 others, posted some leagues nearer Narva. The czar himself had set out to hasten the march of a reinforcement of 40,000 men, with whom he intended to attack the Swedes in flank and rear. But the celerity and valour of the Swedes baffled every endeavour. With 4000 foot and an equal number of horse the king set out, leaving the rest of the army to follow him at their leisure. With these he attacked and defeated the Russian armies one after another, pushing his way to the czar's camp, which he gave immediate orders for attacking. This camp was fortified by lines of circumvallation and contravallation, by redoubts, by 150 pieces of brass cannon placed in front; and was defended by an army of 80,000 men; yet so violent was the attack of the Swedes, that in three hours the entrenchments were carried; the king with 4000 men that composed the wing he commanded in person, pursued a flying army of 50,000 to the river Narva. The bridge broke down by the weight of the fugitives, and the river was instantly covered with their bodies. Great numbers returned in despair to their camp, where they defended themselves for a while; but at last the generals Gallowin and Frederowitz, who commanded them, surrendered. Thirty thousand were killed in the entrenchments and in the pursuit, or drowned in the river; 20,000 surrendered at discretion, and were dismissed unarmed; while the rest were totally dispersed. An hundred and fifty pieces of fine cannon, 28 mortars, 151 pair of colours, 20 standards, and all the baggage of the enemy, were taken. Among the prisoners were the duke de Croy, the prince of Georgia, and seven other generals. Charles behaved with the greatest generosity to the conquered. Being informed that the tradesmen of Narva had refused credit to the officers whom he detained prisoners, he sent 1000 ducats to the duke de Croy, and to every other officer a proportionable sum.

151
Generosity
of Charles.

Peter was advancing with 40,000 men to surround the Swedes, when he received intelligence of the dreadful defeat at Narva. He was greatly chagrined; but, comforting himself with the hopes that the Swedes would in time teach the Russians to beat them, he returned to his own dominions, where he applied himself with the utmost diligence to the raising of another army. He evacuated all the provinces which he had invaded, and for a time abandoned all his great projects, thus leaving Charles at liberty to prosecute the war against Poland.

152
Treaty be-
tween the
Czar and
king of Po-
land.

As Augustus had expected an attack, he endeavoured to draw the czar into a closer alliance with him. The two monarchs had an interview at Birsén, where it was agreed that Augustus should lend the czar 50,000 German soldiers, to be paid by Moscow; that the czar should send an equal number of his troops to be trained up to the art of war in Poland; and that he should pay the king three millions of rix-dollars in the space of two years. Of this treaty Charles had notice, and by means of his minister count Piper entirely frustrated the scheme.

In 1701, as early as the season permitted, Charles,

having received a reinforcement from Sweden, took the field, and appeared suddenly on the banks of the Duna, along which the Saxon army was posted to receive him. The king of Poland at that time being sick, the army was commanded by Ferdinand duke of Courland, marshal Stenau, and general Paykel, all officers of valour and experience. They had fortified certain islands in the mouth of the river, and taken every other precaution against an attack; the soldiers were hardy, well-disciplined, and nearly equal to the Swedes in number: yet Charles, having passed the river in boats with high tide, to screen the men from the fire of the enemy, attacked them with such fury, that they were entirely defeated, with the loss of 2500 killed on the spot, and 1500 taken prisoners. All the Saxon baggage, 36 pieces of cannon, five pair of colours, and six standards, fell into the hands of the Swedes.

This victory was followed by the surrender of all the towns and fortresses in the duchy of Courland. The king then passed into Lithuania, where every town opened its gates to him. At Birsén, an army of 20,000 Russians retired with the utmost precipitation on the news of his approach. Here Charles, perceiving that the kingdom of Poland was greatly affected to Augustus, began to project the scheme of dethroning him by means of his own subjects. This scheme he executed with more policy than he ever showed on any other occasion. The manner of putting it in execution was concerted between Radziewisch, cardinal primate of Poland, and count Piper. Intrigues and cabals were held at the house of the treacherous ecclesiastic, while he was publishing circular letters to keep the people in their duty to the king. The diet being filled with Swedish partisans, became tumultuous, and broke up in confusion. The affairs of the kingdom then fell into the hands of the senate; but here the Swedish party was as strong as in the diet. It was agreed that they should send an embassy to Charles; that the polipote should mount, and be ready against all events: but the chief regulations respected the king's authority, which it was determined at any rate to retrench. Augustus, resolving rather to receive laws from the victorious Charles than from his own subjects, sent an embassy to him, committing the management of the whole to the countess of Konigsmark, a native of Sweden, and a lady famous for her wit and beauty. But the king refused to see her; on which she returned, chagrined and disappointed, to Warsaw. The ambassadors of the senate instantly obtained an audience; and were assured by Charles, that he took arms against the Saxons in defence of the liberties of the Poles, whom he should always regard as his best friends. Conferences were appointed to be held at Kinsching; but Charles soon after altered his mind, and told the ambassadors he would hold them at Warsaw.

Augustus, in the mean time, finding his scheme of peace frustrated, had recourse to the senate; but met with such a rough answer from them, that he determined once more to apply to Charles. To him therefore he sent his chamberlain; but a passport being forgot, the ambassador was arrested. Charles continued his march to Warsaw, which surrendered on the first summons; but the citadel held out for some days. Augustus, finding at last that no dependence was to be had on the Poles, determined to

trust

Sweden.

Sweden.

trust his fortune wholly to the Saxon army and the nobility of the palatinate of Cracow, who offered to support him to the utmost of their power. The Saxon army was now advanced to the frontiers, and Augustus immediately put himself at the head of it. Being joined by the nobility of Cracow, he found his forces to amount to 30,000 men, all brave and well-disciplined. With these he marched in quest of his enemy; who did not decline the combat, though he had with him only 12,000 men. Tho' the Saxons were strongly posted, having their front covered by a morass, besides being fortified with pallisades and chevaux de frise, they were attacked with irresistible impetuosity, and entirely defeated, with the loss of 4000 killed, 2000 made prisoners, and all their baggage and cannon. This victory was followed by the loss of Cracow: after which Charles set out in pursuit of the flying army, with a design of preventing them from re-embarking; but his horse falling under him, he had the misfortune to break his thigh, by which he was confined six weeks: and thus Augustus obtained some respite. The interval he made the best use of. Having convoked a diet first at Marienburg, and then at Lublin, from them he obtained the following resolutions; that an army of 50,000 men should be raised by the republic for the service of the prince; that six weeks should be allowed the Swedes to determine whether they were for war or peace; and that the same time should be granted to the turbulent and discontented nobles of Poland to make their concessions. To counteract the effects of these resolutions, Charles assembled another diet at Warfaw; and while the two assemblies disputed concerning their rights and privileges, he recovered of his wound, received a strong reinforcement from Pomerania, and utterly defeated and dispersed the remains of the Saxon army.

The ill fortune of Augustus continued still to persecute him. In 1704 he was formally deposed by the diet, and the crown conferred by Charles on Stanislaus Leszcynski palatine of Posenia. Augustus, however, did not yet tamely give up his kingdom. His adherents daily skirmished with the Swedes; and Augustus himself, being reinforced by 9000 Russians, retook Warfaw, and was very near surprising the new king, who lived in perfect security in the city while Charles fought in his cause. Count Horn, with 1500 Swedes, vigorously defended the citadel; but at last, finding it no longer tenable, he was obliged to surrender at discretion. The reduction of Warfaw was among the last advantages gained by Augustus in the course of this war. His troops were now composed of Saxon recruits and undisciplined Poles, who had no attachment to his person, and were ready on all occasions to forsake him. Charles and Stanislaus advanced with the victorious army; the Saxons fled before them, and the towns for several miles round sent their submissions. The Poles and Saxons were under the command of Schullemburg, a most sagacious and experienced general, who used every expedient to check the progress of the Swedes, by seizing on the advantageous posts, sacrificing small parties to the safety of the whole, and to mislead the enemy, &c. However, with all his conduct and caution, he found himself outwitted, and Charles in the neighbourhood of his camp ready to fall upon him, while he thought

him at 50 leagues distance. The Swedish monarch attacked him with a superior army, but entirely composed of horse. Schullemburg had posted his men in such a manner as rendered it impossible to surround them. His first rank being armed with pikes and fuses, presented a kind of rampart of bayonets; the second line flooping over the first who kneeled, fired over their heads, while the third rank, who stood upon their feet, kept up an incessant fire, by which the Swedish horse were exceedingly galled and put in disorder. Charles lost the opportunity of cutting off the whole Saxon army, by omitting to order his men to dismount. This was almost the first time that infantry had been regularly opposed to cavalry, and the superiority of the former was evident. After the engagement had continued about three hours, the Saxons retreated in good order; which no enemy had ever done before in any engagement with Charles. The Swedes pursued their enemies towards the Oder, and forced them to retreat through thick woods, almost impervious even to infantry. The Swedish horse, however, pushed their way, and at last inclosed Schullemburg between a wood and the river, where Charles had no doubt of obliging him to surrender at discretion, or die sword-in-hand, as having neither boats nor bridges; but the genius of Schullemburg supplied every defect. In the night he ordered planks and floats of trees to be fastened together; upon which he carried over his troops, while the Swedes were employed in dislodging 300 men, which he had placed in a windmill, for the purpose of defending his flank and keeping the enemy in play. Charles spoke of this retreat with admiration, and said he had been conquered by Schullemburg.

No material advantage, however, resulted from this to Augustus; who was again obliged to leave Poland, and fortify the capital of his hereditary dominions, which he expected every moment to see invested. In the mean time, however, the Russians having recovered their spirits, fell upon the Swedes in Livonia with the utmost fury. Narva, Dorpat, and several other towns, were taken, and the inhabitants and garisons treated with great barbarity. Soon after, an army of 100,000 Russians entered Poland. Sixty thousand Cossacks under Mazepa entered the country at the same time, and ravaged every thing with the fury of barbarians. Schullemburg, too, perhaps more formidable than either, advanced with 14,000 Saxons and 7000 Russians, disciplined in Germany, and reputed excellent soldiers. Could numbers have determined the event of war, the Swedes must certainly have been at this time overpowered. Instead of this, however, Charles seemed to triumph over his enemies with more ease the more numerous they were. The Russians were defeated so fast, that they were all dispersed before one party had notice of the misfortunes of another. The

Astonishing success of Charles against them. defeating an army of 40,000 men scarcely obstructed the march of the Swedes, while their astonished enemies looked upon these actions as the effects of witchcraft, and imagined that the king of Sweden had dealings with infernal spirits. With these apprehensions they fled beyond the Boristhenes, leaving the unhappy Augustus to his ill fate. Schullemburg, with all his skill and experience, succeeded no better. The Swedish general Renschild engaged and defeated him in half.

160
The Saxons
entirely de-
feated.

166
His en-
gagement
with the
Swedes.

167
His fine re-
treat.

161
Cracow ta-
ken.

162
Remains of
the Saxon
army en-
tirely de-
feated.

163
Augustus
formally
deposed,
and Stanis-
laus raised
to the
throne.

164
Warfaw re-
taken by
Augustus.

165
Excellent
conduct of
his general
Schullemb-
urg.

168
Augustus
leaves Po-
land.

166
The Rus-
sians take
several
towns in
Livonia,
and invade
Poland.

170
Astonish-
ing success
of Charles
against
them.

Sweden.

171
Schullemberg entirely defeated by Renschild.

half an hour, though the Swedes were vastly inferior in number, and their enemies posted in a most advantageous situation. Nothing could be more complete than this victory. Whole regiments of Saxons threw down their arms, and begged their lives in the most suppliant posture. Six thousand were slain in the field, and 7000 taken prisoners. Thirty-six pieces of cannon, 11,000 muskets, 40 pair of colours and standards, with all the Saxon baggage, fell into the hands of the Swedes: and the consequences were still more important; for now a passage was opened into Saxony, and Augustus seemed to be in as great danger of losing his hereditary dominions as he had been of losing Poland. This extraordinary victory, indeed, is said to have been owing to a panic which seized the troops of Schullemberg; however, it was looked upon with admiration, and thought to equal the renown of Renschild to that of his sovereign. Charles himself was jealous, and could not help exclaiming, "Surely Renschild will not compare himself with me!" But the cruelty of this general sullied his reputation; for, six hours after the engagement, he caused 1000 Russians to be massacred in cold blood, to revenge, as he said, the cruelties they had committed in Poland.

172
Cruelty of the Swedish general.

Soon after this victory, which was gained on the 12th of February 1706, Charles entered Saxony at the head of 24,000 men. The diet at Ratibon declared him an enemy to the empire if he crossed the Oder. But to this declaration no regard was paid. Charles pursued his march; while Augustus was reduced to the condition of a vagrant in Poland, where he possessed not a single town besides Cracow. Into this city he threw himself with a few Saxon, Polish, and Russian regiments, and began to erect some fortifications for its defence; but the approach of the Swedish general Meyerfeldt, and the news of the invasion of Saxony, disconcerted all his measures, and threw him into despair. The Russians indeed were his faithful allies; but he dreaded them almost as much as the Swedes: so that he was reduced to the necessity of writing a letter to Charles with his own hand, begging for peace on whatever terms he thought proper to grant. However, as he was then at the mercy of the Russians, this transaction was concealed with the greatest care. His emissaries were introduced to the Swedish court in the night-time; and being presented to Charles, received the following answer: That king Augustus should for ever renounce the crown of Poland, acknowledge Stanislaus, and promise never to re-ascend the throne, should an opportunity offer; that he should release the princes Sobieski, and all the Swedish prisoners made in the course of the war; surrender Patkul, at that time resident at his court as ambassador for the Czar of Moscow, and stop proceedings against all who had passed from his into the Swedish service. These articles Charles wrote with his own hand, and delivered to count Piper, ordering him to finish them with the Saxon ambassadors.

174
Augustus begs for peace on any terms.

175
Charles's answer.

176
Augustus, in conjunction with the Russians, defeats and takes prisoner a whole Swedish army.

Augustus all this time was obliged to continue a show of war, though he had neither ability nor inclination to carry it on. He was joined by prince Menzikoff with 30,000 Russians; which obliged him, contrary to his inclination, to come to an engagement with Meyerfeldt, who commanded 10,000 men, one half of whom were Swedes. As at this time no di-

sparity of numbers whatever was reckoned an equivalent to the valour of the Swedes, Meyerfeldt did not decline the combat, though the army of the enemy was four times as numerous as his own. With his countrymen he defeated the enemy's first line, and was on the point of defeating the second, when Stanislaus, with the Poles and Lithuanians, gave way. Meyerfeldt then perceived that the battle was lost; but he fought desperately, on purpose to avoid the disgrace of a defeat. At last, however, he was oppressed by numbers, and forced to surrender; suffering the Swedes, for the first time, to be conquered by their enemies. The whole army were taken prisoners excepting major-general Kraflau; who having repeatedly rallied a body of horse formed into a brigade, at last broke through the enemy, and escaped to Poland.—Augustus had scarce sung *Te Deum* for this victory, when his plenipotentiary returned from Saxony with the articles of the treaty above-mentioned. The king But is obliged to sign the crown of Poland. hesitated and scrupled, but at last signed them; after which he set out for Saxony, glad at any rate to be freed from such an enemy as the king of Sweden, and Poland, from such allies as the Russians.

Czar Peter was no sooner informed of this extraordinary treaty, and the cruel execution of his plenipotentiary Patkul, than he sent letters to every court in Christendom, complaining of this gross violation of the law of nations. He intreated the emperor, the queen of Britain, and the States-General, to revenge this insult on humanity. He stigmatized the compliance of Augustus with the opprobrious name of the *pussanimity*; exhorted them not to guarantee a treaty so unjust, but to despise the menaces of the Swedish bully. So well, however, was the prowess of the king of Sweden known, that none of the allies thought proper to irritate him, by refusing to guarantee any treaty he thought proper. At first, Peter thought of revenging Patkul's death by massacring the Swedish prisoners at Moscow; but from this he was soon deterred, by remembering that Charles had many more Russian prisoners than he had of Swedes.

Giving over thoughts of revenging himself in this way, therefore, in the year 1707 he entered Poland at the head of 60,000 men. Advancing to Leopold, he made himself master of that city, where he assembled a diet, and solemnly deposed Stanislaus with the same ceremonies which had been used with regard to Augustus. The country was now reduced to the most miserable situation; one party, through fear, adhered to the Swedes; another was gained over, or forced by Peter to take part with him: a violent civil war took place between the two, and great numbers of people were butchered, while cities, towns, and villages, were laid in ashes by the frantic multitude. The appearance of a Swedish army under king Stanislaus and general Lewenhaupt put a stop to these disorders, Peter himself not caring to stand before such enemies. He retired, therefore, into Lithuania, giving as the cause of his retreat, that the country could not supply him with provision and forage necessary for so great an army.

In the mean time Charles had taken up his residence in Saxony, where he gave law to the court of Vienna, and in a manner intimidated all Europe. He declared himself the protector of the Protestant interest in Ger-

Sweden.

177
But is obliged to sign the crown of Poland.

† See the article Patkul.

178
Czar Peter complains to all the European.

179
Invades Poland, and formally deposes Stanislaus.

180
Retires into Lithuania.

181
Imperious behaviour of Charles.

Sweden.

182
Submissive
behaviour
of the em-
peror to
him.

Germany, particularly of the Emperor's Protestant subjects in Silesia. He desired, or rather *commanded*, the Emperor to renew and confirm to them all the liberties granted by the treaties of Westphalia, but since that time reclaimed or eluded at the treaty of Ryfwick. The emperor durst not refuse; and upwards of 100 churches were given to the Protestants. On this occasion the Emperor is reported to have said, that "had Charles desired him to become a Lutheran, he did not know whether he could have refused." One would indeed have imagined that Charles had some thoughts of converting, or at least dethroning, the Pope himself; for being incensed at the constant opposition of the court of Rome, whose weakness and intrigues he despised, he one day told the emperor's minister, that "the Swedes had conquered Rome before now, and he might one day demand an inventory of the effects left there by queen Christina." At last, fatiated with the glory of having dethroned one king, set up another, and struck all Europe with terror and admiration, Charles began to evacuate Saxony, in pursuit of his great plan, the dethroning Czar Peter, and conquering the vast empire of Russia. While the army was on full march in the neighbourhood of Dresden, he took the extraordinary resolution of visiting king Augustus with no more than five attendants. Though he had no reason to imagine that Augustus either did or could entertain any friendship for him, he was not uneasy at the consequences of thus putting himself entirely in his power. He got to the palace-door of Augustus before it was known that he had entered the city. General Fleming having seen him at a distance, had only time to run and inform his master. What might be done in the present case immediately occurred to the minister; but Charles entered the elector's chamber in his boots before the latter had time to recover from his surprise. He breakfasted with him in a friendly manner, and then expressed a desire of viewing the fortifications. While he was walking round them, a Livonian, who had formerly been condemned in Sweden, and served in the troops of Saxony, thought he could never have a more favourable opportunity of obtaining pardon. He therefore begged of king Augustus to intercede for him, being fully assured that his majesty could not refuse to slight a request to a prince in whose power he then was. Augustus accordingly made the request; but Charles refused it in such a manner, that he did not think proper to ask it a second time. Having passed some hours in this extraordinary visit, he returned to his army, after having embraced and taken leave of the king he had dethroned.

184
Marches
against the
Russians.

The armies of Sweden, in Saxony, Poland, and Finland, now exceeded 70,000 men; a force more than sufficient to have conquered all the power of Moscow, had they met them on equal terms. Peter, who had his army dispersed in small parties, instantly assembled it on receiving notice of the king of Sweden's march, was making all possible preparations for a vigorous resistance, and was on the point of attacking Stanislaus when the approach of Charles struck his whole army with terror. In the month of January 1708 he passed the Niemen, and entered the south gate of Grodno just as Peter was quitting the place by the north gate. Charles at this time had advanced

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to some distance before the army at the head of 600 horse. The Czar, having intelligence of his situation, sent back a detachment of 2000 men to attack him; but they were utterly defeated; and this disappointment was followed by the total evacuation of Lithuania. The king pursued his flying enemies in the midst of snow and ice, over mountains, rivers, morasses, and through almost every obstacle that could be surmounted by human power. He had foreseen all difficulties, and determined to surmount them all. As he knew that the country could not furnish provision sufficient for the subsistence of his army, he had provided a great quantity of biscuit, on which his men chiefly subsisted till they came to the banks of the Beresina, in view of Borislow. Here the Czar was posted, and Charles designed to bring him to a battle; after which he could penetrate with the greater ease into Russia. Peter, however, did not think proper to come to an action; but retreated towards the Boristhenes, whither he was pursued by Charles as soon as he had refreshed his army. The Russians had destroyed the roads and desolated the country; nevertheless the Swedish army advanced with great celerity, and in their way defeated 20,000 of the enemy, tho' entrenched to the teeth. This victory, considering the circumstances in which it was gained, was one of the most glorious the Swedes had ever obtained. The memory of it is preserved by a medal struck in Sweden, with this inscription, *Sylox, Paludes, Aggeres, Hostes, vici*.

When the Russians had repassed the Boristhenes, which separates Poland from Moscow, the Czar, finding himself closely pursued by an enemy with whom he was not able to cope, determined at last to propose peace. Proposals were accordingly made; but Charles returned no other answer, than that he would treat at Moscow; which being reported to Peter, he coolly replied, "My brother Charles affects to play Alexander, but he will not find in me a Darius." However, he did not think proper to venture an engagement, but continued his retreat; and Charles pursued so close, that he was daily skirmishing with the rear of the enemy. In these actions the Swedes had generally the advantage, though in the main these victories proved detrimental, by weakening the army in a country where it was impossible to recruit. Near Smolensko, the king, with only six regiments, defeated a body of 10,000 horse and 6000 Calmucks. In this engagement he was exposed to the utmost danger, the enemy having separated him from his troops. With one regiment only, he fought with such fury as dispersed the enemy, and drove them before him, at the time they thought themselves sure of taking him prisoner. Two aids-de-camp that fought near him were killed; his horse was killed, as was also an equerry while he presented another. The enemy had broke through the regiment, and got quite up to the king; who is said to have on this occasion killed twelve men with his own hand without receiving a wound.

By the 3d of October 1708, Charles was within 100 leagues of Moscow; but the Czar had made the roads impassable, either by laying them under water, digging deep ditches, or covering them with the wood of whole forests. He had also destroyed the villages on every side, and taken away every possibility of sub-

42 O

sisting

Sweden.

185
Defeats and
drives them
out of Li-
thuania.

186
Gains a
remarkable
victory,

187
The Czar
sues for
peace, but
receives au-
daughty
answer.

188
Another
desperate
engage-
ment.

189
Charles ar-
rives within
100 leagues
of Moscow,
but finds
the roads
impassable.

Sweden.

Sweden.

190
Resolves to
pass thro'
the Ukrain.

191
Meets with
great difficulties.

192
Defeats the
Russians, and
is joined by
Mazeppa in
great distress.

193
Desperate
encounters
between
General
Lewenhaupt
and the
Russians.

sisting an army. The season was also far advanced; the intense severe weather was approaching; so that the Swedes were threatened with all the miseries of cold and famine, at the same time that they were exposed to the attacks of an enemy greatly superior in number, who, from their knowledge of the country, had almost constant opportunities of harassing and attacking them by surprise. For these reasons the king resolved to pass through the Ukrain, where Mazeppa, a Polish gentleman, was general and chief of the nation. Mazeppa having been affronted by the Czar, readily entered into a treaty with Charles, whom he promised to assist with 30,000 men, great quantities of provisions and ammunition, and with all his treasures, which were immense. The Swedish army advanced towards the river Dniwa, where they had to encounter the greatest difficulties; a forest above 40 leagues in extent, filled with rocks, mountains, and marshes. To complete their misfortunes, they were led 30 leagues out of the right way; all the artillery was sunk in bogs and marshes; the provision of the soldiers, which consisted of biscuit, was exhausted; and the whole army spent and emaciated when they arrived at the Dniwa. Here they expected to have met Mazeppa with his reinforcement; but instead of that, they perceived the opposite banks of the river covered with a hostile army, and the passage itself almost impracticable. Charles, however, was still undaunted; he let his soldiers by ropes down the steep banks; they crossed the river either by swimming, or on rafts hastily put together; drove the Russians from their post, and continued their march. Mazeppa soon appeared, having with him about 6000 broken remains of the army he had promised. The Russians had got intelligence of his designs, defeated and dispersed his adherents, laid his towns in ashes, and taken all the provisions collected for the Swedish army. However, he still hoped to be useful by his intelligence in an unknown country; and the Cossacks, out of revenge, crowded daily to the camp with provisions.

Worse misfortunes, however, still awaited the Swedes. When Charles entered the Ukrain, he had sent orders to General Lewenhaupt to meet him with 15,000 men, 6000 of whom were Swedes, and a large convoy of provisions. Against this detachment Peter now bent his whole force, and marched against him with an army of 65,000 men. Lewenhaupt had received intelligence that the Russian army consisted only of 24,000; a force to which he thought 6000 Swedes superior, and therefore disdained to entrench himself. A furious contest ensued; in which the Russians were defeated with the loss of 15,000 men. The Swedes continued their march; but, by the treachery of their guide, were led into a marshy country, where the roads were made impassable by deep ditches and trees laid across. Here he was again attacked by the Czar with his whole army. Lewenhaupt had sent a detachment of two battalions to dispute the passage of the enemy over a morass; but finding they were likely to be overpowered, he marched at the head of the whole infantry to their relief. Another desperate battle ensued; when at last the Russians were put in disorder, and on the point of being totally defeated, when the Czar gave orders to the Cossacks and Calmucks to fire upon all the Russians who fled. "Even

kill me (said he) if I should be so cowardly as to turn my back." On this the battle was renewed with great vigour; but notwithstanding these positive orders, and the example of the Czar himself, the Russians were a third time put in disorder, after losing 6000 men, when general Baver arrived with a strong reinforcement of fresh Russian troops. The engagement was again renewed, and continued without intermission till night. The Swedes took possession of an advantageous post; but were next morning attacked by the Russians. Lewenhaupt had formed a kind of rampart of his waggons, but was obliged to set fire to them, in order to prevent their falling into the hands of the enemy, and at the same time to cover his retreat by the smoke. The Russians, however, came soon enough to have 5000 waggons of those provisions designed for the distressed Swedes. A strong detachment was sent to pursue Lewenhaupt; but so terrible did he appear, that the Russian general offered him an honourable capitulation. This was refused with disdain; and the battle renewed with the same vigour as before. The Swedes, though reduced to 4000, again defeated their enemies, and killed 5000 on the spot. After this, Lewenhaupt was suffered to pursue his march without molestation, but also without cannon or provisions. Prince Menzi-haupt joins koff, indeed, was detached to harass him; but such was the formidable appearance of the Swedes even in their distress, that he was afraid to attack them: so that at last the 4000 arrived safe in the camp of Charles, after having killed upwards of 30,000 of the enemy on their march.

This, we may say, was the last effort of Swedish valour. The difficulties they had now to undergo exceeded what human nature could bear; yet still they hoped, by constancy and courage, to overcome every obstacle. In the severest winter known for a long time even in Russia, they made long marches, clothed like savages in the skins of wild beasts; all the draught-horses perished; thousands of soldiers dropped dead with cold and hunger: so that by the month of February 1709, the whole army was reduced to 18,000 Swedes. Amidst numberless difficulties these penetrated at last to Pultowa, a town on the eastern frontier of the Ukrain, where the Czar had laid up magazines, and of these Charles resolved to get possession. Mazeppa advised the king to invest the place, in consequence of his having correspondence with some of the inhabitants, by whose means he hoped it would be surrendered. However, he was deceived; the besieged made an obstinate defence, the Swedes were repulsed in every assault, and 8000 of them were defeated, and almost entirely cut off, in an engagement with a party of Russians. To complete his misfortunes, Charles received a shot from a carbine in his heel, which shattered the bone. For six hours after he continued calmly on horseback, giving orders, till he fainted with the loss of blood; after which he was carried into his tent. It was imagined that amputation would be necessary, as the wound had already begun to mortify; but one Newman undertook to save the limb. It was told the king that deep incisions would be necessary. "Fall to work then (said he), cut boldly, and fear nothing." He held out his leg while the operation was performing; never chan-

194
All the
Swedish
provisions
burnt or
taken by
the Russians.

195
Lewenhaupt joins
koff, indeed, was
detached to harass
him; but such was
the main army in
spite of all
opposition.

196
Extreme
distress of
the Swedes.

197
Charles besieged
Pultowa, a town on
the eastern frontier
of the Ukrain, where
the Czar had laid up
magazines, and of
these Charles resolved
to get possession.

198
A detachment
of 8000
Swedes entered
the place, by whose
means he hoped it
would be
surrendered.

ged.

Sweden. ged countenance; and while the dressing was laid on, ordered an assault for the next morning.

100
The Swedes
harassed by
an army
of 70,000
Russians.
For some days the Czar, with an army of 70,000 men, had lain at a small distance, harassing the Swedish camp, and cutting off the convoys of provisions; but now intelligence was received, that he was advancing as if with a design of attacking the lines. In this situation, Charles, wounded, distressed, and almost surrounded by enemies, is said to have, for the first time, assembled a grand council of war; the result of which was, that it was expedient to march out and attack the Russians. Voltaire, however, totally denies that the king relaxed one jot of his wonted obstinacy and arbitrary temper; but that, on the 7th of July, he sent for general Renchild, and told him, without any emotion, to prepare for attacking the enemy next morning.

100
Battle of
Pultowa.
The 8th of July 1709 is remarkable for the battle which decided the fate of Sweden. Charles having left 8000 men in the camp to defend the works and repel the sallies of the beleagued, began to march against his enemies by break of day with the rest of the army, consisting of 26,000 men, of whom 18,000 were Cossacks. The Russians were drawn up in two lines behind their intrenchments, the horse in front, and the foot in the rear, with chafms to suffer the horse to fall back in case of necessity. General Slippenbach was dispatched to attack the cavalry; which he did with such impetuosity, that they were broken in an instant. However, they rallied behind the infantry, and returned to the charge with such vigour, that they disordered the Swedes in their turn, and took Slippenbach prisoner. Charles was now carried in his litter to this scene of confusion. The troops were animated by his presence, and returned to the charge; the battle became doubtful, when general Creuk was dispatched by Charles to attack the enemy in flank. Creuk mistook his way, which occasioned the loss of the battle. Peter now dispatched prince Menzikoff with a strong detachment, to post himself between the Swedes and Pultowa, to cut off their communication with their camp, and to fall upon their rear. He executed his orders with great success; cut off a corps de reserve of 3000 men; and thus decided the fortune of the day. The king, however, had ranged his remaining troops in two lines; the foot in the centre, and the horse in the two wings. They had already been twice rallied, and were now attacked with fury on all sides. Charles, in his litter, with his sword drawn in one hand, and a pistol in the other, seemed to be every where present. New misfortunes, however, awaited him. A cannon ball killed both horses in the litter; and scarce were others put in their place, when a second broke the litter itself in pieces, and overturned the king. The soldiers now believing him killed, fell back in consternation. The first line was broke, and the second fled. Charles did every thing in his power to restore order; but the Russians pressed so hard, that rallying was impossible, especially as powder was also wanting. Renchild and several other general officers were taken prisoners; and the king himself must have fallen into the hands of the enemy, had not count Poniatowsky drawn up 500 horse, surrounded the royal person, and with desperate fury broke through ten regiments of the enemy. With these the king arrived

on the banks of the Boristhenes. The Russians forced the Swedish camp, where they found six millions in specie; but could not hinder Lewenhaupt, with 4000 foot and all the remaining cavalry, from retreating to the banks of the Boristhenes. This, however, availed them but little; for being pursued by prince Menzikoff, they were obliged, for want of boats or bridges, to surrender at discretion. Charles fled in all mean calash, attended by a little troop inviolably attached to his person, some on foot, and some on horseback. They were obliged to cross a sandy desert, where neither herb nor tree was to be seen, and where the burning heat and want of water were more intolerable than the extremities of cold they had formerly suffered. The whole had almost perished for want of water, when a spring was fortunately discovered; after which they reached Ozakow, a town in the Turkish dominions, the bashaw of which supplied the king with every necessary. It was some time, however, before boats could be got ready for transporting the whole of the king's attendants; by which accident 500 Swedes and Cossacks fell into the hands of the enemy. This loss affected him more than all his other misfortunes. He shed tears at seeing across the river Bogh the greater part of his few remaining friends carried into captivity, without having it in his power to assist them. The bashaw waited upon him to apologize for the delay, and was severely reprimanded by Charles, as if he had been his own subject.

The king remained but a few days at Ozakow, when the serasquier of Bender sent an aga to compliment him on his arrival in the Turkish dominions, and to invite him to that city. Here he was treated with the utmost hospitality; the Turks practised to its utmost extent their generous maxim of regarding as sacred the persons of unfortunate princes who had taken shelter in their dominions; and perhaps regarded him, notwithstanding his misfortunes, as an ally that might be useful to themselves against the Russians. Every one, indeed, regarded him in his distress. The French king offered him a safe passage from the Levant to Marseilles, from whence he might easily return to his own dominions. But Charles was too obstinate to receive advice. Puffed up with the notion of imitating Alexander the Great, he disdained to return, except at the head of a numerous army; and he yet expected, by means of the Turks, to dethrone his adversary Czar Peter. Negotiations for this purpose, indeed, were carried on in the Turkish divan; and it was proposed to escort Charles with a numerous army to the frontiers of Poland: but the revolution which took place there quickly put an end to all such projects. Augustus thought himself no longer bound to observe the treaty which he had made, than Charles was at hand to force him to it. After the battle of Pultowa, therefore, he entered Poland, and took every measure, in concert with the Czar, for the recovery of his kingdom. Stanislaus was not able to stand before such enemies, but was obliged to leave his dominions and fly to Bender in the disguise of a Swedish officer, in order to share the fortune of Charles.—It was not in Poland alone that the Swedish affairs began to suffer in consequence of the defeat at Pultowa. The Danes quickly invaded the province of Schonen with an army of 13,000 foot and 2500 horse. Only 13,000 Swe-

Sweden.

102
The camp
taken, and
the Swedish
army almost
all killed or
taken.

203
Charles ar-
rives safe in
Turkey.

205
Is kindly
received,
and his
hopes of
conquering
Russia be-
gin to re-
vive.

206
Augustus re-
covers the
kingdom of
Poland.

206
The Danes
recover Swe-
dene.

Sweden.

diff forces remained to defend all the territories possessed by Charles in Germany; and of these only a small part were allotted for the defence of Schonen. The regency of Sweden, however, exerted themselves to the utmost to repel this ungenerous invasion; and having collected an army of 12,000 militia and 8000 regulars, dispatched them under general Steenbock into Schonen. Some Saxon troops were incorporated in this army; and among these a prodigious desertion took place, which the general found it impossible to prevent: and thus the Danes gained several advantages, and at last took Christianstadt. Their insolence on this success was so great, that the Swedes demanded to be instantly led against them. Here the good fortune of Sweden seemed once more to revive. The Danes were driven from a very strong situation, with the loss of 8000 killed and taken prisoners, besides a vast number wounded. The king received the intelligence of this victory with the greatest exultation; and could not help exclaiming, "My brave Swedes, should it please God that I once more join you, we will conquer them all!"

207
But are utterly defeated.

208
The Turks declare war against the Russians.

209
The Czar brought in to a desperate situation, but is relieved by a treaty.

In the mean time Charles, by means of his agents the count Poniatowski and the Sieur Neugebar, used his utmost efforts to procure a rupture between the porte and Russia. For a long time the money bestowed by Peter on the vizirs and janisaries prevailed; but at last, in 1711, the grand signior, influenced by his mother, who was strongly in the interest of Charles, and had been wont to call him *her son*, determined to avenge his quarrel with Peter. He therefore gave orders to the vizir to fall upon the Russians with an army of 200,000 men. The vizir promised obedience; but at the same time professed his ignorance in the art of war, and dislike to the present expedition. The cham of Crim Tartary, who had been gained over by the reputation and presents of the king of Sweden, had orders to take the field with 40,000 of his men, and had the liberty of assembling his army at Bender, that Charles might see that the war was undertaken upon his account. The czar, on this news, left the siege of Riga, where he had continued for some months; and with 24,000 men entered Moldavia, where he was joined by Cantemir a vassal of the porte. The vizir marched against him with a prodigious army, and, through the negligence of the czar, cooped him up in such a manner that he could neither advance nor retreat. In this desperate situation he observed that he was now in as bad a situation as Charles at Pultowa; and gave orders for breaking thro' the enemy with fixed bayonets. The desponding spiritless soldiers, however, were little disposed to execute these orders; when Catharines, wife to the czar, without his knowledge, set on foot a treaty with the vizir; and having soon obtained his consent, had the peace signed in six hours, by which means, in all probability, the whole Russian army was saved.

The new treaty was most violently opposed by count Poniatowski and the cham of Tartary. The former had made the king acquainted with the situation of both armies; on which he instantly set out from Bender, filled with the hopes of fighting the Russians, and taking ample vengeance. Having rode 50 leagues post, he arrived at the camp just as the czar was drawing

off his half-famished troops. He alighted at Poniatowski's tent; and being informed of particulars, instantly flew in a rage to the vizir, whom he loaded with reproaches, and accused of treachery. Recollecting himself, however, he proposed a method by which the fault might be remedied; but finding his proposal rejected, he posted back to Bender, after having by the gross insult showed his contempt of the vizir.

The violent behaviour of Charles did not promote his interest. The vizir perceived that his stay in Turkey might prove fatal to himself; and therefore determined to get him out of the country as soon as possible, either by fair means or foul. Succeeding vizirs adopted the same plan; and at last the grand signior himself wrote a letter to the king, in which he desired him to depart by next winter, promising to supply him with a sufficient guard, with money, and every thing else necessary for his journey. Charles gave an evasive answer, and determined to procrastinate his journey, as well to gratify his own stubborn temper, as because he discovered a correspondence between king Augustus and the cham of Tartary, the object of which, he had reason to believe, was to betray him to the Saxons. When he was therefore again pressed to fix the day of his departure, he replied, that he could not think of going before his debts were paid. Being asked how much was requisite for this purpose, he replied, 1000 purses (A). Twelve hundred purses were instantly sent to the seraskier at Bender, with orders to deliver them to the king of Sweden, but not before he should have begun his journey. By fair promises, however, Charles persuaded him to part with the money; after which, instead of setting out, he squandered away his treasure in presents and gratifications, and then demanded 1000 purses more before he would set out. The seraskier was affronted at this behaviour. He shed tears; and, turning to the king, told him, that his head would be the forfeit of having obliged him with the money. The grand signior, on being acquainted with this shameful behaviour of Charles, flew into a rage, and called an extraordinary divan, where he himself spoke, a thing very unusual for the Turkish monarchs. It was unanimously agreed that such a troublesome guest ought to be removed by force, if he should other means fail. Orders were therefore positively sent to Charles to depart; or, in case of his refusal, to attack him in his quarters. Nothing could equal his obstinacy on this occasion: in spite of the menaces of his enemies, in spite of the intreaties of his friends, he persisted in his resolution; and at last determined to resist with 300 Swedes, being all the attendants he had, an army of 20,000 janisaries well armed and furnished with cannon. At length he was attacked in good earnest; though it must be owned, that even in this extremity the Turks showed their regard to him, and were tender of his life, which the king did not at all return in a similar manner. The most of the Swedes surrendered at once, perhaps as thinking it the only method of saving the king's life. This misconduct, however, had a quite contrary effect. Charles became the more obstinate, the more desperate his affairs seemed to be. With 40 men servants only, and the generals Hord and Dardorff, he determined to defend himself to the last extremity. Seeing his

Sweden.

210
Rage of Charles on this occasion.

211
The Grand Signior desires him to depart.

212
Mean and unjust behaviour of Charles.

213
The Turks resolve to force him to depart.

214
His desperate resolution to resist.

215
Is abandoned by all his followers except 40 soldiers.

(A) Each purse contained 30 sequins.

Sweden.

Sweden.

soldiers lay down their arms, he told the generals, "We must now defend the house. Come, (adds he with a smile), let us fight *pro aris et focis*." The house had been already forced by the Tartars, all but a hall which was near the door, and where his domestics had assembled themselves. Charles forced his way through the janissaries, attended by the generals Hord and Dardorff, joined his people, and then barricaded the door. The moment he entered, the enemy, who were in the house, threw down their booty, and endeavoured to escape at the windows. Charles pursued them from room to room with much bloodshed, and cleared the house in a few minutes. He then fired furiously from the windows, killed 200 of the Turks in a quarter of an hour, so that the bashaw who commanded them was at length forced to fet the house on fire. This was done by arrows with lighted matches shot into the roof; but Charles, instead of quitting it, gave orders for extinguishing the fire, in which he himself assisted with great diligence. All efforts, however, were vain: the roof fell in; and Charles, with his few faithful companions, was ready to be buried in the ruins. In this extremity one called out, that there was a necessity for surrendering. "What a strange fellow! (cries the king), who would rather be a prisoner with Turks than mix his ashes with those of his sovereign." Another had the presence of mind to cry out, that the chancery was but 50 paces off, had a stone roof, and was proof against fire. Pleased with the thoughts of again coming to blows, the king exclaimed, "A true Swede! Let us take all the powder and ball we can carry." He then put himself at the head of his troops, and sallied out with such fury that the Turks retreated 50 paces; but falling down in the hurry, they rushed in upon him, and carried him by the legs and arms to the bashaw's tent.

This extraordinary adventure, which favours not a little of infantry, happened on the 12th of February 1713. He was now kept prisoner, with all his retinue; and in this situation he was visited by the unfortunate Stanislaus. The latter, as we have already observed, came in the disguise of a Swedish officer, and had indeed served in the Swedish army in Pomerania, for which reason he was arrested in the Turkish dominions; but being known at Bender, notice was sent to the bashaw who was conducting the king of Sweden to Adrianople. The bashaw communicated the news to baron Fabricius, a favourite of Charles, who immediately imparted it to the king. "Dear Fabricius, (says this inflexible monarch), run and tell him never to make peace with Augustus; we shall soon have a change in our affairs."

Such were the considerations that still occurred to the mind of Charles; however, at last he seemed inclined to submit to his fate, and began seriously to think of returning to his kingdom, now reduced to the most deplorable situation. His habitation was now fixed at Demotica, a small town about six leagues from Adrianople. Here he was allowed provisions for his own table and those of his retinue; but only 25 crowns a-day in money, instead of 500 which he had received at Bender. During his residence here he received a deputation from Hesse-Cassel, soliciting his consent to the marriage of the landgrave with Eleo-

nora princess royal of Sweden; to which he readily agreed: a deputation was also sent him by the regency of Sweden, requesting that he would prepare for returning to his own dominions, which were ready to sink under a ruinous war in his absence. What determined him, however, more than any thing to hasten his return, was the following accident. The new grand vizir Ibrahim Molla, having for private reasons determined to come to a rupture with the czar, invited Charles to a conference, in the style and with the familiarity of an equal. Charles was so much chagrined at this indignity, that he sent his chancellor Mullern to meet the vizir, with a pretence that he was sick. To avoid giving offence to this minister, Charles was obliged to keep his bed during his residence at Demotica, which was for 10 months after. At last, this vizir being strangled, and the Swedish interest at the porte thereby entirely ruined, he determined to quit Turkey at all events. His departure was to be negotiated by his favourite Grothufen, whom he vested with the character of ambassador extraordinary; sending him to Adrianople with a train of 14 persons richly dressed. To equip this retinue the king was reduced to the most mortifying shifts, and to the necessity of borrowing money from usurers at 50 per cent. The great object was, to obtain from the vizir money and a passport. Grothufen was received with all the respect due to his rank; but the vizir started difficulties. With regard to the passport, he said, it could be of no use until the consent of the court of Vienna was first obtained; and as to money, he said, "his master knew how to give when he thought proper, but it was beneath his dignity to lend; that the king should have every necessary provided for his journey, and possibly the porte might make some pecuniary present, but he would not have it expected." The Imperial minister, however, removed every difficulty with regard to the passport, by granting it in the most full and ample manner, in the name of the emperor, the princes and states of Germany. He sent also a present to the king, consisting of a tent of scarlet richly embroidered with gold; a sabre, the handle of which was studded with jewels; and eight fine horses richly caparisoned. Money, the article most wanted, was entirely forgot; however, the day was fixed for Charles's departure, and the vizir appointed 60 carriages loaded with all kinds of provisions, and several companies of janissaries and other troops to attend him to the frontiers of Transylvania.

On the 14th of October 1714, Charles quitted his bed at Demotica, and set out for Sweden. All the princes through whose territories he was to pass, had given orders for his entertainment in the most magnificent manner; but the king perceiving that these compliments only rendered his imprisonment and other misfortunes more conspicuous, suddenly dismissed his Turkish attendants, and, assembling his own people, bid them take no care about him, but make the best of their way to Stralsund. After this he set out post, in the habit of a German officer, attended only by colonel During. Keeping the bye-roads through Hungary, Moravia, Austria, Bavaria, Wirtemberg, the palatinate, Westphalia, and Mecklenburg, arrived on the 21st of November at midnight, before the gates of Stralsund. Being unknown, he was admitted with difficulty;

216
Fights like a madman, but is taken prisoner with all his followers.

217
Stanislaus arrested in Turkey.

218
Extreme inflexibility of Charles.

219
Begins to think of returning to his dominions.

220
Obliged, by his unbecomable pride, to keep his bed for 10 months.

221
Sends an ambassador to the Porte, who is not very successful.

222
Sets out for Sweden.

223
Dismisses his retinue, and proceeds with only one attendant.

Sweden.

214
Arrives at
Stralsund,
and is recei-
ved with the
utmost
joy.

difficulty; but being soon recognized by the governor, the greatest tokens of joy were shown all over the town. In the midst of the tumult Charles went to bed. He had been booted for 16 days, and now his legs were swelled to such a degree that his boots were cut off. Having slept for some hours, he arose, reviewed his troops, and gave orders for renewing the war with redoubled vigour.

225
Distressed
situation of
Sweden.

Sweden was now in the greatest distress. We have already mentioned, that on the news of the defeat at Pultowa, the Danes had invaded Schonen, but were defeated by general Steenbock. This victory, however, did not put an end to the war. On the contrary, the kings of Denmark and Poland, with the czar of Moscow, entered into stricter bonds of amity than ever. They dreaded the return of Charles to his own dominions, and apprehended that numberless victories would soon efface the remembrance of Pultowa. They determined, therefore, to make the best use of their time; and perhaps Charles never took a more imprudent resolution than obstinately to remain so long in the Turkish dominions. The kings of Denmark and Poland invaded Pomerania; but after laying siege in vain to Stralsund, Wismar, and other places, they were obliged to retire with disgrace into winter-quarters. In 1712, the king of Denmark invaded and reduced Bremen and Verden; but the same year met with a terrible defeat from Steenbock, with the loss of a vast number killed and wounded, and almost all their artillery taken. The following year, however, this general being pursued, and surrounded by the united forces of the Russians, Danes, and Saxons, was obliged to throw himself into the neutral town of Tommingen; where he was besieged, and obliged to surrender at discretion, with his whole army. The consequence of this disaster was an invasion of Finland by the czar; which province he totally reduced, after defeating the Swedes in several engagements. Indeed, the Swedish forces were now so much reduced, that they were unable to cope with almost any enemy. The return of Charles, however, seemed to give new life to the whole nation. Though the number of inhabitants was visibly diminished, the levies he had ordered were complete in a few weeks: but the hands left to cultivate the earth consisted of the infirm, aged, and decrepid; so that a famine was threatened in consequence of the military rage which had seized all the youth of the kingdom.

217
The king is
unable to
retrieve the
Swedish af-
fairs.

The preference of Charles did not now produce those consequences which the allies had feared. The kingdom was too much reduced to be able to furnish the necessary supplies of men and money; and though the king's courage and military skill were not in the least diminished, the efforts he made, instead of restoring Sweden to its splendour, served entirely to ruin it. In 1715, Prussia declared against him, on account of his demanding back the town of Stetin, which that monarch had seized. To complete his embarrassment, the elector of Hanover, George I. of Britain, also became his enemy. The forces of Denmark, Prussia, Saxony, and Hanover, joined to invest Wismar, while a body of 36,000 men formed the siege of Stralsund; at the same time that the czar, with a fleet of 20 large ships of war, and 150 transports, carrying 30,000 men, threw every part of the Swedish coast into the

greatest consternation. The heroism of Charles could not prevail against so many enemies. So dreadful, however, he still was, that the prince of Anhalt, with 12,000 brave troops, did not think himself a match for this furious enemy when at the head of only 2000, till he had entrenched his army behind a ditch, defended by chevaux de frize. It appeared, indeed, that his precaution was not unnecessary; for, in the night, Charles with his men clambered up the ditch, and attacked the enemy in his usual manner. Numbers, however, at last prevailed; and Charles was obliged to retire, after having seen his favourite Grothufen, general Dardorff and During, the companions of his exile, killed by his side, and himself being wounded in the breast.

This rash attempt was made in order to save Rugen, from whence the town of Stralsund was supplied with provisions. The place was well fortified, and garrisoned with 9000 men, with Charles himself at their head; but nothing could resist the efforts of the enemy. The houses were laid in ashes by the bombs; the walls miserably shattered, and large breaches made in them by the cannon; so that by the 17th of December it was proposed to give the assault. The attack on the horn-work was desperate: the enemy were twice repulsed; but at last, by dint of numbers, effected a lodgment. The next day Charles headed a rally in which he dealt terrible destruction among the besiegers, but was at length overpowered and obliged to retreat into the town. At last his officers, apprehending that he must either fall into the hands of the enemy, or be buried in the ruins of the place, intreated him to retire. A retreat, however, was now almost as dangerous as to remain in the town, on account of the fleets of the enemy with which the sea was covered, and it is thought that this very circumstance induced the king to consent to it. Setting out therefore in a small boat with sails and oars, he passed all the enemy's ships and batteries, and arrived safe at Ystet in Schonen.

To revenge himself for these losses, Charles invaded Norway with an army of 25,000 men. The Danes were every where defeated and pursued with that vigour for which the king of Sweden was so remarkable; but strong reinforcements arriving from Denmark, and provision failing, he was at last obliged to retire, and evacuate the country. Soon after this the Swedes left Wismar; but when every thing seemed to go to wreck, Baron Goertz the chief minister and favourite of Charles found means to set on foot a treaty with the czar of Moscow, by which the most formidable of all Charles's enemies was taken off. The minister found means to work upon the inflexible and stubborn temper of Charles by representing to him that the cessions of certain provinces to Peter would induce him to assist him in his projects of again dethroning Augustus, and of replacing James on the throne of Britain; which last scheme he had projected out of revenge for the elector of Hanover having seized on the duchies of Bremen and Verden. In consequence of the conferences between the czar and Goertz, the former engaged to send into Poland an army of 80,000 men, in order to dethrone that prince whom he had so long long defended. He engaged also to furnish ships for transporting 30,000 Swedes to Ger-
many

Sweden.

219
His despe-
rate valour.

230
Stralsund
besieged.

237
And taken,
in spite of
the utmost
efforts of
the king.

232
Charles in-
vades Nor-
way to no
purpose.

233
A treaty
with the
Czar of
Moscow
projected.

238
Is encom-
passed on
all sides by
enemies.

Sweden. many, and 10,000 into Denmark. This treaty, however, was not fully ratified; and the king's death, which happened in 1718, put a final stop to all the great prospects of Sweden.

²³⁴ Charles invades Norway again, and lays siege to Frederick's hall, The king had resolved on the conquest of Norway before he dethroned Augustus; and as no difficulties ever deterred him, he marched his army into that cold and barren country in the month of October, when the ground was covered with frost and snow. With 18,000 men he formed the siege of Frederick's hall, though the severity of the frost rendered it almost impossible to break ground. Charles, however, resolved to form trenches; and his soldiers cheerfully obeyed, digging into the ground with the same labour as if they had been piercing a rock. On the 11th of December the king visited the trenches in the midst of a terrible fire from the enemy, imagining that his men might be animated by his presence. He took his post in the most dangerous station he could choose, standing upon a gabion and leaning with his arm over the parapet, while the enemy were firing chain-shot at the very spot where he stood. He was intended to change his station; but he remained obstinate, as if he had been proof against cannon-bullets. At last he was seen to fall on the parapet with a deep groan. A small cannon-ball had struck him on the temple, beat in the left eye, and forced the right quite out of its socket; his right hand in the mean time grasped the hilt of his sword, as if he had meant to revenge the blow.

²³⁵ His extreme rashness, in consequence of which he is killed. Charles XII. was succeeded by his sister the princess Ulrica Eleonora, wife to the hereditary prince of Hesse. On this occasion the states took care to make a previous stipulation for the recovery of their liberties, and obliged the princess to sign a paper to this purpose before entering on the government. Their first care was to make a peace with Great Britain, which the late king intended to have invaded. The Swedes then, to prevent their farther losses by the progress of the Russian, the Danish, the Saxon, and other arms, made many great sacrifices to obtain peace from those powers. The French, however, about the year 1738, formed a dangerous party in the kingdom, under the name of the *Hats*; which not only broke the internal quiet of the kingdom, but led it into a ruinous war with Russia, by which the province of Finland was lost. Their Swedish majesties having no children, it was necessary to settle the succession; especially as the duke of Holstein was descended from the queen's eldest sister, and was, at the same time, the presumptive heir to the empire of Russia. Four competitors appeared; the duke of Holstein Gottorp, prince Frederic of Hesse-Cassel nephew to the king, the prince of Denmark, and the duke of Deux-Ponts. The duke of Holstein would have carried the election, had he not embraced the Greek religion, that he might mount the throne of Russia. The czarina interposed, and offered to restore all the conquests she had made from Sweden, excepting a small district in Finland, if the Swedes would receive the duke of Holstein's uncle, Adolphus Frederic bishop of Lubeck, as their hereditary prince and successor to their crown. This was agreed to; and a peace was concluded at Abo, under the mediation of his Britannic majesty. This peace was so firmly adhered to by the

czarina, that his Danish majesty thought proper to drop all resentment for the indignity done his son.

The prince-succesor married the princess Ulrica, third sister to the king of Prussia; and in 1751 entered into the possession of his new dignity, which proved to him a crown of thorns. Through a strange medley of affairs and views of interest, the French had acquired vast influence in all the deliberations of the Swedish senate, who of late have been little better than pensioners to that crown. The intrigues of the senators forced Adolphus to take part in the late war against Prussia: but as that war was disagreeable not only to the people, but also to the king of Sweden, the nation never made so mean an appearance; and upon Russia's making peace with the king of Prussia, the Swedes likewise made their peace, upon the terms of leaving things as they stood at the beginning of the war. Adolphus died dispirited in 1771, after a turbulent reign of twenty years; and was succeeded by his son Gustavus, the present monarch. The most remarkable transaction of this reign is the revolution which took place in the government in the year 1772, by which the king, from being the most limited became one of the most despotic monarchs in Europe. Ever since the death of Charles XII. the whole power of the kingdom had been lodged in the states; and which they had on all occasions most grievously abused. Gustavus therefore determined either to seize on that power of which they made such a bad use, or which he perished in the attempt. The revolution was effected in the following manner. On the morning of the 19th of August 1772, a considerable number of officers, as well as other persons known to be attached to the royal cause, had been summoned to attend his majesty. Before then he was on horseback, and visited the regiment of artillery. As he passed through the streets he was more than usually courteous to all he met, bowing familiarly to the lowest of the people. On the king's return to his palace, the detachment which was to mount guard that day being drawn up together with that which was to be relieved, his majesty retired with the officers into the guard-room. He then addressed them with all that eloquence of which he is said to be a perfect master; and after insinuating to them that his life was in danger, he exposed to them in the strongest colours the wretched state of the kingdom, the shackles in which it was held by means of foreign gold, and the dissensions and troubles arising from the same cause which had distracted the diet during the course of fourteen months. He assured them that his only design was to put an end to these disorders; to banish corruption, restore true liberty, and revive the ancient lustre of the Swedish name, which had been long tarnished by a venality as notorious as it was disgraceful. Then assuring them in the strongest terms that he disclaimed for ever all absolute power, or what the Swedes call *sovereignty*, he concluded with these words: "I am obliged to defend my own liberty and that of the kingdom, against the aristocracy which reigns. Will you be faithful to me, as your forefathers were to Gustavus Vasa and Gustavus Adolphus? I will then risk my life for your welfare and that of my country."

The officers, most of them young men, of whose attachment the king had been long secure, who did

Sweden.

²³⁷ Gustavus the present king of Sweden ascends the throne.

²³⁸ Account of the revolution in 1772, by which he became despot.

²³⁶ Account of the Swedish affairs from the death of Cha. XII. to the year 1771.

Sweden. not thoroughly perhaps see into the nature of the request his majesty made them, and were allowed no time to reflect upon it, immediately consented to every thing, and took an oath of fidelity to him.

230
Resolution
of a Swedish
officer.

Three only refused. One of these, Frederic Cederstrom, captain of a company of the guards, alledged he had already and very lately taken an oath to be faithful to the states, and consequently could not take that which his majesty then exacted of him. The king, looking at him sternly, answered, "Think of what you are doing." "I do," replied Cederstrom, "and what I think to-day, I shall think to-morrow; and were I capable of breaking the oath by which I am already bound to the states, I should be likewise capable of breaking that your majesty now requests me to take."

The king then ordered Cederstrom to deliver up his sword, and put him in arrest.

His majesty however, apprehensive of the impression which the proper and resolute conduct of Cederstrom might make upon the minds of the other officers, shortly afterwards softened his tone of voice; and again addressing himself to Cederstrom, told him, that as a proof of the opinion he entertained of him, and the confidence he placed in him, he would return him his sword without insisting upon his taking the oath, and would only desire his attendance that day. Cederstrom continued firm; he answered, that his majesty could place no confidence in him that day, and that he begged to be excused from the service.

While the king was shut up with the officers, Senator Ralling, to whom the command of the troops in the town had been given two days before, came to the door of the guard-room, and was told that he could not be admitted. The senator insisted upon being present at the distribution of the orders, and sent in to the king to desire it; but was answered, he must go to the senate, where his majesty would speak to him.

The officers then received their orders from the king; the first of which was, that the two regiments of guards and of artillery should be immediately assembled, and that a detachment of 36 grenadiers should be posted at the door of the council-chamber to prevent any of the senators from coming out.

But before the orders could be carried into execution, it was necessary that the king should address himself to the soldiers; men wholly unacquainted with his designs, and accustomed to pay obedience only to the orders of the senate, whom they had been taught to hold in the highest reverence.

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gains over
the soldiers.

As his majesty, followed by the officers, was advancing from the guard-room to the parade for this purpose, some of them more cautious, or perhaps more timid than the rest, became, on a short reflection, apprehensive of the consequences of the measure in which they were engaged: they began to express their fears to the king, that unless some persons of greater weight and influence than themselves were to take a part in the same cause, he could hardly hope to succeed in his enterprise. The king stopped a while, and appeared to hesitate. A sergeant of the guards overheard their discourse, and cried aloud—"It shall succeed—Long live Gustavus!" His majesty immediately said, "Then I will venture;"—and

stepping forward to the soldiers, he addressed them in terms nearly similar to those he had made use of to the officers, and with the same success. They answered him with loud acclamations: one voice only said, No; but it was not attended to.

In the mean time some of the king's emissaries had spread a report about the town that the king was arrested. This drew the populace to the palace in great numbers, where they arrived as his majesty had concluded his harangue to the guards. They testified by reiterated shouts their joy at seeing him safe; a joy which promised the happiest conclusion to the business of the day.

The senators were now immediately secured. They had from the window of the council-chamber beheld what was going forward on the parade before the palace; and, at a loss to know the meaning of the shouts they heard, were coming down to inquire into the cause of them, when 30 grenadiers, with their bayonets fixed, informed them it was his majesty's pleasure they should continue where they were. They began to talk in a high tone, but were answered only by having the door shut and locked upon them.

The moment the secret committee heard that the senate was arrested, they separated of themselves, each individual providing for his own safety. The king then mounting his horse, followed by his officers with their swords drawn, a large body of soldiers, and numbers of the populace, went to the other quarters of the town where the soldiers he had ordered to be assembled were posted. He found them all equally willing to support his cause, and to take an oath of fidelity to him. As he passed through the streets, he declared to the people, that he only meant to defend them, and save his country; and that if they would not confide in him, he would lay down his sceptre, and surrender up his kingdom. So much was the king beloved, that the people (some of whom even fell down upon their knees) with tears in their eyes implored his majesty not to abandon them.

The king proceeded in his course, and in less than an hour made himself master of all the military force in Stockholm.

The kingdom of Sweden, in its present state, is divided into the following provinces: 1. Sweden Proper. 2. Gothland. 3. Finland. Swedish Lapland. And, 5. The Swedish islands. Great abatements must be made for the lakes, and unimproved parts of Sweden; which are so extensive, that the habitable part is confined to narrow bounds.

The face of Sweden is pretty similar to those of its neighbouring countries; only it has the advantage of soil, &c. navigable rivers.

The same may be said with regard to its climate, soil, &c. Summer bursts from winter; and vegetation is more speedy than in southern climates. Stoves and warm furs mitigate the cold of winter, which is so intense, that the noses and extremities of the inhabitants are sometimes mortified. The Swedes, since the days of Charles XII. have been at incredible pains to correct the native barrenness of that country, by erecting colleges of agriculture, and in some places with great success. The soil is much the same with that of Denmark and some parts of Norway, generally very bad, but in some valleys surprisingly fertile.

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The Swedes, till of late years, had not industry sufficient to remedy the one, nor improve the other. The peasants now follow the agriculture of France and England; and some late accounts say, that they rear almost as much grain as maintains the natives. Gothland produces wheat, rye, barley, oats, pease, and beans; and in case of deficiency, the people are supplied from Livonia and the Baltic provinces. In summer, the fields are verdant, and covered with flowers; and produce strawberries, raspberries, currants, and other small fruits. The common people know, as yet, little of the cultivation of apricots, peaches, nectarines, pine-apples, and the like high-flavoured fruits; but melons are brought to great perfection in dry seasons.

Sweden produces crystals, amethysts, topazes, porphyry, lapis-lazuli, agate, cornelian, marble, and other fossils. The chief wealth of the country, however, arises from her mines of silver, copper, lead, and iron. The last-mentioned metal employs no fewer than 450 forges, hammering-mills, and smelting-houses. A kind of a gold mine has likewise been discovered in Sweden; but so inconsiderable, that from the year 1741 to 1747, it produced only 2398 gold ducats, each valued at 9s. 4d. sterling. The first gallery of one silver mine is 100 fathoms below the surface of the earth; the roof is supported by prodigious oaken beams; and from thence the miners descend about 40 fathoms to the lowest vein. This mine is said to produce 20,000 crowns a year. The product of the copper mines is uncertain; but the whole is loaded with vast taxes and reductions to the government, which has no other resources for the exigencies of state. Those subterranean mansions are astonishingly spacious, and at the same time commodious for their inhabitants, so that they seem to form a hidden world. The water-falls in Sweden afford excellent conveniency for turning mills for forges; and for some years the exports of iron from Sweden brought in 300,000 l. sterling. Dr Busching thinks that they constituted two-thirds of the national revenue. It must, however, be observed, that the extortions of the Swedish government, and the importation of American bar-iron into Europe, and some other causes, have greatly diminished this manufacture in Sweden; so that the Swedes very soon must apply themselves to other branches of trade and improvements, especially in agriculture.

The animals differ little from those of Norway and Denmark, only the Swedish horse are known to be more serviceable in war than the German. The fishes found in the rivers and lakes of Sweden, are the same with those in other northern countries, and taken in such quantities, that their pikes (particularly) are salted and pickled for exportation. The train-oil of the seals, taken in the gulph of Finland, is a considerable article of exportation.

There is a great diversity of characters among the people of Sweden; and what is peculiarly remarkable among them, they have been known to have different characters in different ages. At present, their peasants seem to be a heavy plodding race of men, strong and hardy; but without any other ambition than that of subsisting themselves and their families as well as

they can: they are honest, simple, and hospitable; and the mercantile classes are much the of the same cast; but great application and perseverance is discovered among them all. One could form no idea that the modern Swedes are the descendants of those who, under Gustavus Adolphus and Charles XII. carried terror in their names through the most distant countries, and shook the foundations of the greatest empires: The principal nobility and gentry of Sweden are naturally brave, polite, and hospitable; they have high and warm notions of honour, and are jealous of their national interests. The drefs of the common people is almost the same with that of Denmark: the better fort are infatuated with French modes and fashion. The common diversions of the Swedes, are skating, running races in sledges, and sailing in yachts upon the ice. They are not fond of marrying their daughters when young, as they have little to spare in their own life time. The women go to plough, thresh out the corn, row upon the water, serve the bricklayers, carry burdens, and do all the common drudgeries in husbandry.

Christianity was introduced here in the 9th century. Their religion is Lutheran, which was propagated among them by Gustavus Vasa, about the year 1523, as we have already related. The Swedes are surprisingly uniform and unremitting in religious matters; and have such an aversion to Popery, that caltation is the fate of every Roman-catholic priest discovered in their country. The archbishop of Upfal has a revenue of about 400 l. a-year; and has under him thirteen suffragans, besides superintendants, with moderate stipends. No clergyman has the least direction in the affairs of state; but their morals, and the sanctity of of their lives, endear them so much to the people, that the government would repent making them its enemies. Their churches are neat, and often ornamented. A body of ecclesiastical laws and canons direct their religious œconomy. A conversion to Popery, or a long continuance under excommunication, which cannot pass without the king's permission, is punished by imprisonment and exile.

The Swedish language is a dialect of the Teutonic, and resembles that of Denmark. The Swedish nobility and gentry are, in general, more conversant in polite literature than those of many other more flourishing states. They have of late exhibited some noble specimens of their munificence for the improvement of literature and science, particularly natural history.

The Swedish commonalty subsists by agriculture, mining, grazing, hunting, and fishing. Their materials for traffic are the bulky and useful commodities of masts, beams, deal-boards, and other sorts of timber for shipping; tar, pitch, bark of trees, pot-ash, wooden utensils, hides, flax, hemp, peltry, furs, copper, lead, iron, cordage, and fish.

Even the manufacturing of iron was introduced into Sweden so late as the 16th century; for till that time they fold their own crude ore to the Hanse-towns, and bought it back again manufactured into utensils. About the middle of the 17th century, by the assistance of the Dutch and Flemings, they set up some manufactures of glass, starch, tin, woollen, silk, soap, leather-

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leather-dressing, and saw-mills. Bookselling was at that time a trade unknown in Sweden. They have since had sugar-baking, tobacco-plantations, and manufactures of sail-cloth, cotton, fusian, and other stuffs; of linen, alum, brimstone, paper-mills, and gunpowder-mills. Vast quantities of copper, brass, steel, and iron, are now wrought in Sweden. They have also foundries for cannon, forgeries for fire-arms and anchors, armories, wire and flattening-mills, mills also for fulling, and for boring and stamping; and of late they have built many ships for sale.

Certain towns in Sweden, being 24 in number, are called *Staple-towns*, where the merchants are allowed to import and export commodities in their own ships. Those towns which have no foreign commerce, though lying near the sea, are called *land-towns*. A third kind are termed *mine-towns*, as belonging to mine-districts. The Swedes, about the year 1752, had greatly increased their exports, and diminished their imports, most part of which arrive or are sent off in Swedish ships; the Swedes having now a kind of navigation-act, like that of the English. Those promising appearances were, however, blasted, by the madness and jealousies of the Swedish government; and the people so oppressed with taxes, that some important revolution was daily expected in that kingdom.

The revenue of Sweden, since the unfortunate wars of Charles XII. has been greatly reduced. Her gold and silver species, in the late reign, arose chiefly from the king's German dominions. Formerly, the crownlands, poll-money, tithes, mines, and other articles, are said to have produced a million sterling. The payments that are made in copper, which is here the chief medium of commerce, is extremely inconvenient; some of those pieces being as large as tiles; and a cart or wheelbarrow is often required to carry home a moderate sum. The Swedes, however, have gold ducats, and eight-mark pieces of silver, valued each at 5 s. 2 d. and the subsidies paid them by France help to increase their currency.

No country in the world has produced greater heroes or braver troops than the Swedes; and yet they cannot be said to maintain a standing army, as their forces consist of a regulated militia. The cavalry is clothed, armed, and maintained, by a rate raised upon the nobility and gentry, according to their estates; and the infantry by the peasants. Each province is obliged to find its proportion of soldiers, according to the number of farms it contains; every farm of 60 l. or 70 l. per annum, is charged with a foot-soldier, furnishing him with diet, lodging and ordinary cloaths, and about 20 s. a-year in money; or else a little wooden house is built him by the farmer, who allows him hay and pasture for a cow, and ploughs and sows land enough to supply him with bread. When embodied, they are subject to military law, but otherwise to the civil law of the country. It may therefore literally be said, that every Swedish soldier has a property in the country he defends. This national army is thought to amount to above 50,000 men; and Sweden formerly could have fitted out 40 ships of the line; but of late years their ships, together with their docks, are suffered to run to decay.

SWEEP, in the sea-language, is that part of the

mould of a ship where she begins to compass in the rung-heads: also when the hauser is dragged along the bottom of the sea to recover any thing that is sunk, they call this action *sweeping for it*.

SWEET, in the wine trade, denotes any vegetable juice whether obtained by means of sugar, raisins, or other foreign or domestic fruit, which is added to wines with a design to improve them.

SWEIN-MOTE. See FOREST Courts.

SWIFT (Dr Jonathan), an eminent divine, politician, and wit, was descended from an ancient family; and born at Dublin in 1667, seven months after his father's death. He was educated at Trinity college, Dublin: but minding history and poetry more than academic learning, he was refused his bachelor's degree for insufficiency, though he was at last admitted *speciali gratia*, by favour rather than merit; a circumstance that served as a spur to his future studies. In 1688, being then without support, he was patronized by Sir William Temple, who had married a relation of his mother, by whose means he was introduced to the notice of king William, who offered to make him a captain of horse; but Swift had determined on a clerical life, and after Sir William's death the king took no farther notice of him. He met with several disappointments in his endeavours at preferment, obtaining only two small livings, Lraceror and Rathbigging, in the county of Meath, when he became eminent as a political writer.

While Swift resided at Lraceror, he invited to Ireland a lady, whom he has celebrated by the name of *Stella*. He became acquainted with her while he lived with Sir William Temple. She was the daughter of his steward, whose name was *Johnson*; and Sir William, in consideration of her father's faithful services, left her at his death 1000 l. She was now about eighteen: and was accompanied by Mrs Dingley, a lady who was fifteen years older, and, though related to Sir William, had only an annuity of 27 l. But whatever was Swift's attachment to Mrs Johnson, every precaution was taken to prevent scandal: they never lived in the same house; nor were they ever known to meet but in the presence of a third person. Swift made frequent excursions; but Mrs Johnson was buried in solitude and obscurity; she was personally known only to a few of Swift's most intimate acquaintance, and Mrs Dingley was her only female companion.

In 1701 Swift took his degree of doctor of divinity. He had been educated among the Whigs; and the same year published a Discourse of the contests and dissensions between the nobles and commons of Athens and Rome: this was in behalf of king William and his ministers, against the violent proceedings of the house of commons. But soon after, he attached himself to the Tories; because, as he said, the Whigs had renounced their old principles.

In 1710, being then in England, he was commissioned by the primate of Ireland to solicit the queen to release the clergy from paying the 20th part and first-fruits; and this brought him acquainted with Mr Harley, who, with the rest of the ministers, appears to have caressed him with uncommon assiduity. From this time he supported his new friends with all his power, in pamphlets, poems, and periodical papers;

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yet received no gratuity or reward until the year 1713, when he accepted the deanery of St Patrick's, Dublin. A bishopric had been intended for him by the queen; but archbishop Sharp, and a certain great lady, having represented him as a man whose religious sincerity was very doubtful, it was given to another.

It is here proper to observe, that among other persons with whom he became intimately acquainted while in England, was Mrs Vanhomrigh. She was born in Ireland; and had been married to Mr Vanhomrigh, first a merchant of Amsterdam, then of Dublin, where king William gave him very great places; but he dying, left two sons and two daughters; and his sons dying soon after, his whole fortune, which was very considerable, fell to the daughters. The widow and the two young ladies came to England in 1709, where they were visited by persons of the first quality; and Swift living near them, used to be much there. During this familiarity, he insensibly became a kind of preceptor to the young ladies, particularly to the eldest, who was then about 20, and was fond of reading, and a great lover of poetry. Hence admiring such a character as that of Swift, she passed from admiration to love, and ventured to make him a proposal of marriage. He at first affected to believe her in jest, then to rally her on so whimsical a choice, and at last gave her an absolute refusal. While he was in this situation he wrote his *Cadenus and Vanessa*; and then returned to the place of his exile, as he usually called it. Soon after Mrs Vanhomrigh died, and left some debts; which it not being convenient for her daughters, who had debts of their own, to pay at present, to avoid an arrest they followed the dean into Ireland.

The first remarkable event of his life after his settlement at the deanery, was his marriage with Mrs Johnson, the daughter of Sir William Temple's steward, the celebrated Stella, after an intimate friendship of more than 16 years; but whatever were the motives to a marriage that was never avowed, the dean and the lady continued to live in the same Platonic manner they had done before. He had hitherto continued to visit Miss Vanhomrigh, but now his visits were less frequent. Soon after, her sister died; and the remains of the family-fortune centering in her, she retired to Selbridge, a small house and estate about 12 miles from Dublin. From thence she frequently wrote to the dean, and pressed him to marry her, but he rallied and still avoided a positive refusal. She pressed him either to accept or refuse her as a wife; upon which he wrote an answer, and delivered it with his own hand, and probably let her into the fatal secret of his being already married: this the unhappy lady did not survive many weeks; however, before her death, she cancelled a will she had made in the dean's favour.

From 1716 to 1720, is a chafm in the dean's life, which it has been found difficult to fill up. Lord Orrery thinks, with great reason, that he employed this time upon *Gulliver's Travels*. The truth is, that Swift's disappointments had rendered him spleenetic; and he frequently indulged himself in an intolerable misanthropy, that, in the midst of all his wit and imagination, is disgusting in several parts of this work.

About the year 1720, the dean distinguished himself

as a patriot, in his *Proposal for the Use of Irish Manufactures*, and by his *Draper's Letters* in opposition to Wood's patent for a copper coinage; which, he clearly showed, was calculated to procure the patentee an exorbitant gain, to the impoverishment of Ireland. These letters rendered him amazingly popular, and from this time the dean's influence in that island was almost without bounds; for he was consulted in whatever related to domestic policy, and particularly to trade.

In 1727, died his wife, the amiable Stella, in the 44th year of her age; a lady possessed of an enchanting beauty, a musical voice, unbounded wit, mingled with sweetness of manners, and a mind adorned with every virtue. She had been declining ever since the year 1724; and it is generally believed that her immature death was occasioned by the peculiarity of the dean's conduct towards her. It is said the dean did at length earnestly desire that she might be publicly owned as his wife; but as her health was then declining, she said it was too late, and insisted that they should continue to live as they had lived before. To this the dean in his turn consented, and suffered her to dispose entirely of her own fortune, by her own name, to a public charity, when she died.

From the death of Stella his life became much retired; the austerity of his temper also increased, and he could not enjoy his public days: these entertainments were therefore discontinued, and he sometimes avoided the company of his most intimate friends; but in time he grew more desirous of company. In 1732, he complains, in a letter to Mr Gay, that "he had a large house, and should hardly find one visitor if he was not able to hire him with a bottle of wine;" and, in another to Mr Pope, "that he was in danger of dying poor and friendless, even his female friends having forsaken him; which," as he says, "vexed him most." These complaints were afterwards repeated in a strain of yet greater sensibility and self-pity: "All my friends have forsaken me.

"Vertiginosus, inops, surdus, male gratus amicis.

"Deaf, giddy, helpless, left alone,

"To all my friends a burden grown."

It is very remarkable, however, that although his mind was greatly depressed, and his principal enjoyment at an end when Mrs Johnson died, yet there is an air of levity and trifling in some of the pieces he wrote afterwards, that is not to be found in any other: such, in particular, are his *Directions to Servants*, and several of his letters to his friend Dr Sheridan.

The fits of giddiness and deafness, to which he had been subjected from a surfeit before he was 20 years old, became more frequent and violent as he grew in years. A presentiment which he had long entertained of that wretchedness which would inevitably overtake him towards the close of life, by the failure of his intellects, clouded his mind with the most melancholy ideas, and tinged every object around him. How far this gloomy sentiment prevailed, we may learn from the following remarkable anecdote mentioned by Mr Faulkner in his letter to lord Chesterfield. "One time, in a journey from Drogheda to Navan, the dean rode before the company, made a sudden stop, dismounted his horse, fell on his knees, lifted up his hands, and prayed in the most devout manner. When

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his friends came up, he desired and insisted on their alighting; which they did, and asked him the meaning. "Gentlemen," said he "pray, join your hearts in fervent prayers with mine, that I may never be like this oak-tree, which is decayed and withered at top, while the other parts are found." In 1736, while he was writing a satire on the Irish parliament, called the *Legion Club*, he was seized with so dreadful a fit of his malady, that he left the poem unfinished; and never after attempted a composition that required a course of thinking. From this time his memory gradually declined; his passions perverted his understanding; and, in 1741, he became utterly incapable of conversation.

The concluding scene of his life was truly affecting, and afforded a striking lesson to check the pride of human genius. Mr Faulkner's account of it is well worth notice: "Swift never was very outrageous; but his memory failed him by degrees for several years together, inasmuch that he forgot all his friends and domesticities. He could not call any of them by their names; nor for cloaths, food, or any necessaries that he wanted. In short, his forgetfulness grew so much upon him, he could not remember any one passage of his life, nor read, nor even tell his letters, for near two years before his death. He likewise lost the use of his speech, excepting now and then uttering some incoherent rambling words, being incapable of asking any questions, or of returning answers; nor could he ask for one necessary of life. During this melancholy situation great care was taken of his person and his food, as he was incapable of dressing, undressing, or helping himself to cloaths or victuals; and so totally was he deprived of all rational faculties, that he was treated like a new-born infant, being taken out of bed, undressed, and put into bed like the youngest child; and had the actions of one, being fond of gold and silver toys, which he would play with or put into his mouth." In this deplorable state of insensibility he lingered until 1745, when the dissolution of his bodily frame followed the extinction of his mental powers. Upon opening the skull, after his death, much water was found in the brain. By his will, which is dated May 1740, he left about 1200*l.* in legacies; and the rest of his fortune, which was about 11,000*l.* to erect and endow an hospital for idiots and lunatics. His works have been often printed, and of various forms.

Swift undoubtedly was a man of native genius. His fancy was inexhaustible. His conceptions were lively and comprehensive; and he had the peculiar felicity of conveying them in language equally correct, free, and perspicuous. His penetration was as quick as intuition; and he was indeed the critic of nature.

As his genius was of the first class, so were some of his virtues.—The following anecdote will illustrate his filial piety. His mother died in 1710, as appears by a memorandum in one of the account-books, which Dr Swift always made up yearly, and on each page entered minutely all his receipts and expences in every month, beginning his year from November 1. He observed the same method all his lifetime till his last illness. At the foot of that page which includes his expences of the month of May 1710, at the glebe-house of Laracor in the county of Meath, where he was then resident, are these remarkable words, which

show at the same time, his filial piety and the religious use which he thought it his duty to make of that melancholy event. "*Memo.* On Wednesday, between seven and eight in the evening, May 10. 1710, I received a letter in my chamber at Laracor (Mr Percival and Jo. Beaumont being by) from Mrs F—, dated May 9. with one inclosed, sent by Mrs Worral at Leicester to Mrs F—, giving an account that my dear mother, Mrs Abigail Swift, died that morning, Monday April 24. 1710, about ten o'clock, after a long sickness: being ill all winter, and lame; and extremely ill about a month or six weeks before her death. I have now lost my barrier between me and death. God grant I may live to be as well prepared for it as I confidently believe her to have been! If the way to heaven be through piety, truth, justice, and clarity, she is there. J. S." He always treated his mother, during her life, with the utmost duty and affection; and she sometimes came to Ireland to visit him after his settlement at Laracor. She lodged at Mr Brent's, the printer, in George's lane, Dublin. She asked Mrs Brent, the landlady, "Whether she could keep a secret?" She replied, "She could very well." Upon which she enjoined her not to make the matter public, which she was now going to communicate to her. "I have a spark in this town, that I carried on a correspondence with whilst I was in England. He will be here presently to pay his address, for he hath heard by this time of my arrival. But I would not have the matter known." Soon after this a rap was heard at the door, and Dr Swift walked up stairs. Mrs Brent retired: but after a little time she was called, and then Mrs Swift introduced her to her son, and said, "This is my spark I was telling you of. This is my lover; and indeed the only one I shall ever admit to pay their addresses to me." The doctor smiled at his mother's humour, and afterwards paid his duty to her every day, unsuspected by Mrs Brent, whom he invited some years afterwards to take care of his family-affairs, when he became dean of St Patrick's: and when Mrs Brent died, he continued her daughter, a poor widow, in the same office.

The liberality of the dean hath been a topic of just encomium with all his admirers: nor could his enemies deny him this praise. In his domestic affairs, he always acted with strict economy. He kept the most regular accounts: and he seems to have done this chiefly with a view to increase his power of being useful. Mr Faulkner informs us, that "his income was 900*l.* per annum, which he endeavoured to divide into three parts, for the following purposes. First, to live upon one-third of it. Secondly, to give another third in pensions and charities, according to the manner in which persons who received them had lived: and the other third he laid by, to build an hospital for the reception of idiots and lunatics." "What is remarkable in this generous man, is this, (says Mr F.) that when he lent money upon bond or mortgage, he would not take the legal interest, but one per cent. below it."

Fires have sometimes happened in Dublin, by which people of all denominations have been sufferers: upon which melancholy occasions the dean always exerted himself, not only in person, by going from house to house to make collections for them, but wrote and recom-

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mended their melancholy cafes to the public. He would go to the afflicted sufferers, offer them his service, and would be the first to subscribe in a most princely and generous manner to their relief; which worthy example of his the benevolent citizens of Dublin would imitate.

His charity appears to have been a settled principle of duty, more than an indistinct effort of good-nature: but as it was thus founded and supported, it had extraordinary merit, and seldom failed to exert itself in a manner that contributed most to render it beneficial. He did not lavish his money on the idle and the worthless. He nicely discriminated characters, and was seldom the dupe of imposition. Hence his generosity always turned to a useful account: while it relieved distress, it encouraged industry, and rewarded virtue.

We dwell with great pleasure on this truly excellent and distinguishing part of the dean's character: and for the sake of his charity we can overlook his oddities, and almost forgive his faults. He was a very peculiar man in every respect. Some have said, "What a man he would have been, had he been without those whims and infirmities which shaded both his genius and his character!" But perhaps the peculiarities complained of were inseparable from his genius. The vigour and fertility of the root could not fail now and then of throwing out superfluous suckers. What produced these, produced also the more beautiful branches, and gave the fruit all its richness.

It must be acknowledged, that the dean's fancy hurried him into great absurdities and inconsistencies, for which nothing but his extraordinary talents and noble virtues, discovered in other instances, could have atoned. The rancour he discovered on all occasions towards the dissenters, is totally unjustifiable. No sect could have merited it in the degree in which he always showed it to them; for, in some instances, it bordered on downright perfection. He doubtless had his reasons for exposing their principles to ridicule; and might perhaps have sufficient grounds for some of his accusations against their principal leaders in Ireland: but nothing could justify his virulence against the whole body.

It must likewise be admitted, that when Swift's resentment was excited, it generally arose to indignation. Amidst the constellation of virtues which shed a distinguishing lustre on his character, he wanted one that a minister of Christianity ought to be ambitious of numbering amongst the chief ornaments of his profession, and that was *forgiveness*. This is a virtue that requires a great share of humility; and Swift seemed to consider himself as having a prescriptive right to haughtiness. His pride gave a dignity indeed to some parts of his conduct; but it frequently transgressed all the bounds of common civility and Christian confession. His pride was not gratified with lowering on those he hated with a supercilious brow; it must trample them under his feet. He could not laugh away his resentment. "It stuck to his last sand;" and gained strength by its duration.

Of Dr Sharp the archbishop of York, who hindered his promotion in the church by insinuating something to the prejudice of his religion, he never spoke but with a tone of indignation that marked a settled rancour. Dr Tenison the archbishop of Canterbury, he

calls, for the same good reason, "the most good-for-nothing prelate that ever lived." Mr Nicols, the editor of a late Supplement to Swift's works, hath transcribed, from an authentic MS. in the possession of Thomas Astle, Esq; a sort of a counter-part to *Macky's Characters*, annexed to the *Memoirs of Secret Services*, in which the dean hath discovered his keenness of observation and severity of resentment against some of the most distinguished characters of the court of George I. The following are a few instances.

Lord Wharton (A).—"He is one of the completest gentlemen in England: hath a very clear understanding and manly expression; with abundance of wit." Macky.—"The most universal villain I ever saw." SWIFT, MS.

Earl of Galway. "He is one of the finest gentlemen in the army, with a head fitted for the cabinet as well as the camp: is very modest, vigilant, and sincere: a man of honour and honesty: without pride or affectation." Macky.—"In all directly otherwise. A deceitful, hypocritical, seditious knave: a damnable hypocrite: of no religion." SWIFT, MS.

Of John duke of Argyle, Swift says in his MS. "Ambitious, covetous, cunning Scot: has no principles but his own interest and greatness: a true Scot in his whole deportment."—Of the earl of Derby: "As arant a scoundrel as his brother."—Of the duke of Grafton: "Almost a slobberer: without one good quality."—Lord Cholmondeley: "Good for nothing, as far as ever I knew."—Lord Guildford: "A mighty silly fellow."—Duke of Marlborough: "Detestably covetous."—Earl of Sandwich: "As much a puppy as ever I saw; very ugly, and a fop."—Speaker of the house of commons: "A heavy man."

The natural acrimony of Swift's temper, as already observed, had been increased by repeated disappointments. This gave a splenetic tincture to his writings; and amidst the duties of private and domestic life, it too frequently appeared to shade the lustre of his more eminent virtues.—The dean hath been accused of avarice, but with the same truth as he hath been accused of infidelity. In detached views, no man was more liable to be mistaken. Even his genius and good sense might be questioned, if we were only to read some passages of his writings. To judge fairly and pronounce justly of him, as a man and as an author, we should examine the uniform tenor of his disposition and conduct, and the general nature and design of his productions. In the latter, he will appear great; and in the former, good; notwithstanding the puns and puerilities of the one, and the absurdities and inconsistencies of the other.

SWIMMING, the art of suspending one's self on water; and at the same time making a progressive motion through it.

As swimming is not natural to man, it is evident, that at some period it must have been unknown among the human race. Nevertheless there are no accounts of its origin to be found in the history of any nation; nor are there any nations so barbarous but that the art of swimming is known among them, and that in greater perfection than among civilized people. It is probable, therefore, that the art, though not absolutely natural, will always be acquired by people in a savage

Swift, Swimming.

state,

Swimming.

state from imitating the brute animals, most of whom swim naturally. Indeed, so much does this appear to be the case, that very expert swimmers have recommended it to those who wished to learn the art, to keep some frogs in a tub of water constantly beside, and to imitate the motions by which they move through that element.

The theory of swimming depends upon one exceeding simple principle; namely, that if a force is applied to any body, it will always move towards that side where there is the least resistance. Thus, if a person standing in a boat pushes with a pole against the side or any other part of the vessel in which he stands, no motion will ensue; for as much as he presses in one direction with the pole, just so much does the action of his feet, on which the pressure of the pole must ultimately rest, push the vessel the other way: but if, instead of the side of the vessel, he pushes the pole against the shore, then only one force acts upon it, namely, that of the feet; which being resisted only by the fluid water, the boat begins to move from the shore. Now the very same thing takes place in swimming, whether the animal be man, quadruped, bird, or fish. If we consider the matter simply, we may suppose an animal in such a situation that it could not possibly swim: thus, if we cut off the fins and tail of a fish, it will indeed float in consequence of being specifically lighter than the water, but cannot make any progressive motion, or at least but very little in consequence of wriggling its body; but if we allow it to keep any of its fins, by striking them against the water in any direction, the body moves the contrary way, just as a boat moves the contrary way to that in which the oars strike the water. It is true, that as the boat is but partly immersed in the water, the resistance is comparatively less than when a frog or even any other quadruped swims; but a boat could certainly be rowed with oars though it was totally immersed in water, only with less velocity than when it is not. When a man swims, he in like manner strikes the water with his hands, arms, and feet; in consequence of which the body moves in a direction contrary to the stroke. Upon this principle, and on this only, a man may either ascend, descend, or move obliquely, in any possible direction in the water. One would think, indeed, that as the strength of a man's arms and legs is but small, he could make but very little way by any stroke he could give the water, considering the fluidity of that element. Nevertheless it is incredible what expert swimmers will perform in this way; of which Mr Forster gives a most remarkable instance in the inhabitants of O-Taheitee; whose agility, he tells us, was such, that when a nail was thrown overboard, they would jump after it into the sea, and never fail to catch it before it came to the bottom.

As to the practice of swimming, there are but few directions which can be given. The great obstacle is the natural dread which people have of being drowned; and this it is impossible to overcome by any thing but accustoming ourselves to go into the water. With regard to the real danger of being drowned, it is but little; and on innumerable occasions arises entirely from the terror above mentioned, as will appear from the following observations by Dr Franklin.

Swimming.

"That though the legs, arms, and head of a human body, being solid parts, are specifically somewhat heavier than fresh water, yet the trunk, particularly the upper part, from its hollowness, is so much lighter than water, as that the whole of the body, taken together, is too light to sink wholly under water, but some part will remain above until the lungs become filled with water; which happens from drawing water into them instead of air, when a person in the fright attempts breathing while the mouth and nostrils are under water.

"2dly, That the legs and arms are specifically lighter than salt-water, and will be supported by it: so that a human body would not sink in salt-water though the lungs were filled as above, but from the greater specific gravity of the head.

"3dly, That therefore a person throwing himself on his back in salt-water, and extending his arms, may easily lie so as to keep his mouth and nostrils free for breathing; and, by a small motion of his hands, may prevent turning, if he should perceive any tendency to it.

"4thly, That in fresh water, if a man throws himself on his back near the surface, he cannot long continue in that situation, but by a proper action of his hands on the water. If he uses no such action, the legs and lower part of the body will gradually sink till he comes into an upright position; in which he will continue suspended, the hollow of the breast keeping the head uppermost.

"5thly, But if in this erect position the head is kept upright above the shoulders, as when we stand on the ground, the immersion will, by the weight of that part of the head that is out of water, reach above the mouth and nostrils, perhaps a little above the eyes; so that a man cannot long remain suspended in water with his head in that position.

"6thly, The body continued suspended as before, and upright, if the head be leaned quite back, so that the face looks upwards, all the back-part of the head being then under water, and its weight consequently in a great measure supported by it, the face will remain above water quite free for breathing, will rise an inch higher every inspiration, and sink as much every expiration, but never so low as that the water may come over the mouth.

"7thly, If, therefore, a person, unacquainted with swimming, and falling accidentally into the water, could have presence of mind sufficient to avoid struggling and plunging, and to let the body take this natural position, he might continue long safe from drowning, till perhaps help would come: for as to the cloaths, their additional weight, while immersed, is very inconsiderable, the water supporting it; though when he comes out of the water, he would find them very heavy indeed."

The method of learning to swim is as follows: The person must walk into water so deep that it will reach to the breast. He is then to lie down gently on the belly, keeping the head and neck perfectly upright, the breast advancing forward, the thorax inflated, and the back bent; then withdrawing the legs from the bottom, and stretching them out, strike the arms forwards in unison with the legs. Swimming on the back is somewhat similar to that on the belly; but

Swimming but with this difference, that although the legs are employed to move the body forwards, the arms are generally unemployed, and the progressive motion is derived from the movement of the legs.—In diving, a person must close his hands together, and, pressing his chin upon his breast, make an exertion to bend with force forwards. While in that position, he must continue to move with rapidity under the surface; and whenever he chooses to return to his former situation, he has nothing to do but bend back his head, and he will immediately return to the surface.

It is very common for novices in the art of swimming to make use of corks or bladders to assist in keeping the body above water. Some have utterly condemned the use of these; however, Dr Franklin allows that they may be of service for supporting the body while one is learning what is called the *stroke*, or that manner of drawing in and striking out the hands and feet that is necessary to produce progressive motion. "But (says he) you will be no swimmer till you can place confidence in the power of the water to support you: I would therefore advise the acquiring that confidence in the first place, especially as I have known several who, by a little of the practice necessary for that purpose, have infensibly acquired the *stroke*, taught as it were by nature.

"The practice I mean is this: Choosing a place where the water deepens gradually, walk coolly into it till it is up to your breast: then turn round your face to the shore, and throw an egg into the water, between you and the shore; it will sink to the bottom, and be easily seen there, if the water is clear. It must lie in the water so deep as that you cannot reach it to take it up but by diving for it. To encourage yourself in order to do this, reflect that your progress will be from deeper to shallower water; and that at any time you may, by bringing your legs under you, and standing on the bottom, raise your head far above the water: then plunge under it with your eyes open, throwing yourself towards the egg, and endeavouring, by the action of your hands and feet against the water, to get forward till within reach of it. In this attempt you will find that the water buoys you up against your inclination; that it is not so easy a thing to sink as you imagined; that you cannot, but by active force, get down to the egg. Thus you feel the power of the water to support you, and learn to confide in that power; while your endeavours to overcome it, and to reach the egg, teach you the manner of acting on the water with your feet and hands; which action is afterwards used in swimming to support your head higher above water, or to go forward through it."

SWINE, in zoology. See SUS.

SWITZ, or SCHITZ, the capital of one of the cantons of Switzerland, to which it gives name, seated on the east side of the lake Lucern, in N. Lat. 47. E. Long. 8. 30.

SWITZERLAND, or SWISSERLAND, a country bounded to the south by Savoy, the Milanese, and the territories of Venice; to the north, by Swabia; to the east, by the country of Tyrol, a part of Austria and Swabia; and to the west by the Sandgau, Burgundy, and the country of Gex; being about 260 miles long and 100 broad.

The Swifts were anciently called *Helvetii*; and being subdued by the Romans, they continued in subjection to that power till the empire declined, when they became a part of the kingdom of Burgundy. After that they fell under the dominion of the Franks, then of the Germans; but being oppressed by the latter, they threw off the yoke, and erected several states and republics, which, at the treaty of Westphalia in 1648, were recognized as free and independent. The cantons of Switz, Uri, and Underwald, having, as early as the year 1308, entered into a confederacy in the canton of Switz, and having also obtained their first victory in 1315 over Leopold archduke of Austria in the same canton, its name was given to the whole confederacy, which it still retains. The other cantons successively acceded to this association, but some of them not until upwards of 100 years after. With respect to the government and constitution of these cantons, some of them are aristocracies and some democracies. In the former, both the legislative and executive power is lodged in the burghers or citizens of the capital of each canton; and of these there are seven, viz. Zurich, Bern, Basil, Friburg, Solothurn, and Schaffhausen. In the others, the legislative power is lodged in the whole body of the people; and every male above sixteen, whether master or servant, has a vote in making laws, and in the choice of magistrates. For what concerns the whole Helvetic body, there are diets ordinary and extraordinary: the former are held annually, and the others upon particular emergencies; and both are summoned by the city of Zurich, which appoints the time and place of their meetings. Besides the general diets, since the Reformation, there have been particular diets of the two religions, at which all public affairs of consequence that regard the two parties are treated separately; for though a sense of their common interest obliges them to study to maintain the league and union, yet it is certain, that the mutual confidence between the cantons is in some measure lost through the zeal of each party for their particular opinions, especially of the Roman Catholics. The annual general diets are held always at Frauenfeld or Baden, principally to regulate the affairs of the common bailiages. Lucern takes the lead of the Roman Catholic cantons, being the most powerful of that denomination; but Zurich, though less powerful than that of Bern, takes the precedence of all the other cantons, both Protestant and Popish. These cantons do not make one commonwealth, but are so many independent states united together by strict alliances for their mutual defence. The extraordinary diets or congresses are held at Aldorf. Each canton usually deputed two envoys both to the ordinary and extraordinary, to which also the abbot and town of St Gall, and the town of Biel, send representatives as allies. To the 13 cantons belong in common 21 bailiages, two towns, and two lordships. The allies or incorporated places, as they are called, are the abbot and town of St Gall, the three Grison leagues, the republic of the Valais, the towns of Muhlhausen and Biel, the principality of Neuenburg or Neuchâtel, Geneva, and the bishop of Basil. Of these the abbot and town of St Gall, and the town of Biel, are regarded as members of the Helvetic body, but the rest only as allies.

As to the air, soil, and produce of Switzerland, that part of the canton of Bern to the east of the lake of Geneva, together with the cantons of Uri, Schwyz, Unterwald, Glaris, Appenzel, and part of the canton of Lucern, consist of stupendous mountains, whose tops are said to be from 9000 to 12000 feet above the level of the sea, consisting of craggy inaccessible rocks, of which some are quite bare, while others are always covered with ice and snow. Among the mountains are many excellent medicinal and other springs, cold and warm baths, water-falls, craggy precipices, deep narrow valleys, and caverns. They yield also a great variety of herbs, thickets, and bushes, in the upper parts; and in the lower rich pastures and woods. The highest are those in the canton of Uri. Many of the valleys are covered with lakes, or watered by brooks and rivers. In some of them are towns, villages, woods, vineyards, and corn-lands. Both on the mountains and in the valleys the air is extremely cold in winter; but in summer it is very pleasant, cool, and refreshing on the former, but excessive hot in the latter. Sometimes it is winter on the north side of a mountain when it is summer on the other; nay, flowers may be gathered sometimes with one hand and snow with the other. Prodigious masses of ice and snow often fall from them in winter, and do a great deal of damage; and most of the streams and rivers take their rise from the thawing of the ice and snow on their sides and tops. From the rising or descending of the clouds, with which they are commonly enveloped, the inhabitants can, for the most part, pretty exactly foretell the changes of the weather; so that they serve them instead of weather-glasses. The other and lower parts of Switzerland are very pleasant and fertile, being diversified with vineyards, corn-fields, meadows, and pasture-grounds. The mountains in these are but mole-hills in comparison of the others: there is neither snow nor ice on them in summer; and they frequently afford not only good pasturage, but arable ground. Many petrifications are found both among these and the others, with a variety of fossils. The sands of the rivers yield gold-dust, particularly those of the Rhine, the Emmet, the Aare, the Reusz, the Adda, and the Goldbach. The metals of this country being generally found to be brittle, the only mines that are worked are a few iron ones. In the lower parts of Switzerland they sow rye, oats, barley, spelt, flax, and hemp. Wines of various sorts are also produced in some of them, with a variety of fruits. Of wood for fuel and other uses, there is generally plenty; in some places, however, they are obliged to burn sheep dung, and in others a kind of heath and small shrubs. In the valleys they cultivate saffron with good success. The Swissers derive their principal subsistence from their flocks and herds of cattle, which in summer graze upon the mountains. Their cheese is much esteemed, especially that of Bern and Griers in the canton of Freyburg. Great numbers of horses also are bred here, and bought up for the French cavalry. Besides the above-mentioned rivers, the Rhone and the Teline have their sources in this country. The lakes are very numerous; but the chief are those of Geneva, Neuchâtel, Biel, Zurich, Thun, Brienz, Constance, and Lucern. Both rivers and lakes abound with fish, and afford a cheap water-

carriage. Switzerland is not so populous as many other countries in Europe; and the Popish cantons less so than the Protestant. The total number of the inhabitants is computed at two millions.

The language generally spoken here is the German, in which also all public affairs are transacted; but in those parts of the country that border on Italy or France, a corrupt French or Italian prevails. The two predominant religions are Calvinism and Popery. Of the former are the cantons of Zurich and Bern, the towns of St Gall, Geneva, Muhlhausen, and Biel, the principality of Neuchâtel, the greater part of Basle, Schaffhausen, the country of the Grisons, the Thurgau, Toggenburg, Glaris, and the Rhine valley; the frontiers of Appenzel, with a small part of Solothurn, and some places in the countries of Baden and Sargans. The rest of the Swiss cantons, allies, and dependents, are Popish. For the education of youth there is an university at Basle, and academies at Zurich, Bern, Lausanne, and Geneva, besides gymnasiums and schools illustres, both in the Popish and Swiss cantons. There are also societies among them for the improvement of the German language and the sciences.

The principal manufactures are snuff and tobacco, linen of several sorts, lace, thread, silk and worsted stockings, neckcloths, cotton fluffs, gloves, handkerchiefs, silks of several sorts, gold and silver brocades, a variety of woollen manufactures, hats, paper, leather of all sorts, earthen wares, porcelain, toys, watches, clocks, and other hardware, &c. The trade of Switzerland is greatly promoted by many navigable lakes and rivers. In some of the above manufactures, and in cheese, butter, sheep, horses, black cattle, hides, and skins, the exports are considerable; and as the imports are chiefly grain and salt, with some American and Asiatic goods, there is probably a large balance in their favour. In some parts of Switzerland dress is restrained by sumptuary laws.

The public revenues are in general very inconsiderable, arising chiefly from the usual regalia, appropriated every where to the sovereign, the demesnes, and public granaries, voluntary contributions, the sale of salt, and a land-tax; in the Protestant cantons, from the church-lands also that were seized at the Reformation. Except in Zurich, Bern, Basle, and Schaffhausen, where the people are more industrious, have a greater trade, and are richer than in the others, they defray the ordinary charges, and that is all.

The cantons never keep any standing troops, except for a few garrisons; but their militia is reckoned to be the best regulated of any in Europe. Every male from 16 to 60 is enrolled, and about one-third of them regimented. They must all provide themselves with arms, clothing, and accoutrements, and appear on the stated days for exercise; and the several cantons and districts must be furnished with a sufficient train of artillery, and all the other implements of war. The Swissers of the several cantons are allowed to engage in the service of such foreign princes and states as are in alliance with those cantons, or with whom they have made a previous agreement. Such states, paying an annual subsidy to the respective cantons, are allowed to make levies. Every man enlists voluntarily, and for what number of years they please; at the expiration of which they are at liberty to return home. A

Sword
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Sydenham.

great many thus always returning from foreign service, Switzerland is never unprovided with able and experienced officers and soldiers. With respect to their character, they are a brave, honest, hospitable, hardy people; very true to their engagements, friendly, and humane. In short, there is not a people in Europe whose national character is better. In their persons they are generally tall, robust, and well made; but their complexions are none of the best, and those that live in the neighbourhood of the mountains are subject to wens. The women are said to be generally handsome and well-shaped, sensible and modest, yet frank, easy, and agreeable in conversation. Few of the peasants are miserably poor; many of them are rich, especially in the Protestant cantons, and that of Bern in particular.

SWORD, an offensive weapon worn at the side, and serving either to cut or stab. Its parts are the handle, guard, and blade; to which may be added the bow, scabbard, pommel, &c.

SWORD of State, which is borne before the king, lords, and governors of counties, cities, or boroughs, &c. For or before the king, it ought to be carried upright; the hilt as low as the bearer's waist, the blade up between his eyes. For or before a duke, the blade must decline from the head, and be carried between the neck and the right shoulder. For or before an earl, the blade is to be carried between the point of the shoulder and the elbow: and for or before a baron, the blade is to be borne in the bend of the arm. This ceremonial form no less denotes the dignity of a governor than the coronet set on his coat of arms.

SWORD-Fish. See *XIPHIAS*.

SWORN BROTHERS, (*fratres jurati*), persons who, by mutual oath, covenanted to share each others fortune. Formerly, in any notable expedition to invade and conquer an enemy's country, it was the custom for the more eminent soldiers to engage themselves by reciprocal oaths to share the rewards of their service. This practice gave occasion to the proverb of *sworn brothers or brethren in iniquity*, because of their dividing plunder and spoil.

SYCAMORE-TREE, in botany. See *ACER*.

SYCOPHANT, an appellation given by the ancient Athenians to those who informed of the exportation of figs contrary to law: and hence it is still used in general for all informers, parasites, flatterers, cheats, &c.

SYDENHAM (Dr Thomas), an excellent English physician, was the son of William Sydenham of Winford Eagle in Dorsetshire, and was born there about the year 1624. He studied at Magdalen-hall, Oxford; but left that university when Oxford was garrisoned for king Charles I. and went to London: where becoming acquainted with Dr Thomas Cox, an eminent physician, that gentleman persuaded him to apply himself to the study of physic; and therefore, after the garrison was delivered up to the parliament, he retired again to Magdalen-hall, entered on the medical line, and in 1648 was created bachelor of physic. Soon after, he was made a fellow of All-Souls college, and continued there several years: when, leaving the university, he settled at Westminster, became doctor of his faculty at Cambridge;

grew famous for his practice; and was the chief physician in London from the year 1660 to 1670; at which period he began to be disabled by the gout. He died in 1689. His works are highly esteemed both at home and abroad. He was famous for his cool regimen in the small-pox; for giving the bark after the paroxysm in agues; and for his use of laudanum. He regulated his practice more by his own observations and inquiries, than by the method either of his predecessors or cotemporaries.

SYLLABLE, in grammar, a part of a word consisting of one or more letters pronounced together.

SYLLABUS, in matters of literature, denotes a table of contents, or an index of the chief heads of a book or discourse.

SYLLOGISM, in logic, an argument or term of reasoning, consisting of three propositions; the two first of which are called *premises*, the last the *conclusion*. See *LOGIC*, n° 61, 63, 84—101; and *ORATORY*, n° 30.

SYMBOL, a sign or representation of something moral, by the figures or properties of natural things. Hence symbols are of various kinds; as hieroglyphics, types, ænigmas, parables, fables, &c.

SYMMACHUS, a citizen and senator of ancient Rome, and consul in the year 391, has left us ten books of epistles; from which, as well as from other things, we collect, that he was a warm opposer of the Christian religion. He was banished from Rome by Valentinian on some account or other, but afterwards recalled and received into favour by Theodosius. Ammianus Marcellinus speaks of him as a man of great learning and modesty. Scippius, Pareus, and other learned men, have written notes upon the epistles of Symmachus: we know of no later edition of them than that of Francfort, 1642, 8vo. Ambrose bishop of Milan wrote against Symmachus, and so did the Christian poet Prudentius.

SYMMETRY, the just proportion of the several parts of any thing, so as to compose a beautiful whole.

SYMMETRY, in painting. See *PAINTING*, n° 7.

SYMPATHETIC, something that acts or is acted upon by sympathy. Thus we say sympathetic diseases, inks, &c.

SYMPATHETIC Inks. See *INK Sympathetic*.

SYMPATHY, an agreement of affections and inclinations, or a conformity of natural qualities, humours, temperaments, which make two persons delighted and pleased with each other.

SYMPATHY also denotes the quality of being affected by the affection of another; and may subsist either between different persons or bodies, or between different parts of the same body. It is either similar or dissimilar: similar, when the affection or action in the sympathiser is similar to the affection or action in the sympathant; and dissimilar, when those are different.—Sympathy, too, is often an imitative faculty, sometimes involuntary, frequently without consciousness: thus we yawn when we see others yawn, and are made to laugh by the laughing of another.

Sympathy, according to Dr Jackson, relates to the operations of the affections of the mind, to the operations of the imagination, and to the affections of the external senses.

Syllable
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Sympathy.

Sympathy.

1. The passions and affections of the mind produce in the body different sensations and impressions, and, as sympathies of consciousness, determine in general the spirits to those parts which labour most, or are most apt to be affected. Thus fear and anger determine to the heart; lust to the eyes, &c.; joy, pity, wonder, and the like, to the head.

Jackson on
Sympathy,
p. 95.

The passions and affections have been said to impress and act upon the body, in the following manner: "1. Fear causeth paleness, trembling, the standing of the hair upright, starting, and shrieking. 2. Grief and pain causeth sighing, sobbing, groaning, screaming, and roaring; they also cause tears, distorting of the face, grinding of the teeth, and sweating. 3. Joy causeth a cheerfulness and vigour in the eyes, singing, leaping, dancing, and sometimes tears. 4. Anger produces paleness in some, and the going and coming of the colour in others; also trembling in some, swelling, foaming at the mouth, stamping, and bending of the fist. 5. Slight, displeasure, or dislike, causes shaking of the head, frowning, and knitting of the brows. 6. Shame causeth blushing, and casting down of the eyes. 7. Pity causes sometimes tears, and a flexion or cast of the eyes aside. 8. Wonder causeth astonishment, and an immovable posture of the body, casting up of the eyes to heaven, and lifting up of the hands. 9. Laughing, though hardly to be considered as a passion, since it is produced by an affection of the mind, causeth a dilatation of the mouth and lips; a continued expulsion of the breath; with a loud noise, which maketh the interjection of laughing, shaking of the breast and sides, and running of the eyes with water, if it be violent and continued. 10. Lust causes a fragrance in the eyes, and priapism."

The affections of the mind of one person will often work upon the spirits of many. Thus whole companies are sometimes disposed to be sad and melancholy, or merry and jovial, when any one is present much inclined to either of those states of mind; and it has been observed, that old people, who have loved the company of the young, and have been conversant continually with them, have generally lived long. But young people must not conclude from this, that the company and conversation of the grave and old will operate upon their living and sensitive principle, thro' the affections of their mind, and dispose them to be short-lived. On the contrary, by thus improving their understanding, they will be more enabled to fortify their constitution and resist the ravages of youthful indulgence.

It may also be further observed, that those tender sympathetic affections which lay hold of the mind, at the representation of theatrical performances, originate from the same principle, while they are to be considered as the surest test of just execution in the actor, and of the expressive language of the author. Indeed all stage-effect depends on sympathy.

The affections of the mind make the spirits more powerful and active, especially those which manifest themselves by the eyes. Two in particular may be named, *love* and *envy*. As sympathies of consciousness, their operations are more easily felt than described. Though opposite in their nature, they are equally violent in obtaining their particular ends. The one can

no more suffer indifference and disappointment, than Sympathy: the other contempt and haughtiness.

It has been said, that the passions of the mind are occasionally ineffective, particularly some of them. Thus *fear* and *shame* are sometimes very suddenly so. We frequently may have occasion to see, that the starting of one will make another ready to start. Again, when one man is out of countenance in company, others will often blush in his behalf. However, the serious passions may surely be so under the controul of reason as to resist infection, whatever may be the cause of temporary, muscular, or nervous attraction.

2. Our author is inclined to think, that a connection between the affections and sensations of the female mind and uterus is very materially concerned in the process of generation, and probably can alone give efficacy to those actions and impressions subservient to conception, through the sympathizing affections of the mind.

One of the first medical philosophers of the present time, he observes, is of opinion that the mother has always the powers and principles of fashioning her child within herself, but that they are not roused to action without the stimulating influence of the male. The principles that must be immediately concerned are the sensitive and living; but it is through the influence of the mental principle that the form and image of the embryo is stamped.

With respect to the depravity and force of the imagination in the production of sympathies, they always operate most upon "weak minds and spirits, and therefore most on women, superstitious and fearful persons, sick people, children, and young creatures." "Their effects, however, sometimes fail to appear, because they are encountered and overcome by the mind and spirit before they work any manifest effects."

Such effects are obviated upon the same principle which establishes the prevention of bodily disease: "for in infection and contagion from body to body (as, for example, during the plague), the miasma may be received; but from the strength and good disposition of the body, it is expelled and wrought out before it has had sufficient time to form the disease."

It has been said, and many are of the opinion, that the force of imagination doth often forward the end proposed. Thus, for instance, it has been put as a question, "Whether a man, when he constantly and strongly believes that such a thing shall be (as that such a one will love him, and the like), helps any thing to the effecting the thing desired?" Certainly not in the manner which has been advanced, namely, "by a secret operation on the spirit of another." If he succeeds, it is either because he persevered, or because his perseverance and earnestness (and not any occult operation) makes him at length be attended to.

There is not a doubt but the force of imagination often gives energy to our actions. It may, however, unless we are much on our guard, easily delude us aside from reason. It has been the tree which has yielded the fruits of superstition in former times, and which has often fed the human mind with the most extravagant notions of sympathy. Sympathies of this kind, such as the power of charms, and the like, are

now

Sympathy. now pretty generally exploded.

3. The five principal senses, *hearing, tasting, smelling, feeling, and seeing*, are conscious of a sympathetic impression from odious objects. "1. A disagreeable sound will set the teeth on edge, and make all the body shiver. 2. The swallowing of a nauseous medicine will be attended with a shaking of the head and neck. 3. Disagreeable smells produce nearly the same effect, which are less perceived, because there is a remedy at hand by stopping the nose. 4. If you come suddenly out of the sun into the shade, the sense of feeling is disturbed by a chillness or shivering of the whole body. 5. And even sudden darkness produces a propensity to shivering."

2011.

There is a very apparent reason why a sympathy should take place between the eyes. Hence their motions are synchronous. It may be said, that custom and habit dispose the eyes to move one and the same way; "for when one eye moveth towards the nose, the other eye moveth from the nose."

Though the eyes are by nature prone to move in concert, custom will, however, destroy this natural consent, and produce the contrary. Thus some people can squint when they will. Our author therefore gives this caution to mothers and nurses: "Let them not suffer infants to sit with a candle placed behind them; for both their eyes will dispose to move outwards, as affecting to see the light of the candle, which may bring on the habit of squinting."

It appears as a quality in the senses of hearing and seeing, "that the instrument of each separate sense has a sympathy and similitude to that which giveth the reflection." Thus it has been observed, "that the eye will sympathize with a crystal glass or water, and the ear with caves and such hollow places as are suited to report echo."

Sympathies have been compared to unisons of sound in music. Unisons of sound produce agreeable sympathetic feelings; the reverse produce disagreeable feelings. "All concords and discords of music are (no doubt) sympathies and antipathies of sound." Moreover, "they are said to work as well by report of sound as by motion."

The sense of feeling may be disturbed by any uncommon, though apparently slight, irritation. Thus tickling the sides or soles of the feet will cause laughter; and again, tickling the nostrils will raise sneezing, and on a sudden wonderfully increase the secretion of tears. Both these operations, as sympathies, tend to remove both cause and effect, "by producing a sudden emission of the spirits," and the expulsion (if there should be any) of the offending matter.

The most agreeable as well as odious objects operate in a secondary way, in producing those sympathetic impressions and actions which they commonly give rise to. An increased secretion of saliva often takes place at the sight of a favourite dish; and the running of water from a bottle, or otherwise, will sometimes affect individuals of a particular idiosyncrasy, with an involuntary propensity to void urine.

Many have attempted to account for the remarkable sympathy which takes place between parts of the body seemingly in a great measure unconnected with each other. Most have supposed that the sym-

phy took place through the brain; that the extremities of the nerves conveying a disagreeable or painful sensation to the medullary part of the brain, affected some part of its fibres adjacent to or connected with the origin of the nerves distributed to some other parts of the body; whence the latter become also affected, and of consequence that part of the body to which they are distributed. In a late treatise†, however, Dr Kirkland has endeavoured to explode this theory, and to establish another. He denies that either the medullary part of the brain or of the nerves consists, as into the present State of Medical surgery. he says, ever saw the extremity of any nerve; nor are any fibres, distinct from blood-vessels, to be seen even by a solar microscope in the medullary substance of the brain or inside of a nerve. He asserts, that the medulla of the brain is a mere mucus, which totally, or almost totally, evaporates with the heat of boiling water, or even in the heat of the common atmosphere in the shade; that this mucus is continued through the nerves, and by them spread out on the muscles, where it appears in its proper form, namely that of a fine transparent mucus. This he proves from observing, that though a muscle may be irritated, either by pricking it or the nerve above it, yet if the mucus which lies on the surface be previously wiped off, no such irritation will take place. The nerves then, according to our author, are only designed to convey this mucus to every part of the body, that, as the brain is the fountain of life, every part may share in the common life of the whole. Hence he is of opinion, that the nervous sympathy does not act from one part of the body through the brain to another; but from one part directly to another by means of the mucus, or substance similar to the brain, with which all the muscles are covered.

Dr Monro, in his observations on the structure and functions of the nervous system, gives it as his opinion, that the nerves are not entirely formed out of the substance of the brain, but receive a considerable addition of matter as they pass through the body; and that the nerves have a peculiar energy of their own independent of the brain. He is also of opinion, that the rest of the brain which is not sent out in nerves serves as a medium between the living principle and the other parts of the body; and that the opposite sides of the encephalon are joined by bundles of fibres: "so that (says he) we seem in a certain degree to perceive the cause of the suffering of all the parts of the nervous system with that of any one part of it, or of the general sympathy of the nerves."

SYMPHONY, in music, properly denotes a concert or concert of several sounds agreeable to the ear, whether vocal or instrumental, called also *harmony*. See HARMONY.

SYMPHYSIS, in anatomy, one of the kinds of junctures or articulation of the bones. See ANATOMY, n° 2, c.

Cutting the SYMPHYSIS of the Pubes. See MIDWIFERY, p. 5032.

SYMPHYTUM, COMFREY; a genus of the monogynia order, belonging to the pentandria class of plants. There are three species; of which the officinale, or common comfrey, is the most remarkable. This

Symposiarch grows naturally in many places of Britain on the sides of rivers and wet ditches. The roots are used in medicine, and are of a mucilaginous nature; the leaves give a grateful flavour to cakes and panadoes. Cows and sheep eat the herb; horses, goats, and swine, refuse it.

Syngethus.

SYMPOSIARCH, in antiquity, the director or manager of an entertainment. This office was sometimes performed by the person at whose charge the entertainment was provided; sometimes by another named by him; and at other times, especially in entertainments provided at the common expence, he was elected by lot or by the suffrages of the guests.

SYMPTOM, in medicine, is defined by Galen to be a preternatural affection which depends upon a disease or follows it. Thus symptoms are diseases produced by an original principal disease. But symptoms are sometimes the effect of symptoms also. A symptom may be a symptom and a disorder at the same time; as when a symptomatic fever is produced by a phlegmon.—A knowledge of the origin and cause of symptoms conduces to confirm the prognosis, and to the certain removal of the disease.

SYMPTOMATICAL, in medicine, is a term often used to denote the difference between the primary and secondary causes in diseases: thus a fever from pain is said to be symptomatical, because it rises from pain only.

SYNÆRESIS, CONTRACTION, in grammar, a figure whereby two syllables are united in one; as *veniens* for *vehemens*.

SYNAGOGUE, a particular assembly of the Jews met to perform the offices of their religion: Also the place wherein they meet. The word is Greek, *συναγωγή*, which literally signifies an assembly or congregation.

SYNARTHROSIS,

SYNCHONDROSIS. } See **ANATOMY**, n° 2.

SYNCHRONISM denotes the happening of several things at the same time. See **CHRONOLOGY**.

SYNCOPE, **FAINTING**; a deep and sudden swooning, wherein the patient continues without any sensible heat, motion, sense, or respiration, and is seized with a cold sweat over the whole body; all the parts, in the mean time, turning pale and cold as if he was dead.

SYNCOPE, in grammar, an elision or retrenchment of a letter or syllable out of the middle of a word, as *calidus* for *calidulus*.

SYNDIC, in government and commerce, an officer, in divers countries, intrusted with the affairs of a city or other community, who calls meetings, makes representations and solicitations to the ministry, magistracy, &c. according to the exigency of the case.

SYNECDOCHE, in rhetoric, a kind of trope frequent among orators and poets. See **ORATORY**, n° 52.

SYNECPHONESIS, in grammar, a coalition, whereby two syllables are pronounced as one; being much the same as **SYNALOPHA** and **SYNÆRESIS**.

SYNEUROSIS. See **ANATOMY**, n° 2.

SYNGENESIA, (*συν*, together, and *γενεσις*, generation), the name of the 19th class in Linnæus's Sexual Method, consisting of plants in which the antheræ or male organs of generation are united into a cylinder; the filaments on which they are supported being separate and distinct.

SYNGNATHUS, or **PIPE-FISH**, in ichthyology, a

genus of fishes belonging to the order of amphibia **Syngnathus** nantes. There are seven species; of which three are found in the British seas, viz.

Syngnathus.

1. The barbarus, or longer pipe-fish. One described by Sir Robert Sibbald, was two feet in length; that examined by Mr Pennant only 16 inches. The nose was an inch long, compressed sidewise, and the end of the lower mandible turned up: the aperture of the mouth was very small.—The irides were red; behind each eye was a deep brown line.—The body, in the thickest part, was about equal to a swan's quill, hexangular from the end of the dorsal fin; from thence to the tail, quadrangular. The belly was slightly carinated, and marked along the middle with a dusky line. Under the tail, commencing at the anus, is a sulcus or groove six inches and a half long, covered by two longitudinal valves, which concealed a multitude of young fish. On crushing this part, hundreds may be observed to crawl out.

2. The acus, or shorter pipe-fish, is thicker than the former, yet it has been seen of the length of 16 inches. The middle of the body in some is hexangular, in others heptangular. The mouth is formed like that of the former: the irides are yellow: close behind the head are the pectoral fins, which are small and short. On the lower part of the back is one narrow fin; beyond the vent the tail commences, which is long and quadrangular. At the extremity is a fin found and radiated. The body is covered with a strong crust, elegantly divided into small compartments. The belly is white; the other parts are brown.

3. The ophidion, or little pipe-fish, seldom exceeds five inches in length, is very slender, and tapers off to a point. It wants both the pectoral and tail fins; is covered with a smooth skin, not with a crust as the two former kinds are. The nose is short, and turns a little up; the eyes are prominent. On the back is one narrow fin.—This species is not viviparous: on the belly of the female is a long hollow, to which adhere the eggs, disposed in two or three rows. They are large, and not numerous. The synonym of *serpent* is used in several languages to express these fish: the French call one species *orouel*, from a sort of snake not unlike the blindworm: the Germans call it *weberschlange*; and the Cornish the *sea adder*.

SYNOCHA, and **SYNOCHUS**, in medicine, the names of two species of continued fever. See **MEDICINE**, n° 274, 279.

SYNOD, in astronomy, a conjunction or conjunction of two or more stars or planets; in the same optical place of the heavens.

SYNOD signifies also a meeting or assembly of ecclesiastical persons concerning matters of religion.

SYNODICAL, something belonging to a synod. Thus, synodical epistles are circular letters written by the synods to the absent prelates and churches; or even those general ones directed to all the faithful, to inform them of what had passed in the synod.

SYNOECIA, in Grecian antiquity, a feast celebrated at Athens in memory of Theseus's having united all the petty communities of Attica into one single commonwealth; the feast whereof was at Athens, where all the assemblies were to be held. This feast was dedicated to Minerva; and, according to the scho-

Synonymus. scholiast of Thucydides, it was held in the month *Me-*
tagitnon.

Syracuse. **SYNONIMOUS**, is applied to a word or term that has the same import or signification with another.

SYNOVIA, in medicine, a term used by Paracelsus and his school for the nutritious juice proper and peculiar to each part. Thus they talk of the synovia of the joints, of the brain, &c.

SYNTAX, in grammar, the proper construction or due disposition of the words of a language into sentences and phrases. See **GRAMMAR**, and **LANGUAGE**.

SYNTHETIC, or **SYNTHETICAL**, that part of chemistry by which we are taught to compound bodies from the various principles or elements into which they have been resolved by the analytical part.

SYNTHETIC, in logic. See **LOGIC**, n° 117.

SYPHON. See **HYDROSTATICS**, n° 20, 38. Some uncommon phenomena in nature may be accounted for upon the principles of the syphon; as, for instance, that of reciprocating springs. See the article **SPRING**.

SYRACUSE, once a celebrated city of Sicily, and the capital of the island. It was built, according to Thucydides and Strabo, by Archias, one of the Heraclidae, who came from Corinth into Sicily in the second year of the 11th olympiad, deriving its name from a neighbouring marsh named *Syraco*.

What form of government first prevailed in the city is not certainly known. Many have supposed it originally to have been governed by kings: but if this was the case, the monarchical government must have continued only for a very short time; since Aristotle, Diodorus Siculus, and Justin, mention it as being very early subject to a democracy. The history, however, is obscure and unimportant till the time of Gelon, when it first began to make a conspicuous figure.

Gelon was born in the city of Gela in Sicily, of the family of Telines, who had been created priest of the infernal gods. He signalized himself in a war carried on by Hippocrates tyrant of Gela against the Syracusans, whom he defeated in a pitched battle, and had well nigh taken their city afterwards. Having thus become very powerful among his countrymen, he soon found means to seize on the sovereignty for himself. In a short time, having put himself at the head of some Syracusan exiles, he marched towards that place, where he was received with loud acclamations by the faction to which they belonged; and by their means obtained possession of the city.

Gelon, in order to people the capital of his new dominions, first demolished the neighbouring city of Camarina, and transplanted the inhabitants to Syracuse. Soon after, entering into a war with the Megareans, he defeated them, took and razed their cities, and in like manner transplanted the people. Syracuse thus became very powerful, and full of inhabitants; and the friendship of Gelon was courted both by Athens and Lacedæmon at the time of the Persian invasion. His assistance, however, was afterwards rejected, as he insisted upon being made commander in chief, or at least of either the fleet or the land-army. In the mean time the Carthaginians had entered into a treaty with the Persians; by which it was agreed, that the former should attack those of the Greek name in Sicily and Italy, in order to divert them from assisting

one another. Sicily was accordingly invaded by the Carthaginians with a vast army; but they were utterly overthrown by Gelon, as is related under the article **CARTHAGE**, n° 7—9. After this victory, the people out of gratitude obliged him to take upon himself the title of king; which till that time he had refused. The decree also passed without opposition, by which the crown was settled on his two brothers Hiero and Thrasylbulus after his death.

The new king, instead of keeping his subjects in greater awe, studied the more to make them happy as he found his power increased; and, according to Diodorus Siculus, was the first man who became more virtuous by being raised to a throne. He was particularly famous for his honesty, truth, and sincerity; is said never to have wronged the meanest of his subjects, nor ever to have promised a thing which he did not perform.

Gelon died in the year 471 B. C. after having reigned three or four years; and was succeeded by his brother Hiero, whose character is differently related by different historians. He was twice engaged in a war with the Agrigentines, and drove from their habitations the people of Catania and Naxos, settling in their room a colony of Syracusians and Peloponnesians. He is highly celebrated in the odes of Pindar; and it is certain that his court was the resort of men of wit and learning, to whom he behaved in the most courteous manner and with the greatest liberality.

In 459 B. C. Hiero was succeeded by Thrasylbulus; who proving a tyrant, was in ten months driven out, and a popular government restored; which continued for the space of 55 years. However, several persons continued for some time to aspire at the sovereign power; and to rid themselves of these aspiring geniuses, the inhabitants made a law not unlike that of the ostracism at Athens. By this law they were to write on a leaf the names of those whom they supposed to be powerful enough to aspire at the crown; and when the leaves were counted, he who had the most suffrages against him was, without further inquiry, banished for five years. This method of weakening the interests of the overgrown citizens was called *petalism*, from the Greek word *πιταλον*, signifying a leaf; but being found to be productive of great inconveniences, by driving out of the country all those who were most capable of governing the commonwealth, the law was repealed soon after it had been enacted.

About this time the Syracusians entered into a war with the Siculi, which terminated in the total subjection of the latter; after which Syracuse became so powerful, that it in a manner gave law to the whole island. The Greek cities indeed enjoyed a perfect liberty; but they all acknowledged Syracuse as their metropolis: by degrees, however, the latter began to assume such an authority over them as was totally inconsistent with liberty; and this occasioned many wars, which involved them in much distress and danger. They began with the Leontines, whose territory they laid waste, and reduced their city to great straits. Leontini was an Athenian colony; and this furnished the Athenians, who had already meditated the conquest of Sicily, with a pretence to attack the Syracusians with their whole force. Under colour of assisting their countrymen, therefore, they sent a fleet

Defeats the Carthaginians, and takes the title of king.

Hiero's excellent reign.

Gelon dies, and is succeeded by Hiero.

Thrasylbulus, a tyrant.

Popular government restored.

Petalism introduced, but soon afterwards abolished.

The Siculi subdued.

Syraculians become haughty.

Invaded by the Athenians wishing to succeed.

At what time rebuilt.

Government originally monarchical.

Soon becomes democratical.

Gelon seizes on the sovereignty.

Takes several cities, and drives the inhabitants to Syracuse.

Syracuse.

of 250 fail to Sicily : but the Leontines, sensible that their pretended allies aimed at nothing less than the conquest of the whole island, concluded a peace with Syracuse; and the disappointed Athenians vented their rage upon those who had advised and conducted the expedition.

15
A new in-
vasion.

In 416 B. C. a dispute happening between the inhabitants of Egæta and Selinus concerning some lands which the latter had seized, the Egælines applied for assistance to Agrigentum, Syracuse, and even to Carthage. But as none of these states chose to interest themselves in their quarrel, they applied at last to the Athenians, who joyfully accepted of the opportunity of again interfering in the affairs of Sicily. Though the Egælines were but an inconsiderable people, they had engaged to pay all the troops that should be employed in the war; but this appearing doubtful to the Athenians, they sent ambassadors to inquire into the state of the island in general, and particularly that of Egæta. The Egælines imposed on these ambassadors by producing a great number of gold and silver vessels which they had borrowed for the purpose; so that the populace of Athens, dreaming of nothing but conquests to be made without any expence, became obliquely bent on the war. Nicias, a man of great influence at Athens, attempted to show, that as Athens was then engaged in a dangerous war with Sparta, it was impossible to spare a force sufficient to reduce the island; but the contrary opinion being espoused by Alcibiades, at that time the most eloquent speaker in Athens, Nicias was over-ruled, and obliged to engage in the expedition. The force he required was only 5000 land-forces and 100 galleys, with which, however inadequate to the purpose it may seem, the Athenians were so sure of success, that the officers, before they set sail, had a conference with the senate concerning the disposal of the Sicilians. In this conference it was agreed, that the Selinuntines and Syracusians their supposed allies should be carried off and sold for slaves, and the rest obliged to pay an annual tribute and live according to the Athenian laws.

17
The ground-
less confi-
dence of the Athe-
nians.

With these sanguine expectations the Athenian forces embarked to the number of 7000; for such was their eagerness for the expedition, that 2000 more enlisted themselves than Nicias had required. They first sailed to the island of Egina, and from thence to Corcyra, where they had appointed the place of rendezvous for their allies and the transports. On their arrival, they set sail again, and landed on the coast of Italy, with a view to engage some of the Italian cities in their quarrel; but finding this impossible, they sent some ships to cruise off the coast of Sicily, in order to find out a proper place for landing, and at the same time to know what treasure the Egælines could contribute towards carrying on the war, which had been undertaken for their sake. These, on their return, acquainted the generals, that the Egælines had imposed on them, and were a poor indigent people, who had only 30 talents in their treasury. On this information a council of war was called, in which Nicias gave it as his opinion that they should sail to Selinus, which had been the first occasion of this expedition; and then, if the Egælines performed their promise, and supplied the army with a month's pay,

18
Find out
the deceit
of the Ege-
lines.

to oblige the Selinuntines and Egælines to come to an agreement, and then return to Athens without engaging in such an expensive war. Alcibiades, however, again opposed Nicias; thinking, it highly dishonourable to return home without doing any thing, after having been at the expence in fitting out an armament. He therefore urged, that they should solicit the cities of Sicily to enter into a confederacy against the Syracusians and Selinuntines; and, in case they found them disposed to come into their measures, to attack either Syracuse or Selinus. Another of the Athenian generals was for laying siege immediately to Syracuse; but the opinion of Alcibiades prevailing, they set sail for Sicily. Having accordingly landed in the island, they reduced several places; but Alcibiades in the mean time being recalled, Nicias and Lamachus were left to conduct the war as they best could. At first they were successful, possessing themselves of a strong post, and put the Syracusians to flight; soon after which they received considerable supplies both of men, money, and provisions, from Athens, as well as from their Sicilian allies. The Syracusians also received assistance from the Lacedæmonians under the command of an experienced officer named Gylippus. Before these arrived, however, the Athenians had possessed themselves of an important post named Epipolæ, which being a very steep hill, flood without the city and commanded it. Immediately after this the city was invested in form. The inhabitants made frequent and vigorous sallies; but were always repulsed with loss. In one of these sallies Lamachus was slain; and thus Nicias became sole commander. He then caused the canals to be cut by which water was conveyed into the city; upon which the Syracusians began to think of capitulating. From this, however, they were soon prevented by the arrival of Gylippus with the Spartan auxiliaries. On this they prepared for making vigorous sallies, in order to facilitate relief of the entrance of Gylippus. While they were making these preparations, Gylippus himself appeared at the head of 3000 foot and 200 horse. Making directly for Epipolæ, where Nicias had fortified himself in a castle named *Labdalon*, he drew up his small army under the walls; and sent an herald to Nicias, letting him know that he would allow him only five days to leave Sicily. To this message Nicias returned no answer; but Gylippus soon after attacked the fort, carried it by storm, and put to the sword all the Athenians that were in it. This opened him a way into the city, where he was received with loud acclamations.

Syracuse.

19
Reduce se-
veral places.

20
Defeat the
Syracusians,
and possess
themselves
of a strong
post.

21
Syracuse in-
vested.

22
Gylippus
arrives with
some Spar-
tans to the
relief of Sy-
racuse.

23
Takes a
fort, and
enters the
city.

The fortune of the war was now soon changed. The Athenians gained an advantage by land, but were next day defeated with considerable loss. The Syracusians received fresh supplies from Corinth, and the Athenians from their own country. Many engagements both by sea and land took place, in which the success was ultimately in favour of the Syracusians. At last the Athenian affairs were totally ruined by the loss of a sea-fight, in which 60 of their ships were taken or destroyed, and the rest left quite unserviceable. In this desperate situation it was determined to abandon their ships, and retire that very night to the city of their confederates. The Syracusan commander, suspecting that this would be the case, ordered all his

24
Athenians
totally de-
feated at
sea.
forces

Syracuse.

forces to be in readiness to prevent them from effecting their purpose. But as the people were then in the height of their rejoicing for the late victory, they refused to take up arms again until they had rested for some days. On this Hermocrates the general sent to the Athenian camp some horsemen, who were to pass for friends, and advise Nicias to quit his camp, which was well fortified, since the Syracusians lay in ambush for him, and had seized on all the passes leading to the cities of their allies. To this false advice Nicias gave too easy credit, and did not march out till the third day, when his antagonist Hermocrates had prevailed upon his forces to march out. The Athenians and their allies also marched out to the number of no less than 40,000; but finding themselves shut up on all sides, and being obliged to fight their way through every outlet, they soon sunk into the deepest despair. Nicias did his utmost to encourage them; and at last succeeded so far that they marched out in two bodies, both drawn up in proper order. The vanguard led by Nicias continued to keep together, and advanced in good order; but half the rear, commanded by Demosthenes, lost their way in the night, and were obliged to surrender. Nicias being informed of this misfortune, offered to pay the whole expence of the war, provided he was allowed to march off with his men. But this being rejected, he set out, though galled all the way by showers of darts from his enemies. Arriving at a river called *Asmarus*, they rushed into it without any order; in which confusion the Syracusan cavalry attacked them so desperately, that 18,000 perished, and the river for many miles was dyed with their blood. On this occasion the Athenians were so pressed with thirst, that, unmindful of their danger, they drank the waters of the river all bloody as they were, which gave their enemies the better opportunity of slaughtering them without resistance. The remainder surrendered, on the single condition of having their lives saved; but the terms were shamefully broke by the Syracusians. The generals were first ignominiously whipt, and then put to death: the common soldiers were thrust down into quarries, where they were allowed only two small measures of flour and one of water a day; and where, being crowded upon one another, they suffered inexpressible miseries for many months. Most of them perished by this cruel treatment, and the few who survived were sold for slaves.

The war was scarce ended, when a new and formidable invasion by the Carthaginians took place; but the event of that expedition was as unfortunate to the Carthaginians as the former had been, of which a particular account is given under the article *CARTHAGE*, n^o 12. *et seq.*

In the mean time, however, a considerable revolution had happened in Syracuse. The city of Agrigentum had been taken by the Carthaginians, and of the few inhabitants who escaped, some fled to Syracuse, where they accused the Syracusan commanders of having betrayed the city into the hands of the enemy. Dionysius, a man of great valour and address, but who had become very obnoxious to the populace, took this opportunity of attempting to retrieve his credit. He therefore supported the accusations brought against his countrymen by the Agrigentines, and even impeached the magistrates as

having a secret intelligence with the enemy, and attempting to introduce an oligarchy. As his speech was entirely levelled against the more wealthy citizens, it was very agreeable to the lower class: the commanders were instantly degraded; and others, among whom was Dionysius, were appointed. Having once gained this point, he began to consider how he might get all his colleagues turned out. For this purpose he never joined in any council of war with the other commanders, nor imparted to them his resolutions, giving out that he could not trust them, and that they had more regard for their own interest than the welfare of their country. But while he was proceeding in this manner, the more prudent part of the citizens, perceiving what he aimed at, complained of him to the senate and magistrates, and fined him as a disturber of the public peace. According to the laws, the fine was to be paid before he could speak in public, and the circumstances of Dionysius did not allow him to discharge it. In this dilemma he was assisted by Philistus the historian, a man of great wealth, who not only paid this fine for him, but encouraged him to speak his mind freely, as it became a zealous citizen to do, promising to pay all the fines that should be laid upon him.

Being extricated out of this difficulty, Dionysius next proceeded to inveigh, with all the eloquence he was master of, against those who by means of their power or interest were able to oppose his designs, and by degrees brought them into discredit. His next scheme was to get those exiles recalled whom the nobility had banished at different times; as thinking that they would support him with all their power, as well out of gratitude as out of hatred to the opposite party. Having gained this point also, he next found means to ingratiate himself with the soldiery to such a degree, that, under pretence of taking proper measures for resisting the Carthaginians, he was chosen commander in chief, with absolute and unlimited power. This was no sooner done, than, pretending that his life was in danger, he chose out 1000 men for his guard, whom he attached to his interest by great promises. As no person durst now oppose him, he possessed himself of the citadel, where all the arms and provisions were kept; after which he publicly took the title of king of Syracuse in the year 404 B. C.

The Syracusians did not tamely submit to their new master: but Dionysius managed matters so well, that their frequent revolts answered no other purpose than more certainly to entail slavery on themselves; and he was allowed to possess the throne without much opposition till his death, which happened in the year 366 B. C.

On the death of Dionysius, he was succeeded by his son, called also *Dionysius*. He was naturally of a mild and peaceable temper, averse from cruelty, and inclined to learning; but his father, to whom all merit, even in his own children, gave umbrage, stifted as far as possible his good qualities, by a mean and obscure education. He no sooner ascended the throne, than Dion, brother to Aristomache the other wife of Dionysius the elder, undertook to correct the faults of his education, and to inspire him with thoughts suitable to the high station in which he was placed: For this purpose he

Syracuse:

32
Is chosen
generalissimo.

33
Becomes
king of
Syracuse.

34
Dionysius.

sent.

25
Outwitted
by the Sy-
racusan
general.

26
Harassed in
their re-
treat.

27
Part of the
army sur-
renders.

28
The rest
defeated
with great
slaughter.

29
The re-
mainder
surrender,
and are
cruelly used.

30
New inva-
sion by the
Carthagi-
nians.

31
Rise of
Dionysius.

Syracuse.

35 Put under the care of Plato by his uncle Dion, whom he banishes.

sent for the philosopher Plato, under whose care he immediately put the young king. This instantly produced a reformation on Dionysius; but the courtiers, dreading the effects of the philosopher's instructions, prevailed on him to banish Dion, and to keep Plato himself in a kind of imprisonment in the citadel. At last, however, he set him at liberty; upon which Plato returned to his own country.

Dion, in the mean time, visited several of the Grecian cities, and at last took up his residence in Athens; but the honours which were every where paid him, raised such jealousies in the breast of the tyrant, that he stopped his revenue, and caused it to be paid into his own treasury. In a short time, Dionysius again sent for Plato; but finding it impossible to dissolve the friendship between him and Dion, disgraced, and placed him in a very dangerous situation, in the midst of assassins who hated him. Not daring, however, to offer him any violence, he allowed him soon after to depart; revenging himself on Dion, whose estate he sold, and gave his wife Arete in marriage to Timocrates one of his own flatterers.

Dion now resolved to revenge himself on the tyrant for the many injuries he had sustained, and at once to deliver his country from the oppression under which it groaned. He began with raising foreign troops privately, by proper agents, for the better execution of his design. Many Syracusians of distinction entered into his scheme, and gave him intelligence of what passed in the city: but of the exiles, of whom there were upwards of 1000 dispersed up and down Greece, only 25 joined him; so much were they awed by the dread of the tyrant. The troops were assembled at the island of Zacynthus, in number only about 800; but who had all been tried on many occasions, were well disciplined, and capable of animating by their example the forces which Dion hoped to find in Sicily. When they were about to set sail, Dion acquainted them with his design, the boldness of which at first occasioned no small contention among them; but Dion soon removed their fears, by telling them that he did not lead them as soldiers, but as officers, to put them at the head of the Syracusians and all the people of Sicily, who were ready to receive them with open arms.

Having then embarked in two small trading vessels, they arrived in 12 days at Cape Pachynum near Syracuse. Their pilot advised them to land immediately, lest they should be overtaken by a violent storm, which he perceived was approaching; but Dion, judging it improper to land so near the enemy, commanded him to put to sea again and double the Cape.—This was no sooner done than the storm came on; and the two vessels were driven on the coast of Africa, where they were in great danger of being lost. At last they arrived at the port of Minoa, not far from Agrigentum. Here they received intelligence that Dionysius had set sail for Italy, attended by a fleet of 80 galleys. On this Dion resolved to take advantage of the tyrant's absence; and immediately set sail for Syracuse. On his march he prevailed upon the inhabitants of Agrigentum, Gela, Camarina, and other cities, to join him. As soon as he entered the territories of Syracuse, multitudes flocked to him; and as nobody appeared to oppose him, he boldly entered the city, where he quickly found himself at the head of 50,000

men. As soon as he had landed in Sicily, Timocrates, to whom his wife Arete had been given by Dionysius, and to whom the care of the city had been left, dispatched a courier to let the tyrant know the danger in which he was. The messenger, when almost at his journey's end, found himself so much oppressed by fatigue, that he could not help lying down on the ground to take some rest. In the mean time, a wolf, smelling some meat which he had in his wallet, came to the place, and carried off the bag in which was the meat; together with the dispatches. By this means Dionysius was prevented from receiving a timely account of Dion's arrival; so that when he entered the citadel by sea, seven days after Dion's arrival, he found his affairs in a desperate situation. Upon this he had recourse to artifice; and having amused the Syracusians by a feigned negotiation, until he observed that they kept a negligent guard, he attacked them all at once with such fury, that he had almost taken the city. But Dion encouraged the soldiers by his example so much, that he at last obtained a complete victory; for which they presented him with a crown of gold.

It was not long, however, before the ungrateful Syracusians began to think of conferring quite different rewards on their benefactor. Dionysius had addressed to render him suspected by the multitude; at the same time that Heracles, an excellent officer, but a secret enemy to Dion, did all that lay in his power to sink his credit. In a short time Dionysius was obliged to fly into Italy: after which Heracles, in order to ingratiate himself with the populace, proposed a new division of lands; insinuating, that they could never enjoy perfect liberty as long as there was so much inequality in wealth and power among the citizens. This scheme was opposed by Dion, in consequence of which a general combination was formed against him; and he was deserted by all, excepting the foreign troops whom he had brought with him into the island. The Syracusians solicited even these to abandon the cause of their general: but their offers were rejected with disdain; and Dion, with his faithful adherents, getting clear of the tumultuous and riotous populace, took the road to Leontini. The rabble pursued him, but were soon driven back; and Dion resided for some time at Leontini, where he was received with all the respect due to his character.

In the mean time the citadel still continued in the hands of the adherents of Dionysius. Being blocked up on all sides, they were reduced to great straits, and were actually making proposals of capitulation, when Nymphis, an experienced general, and greatly attached to Dionysius, appeared with a numerous squadron of galleys, and a large fleet of transports laden with provisions. The general landed his men, and got them into the citadel; but almost all his galleys and ships laden with corn were sunk or taken. This victory proved the ruin of the Syracusians; for, giving themselves up to feasting and debauchery, the enemy sallied out in the night-time from the citadel, and massacred the citizens without mercy. Being thus made sensible of the error they had committed, an embassy was sent to Dion, intreating him to return and save the city a second time. To this he agreed without hesitation, and instantly set out on his march; but in the mean time,

Syracuse.

41 Dionysius arrives, but is totally defeated.

42 Ingratitude of the Syracusians to Dion.

43 He is obliged to leave the city.

44 A new advantage gained over the Dionysians.

45 The inhabitants massacred by the garrison of the citadel.

36 Uses Plato ill, and provokes Dion to revenge.

37 Dion raises troops for dethroning the tyrant.

38 His force very slender at first.

39 Is in great danger.

40 Enters Syracuse without opposition.

Syracuse. time, as the soldiers of Dionysius, fatiated with slaughter, had retired into their fortresses, the ungrateful Syracusians began to repent of their having sent an embassy to Dion. The chief commanders, therefore, sent messengers to stop his march; but as some of his friends sent deputies to him at the same time, desiring him to pay no regard to the former message, he proceeded on his journey. The insatuated multitude seized the gates in order to dispute his entrance; but they paid dear for their frenzy. The Dionysians again sallied out upon them, and made such slaughter that one would have thought they had left none alive in the city. As the troops of the tyrant well knew that Dion was hastening to the relief of the city, they used their utmost endeavours to destroy it entirely before his arrival; for, after they had murdered all the inhabitants they could find, they set fire to the houses, by which great numbers perished. During this confusion Dion unexpectedly arrived; and having briskly attacked the enemy, at last defeated them with great slaughter, driving the remainder into the citadel. During the rest of the night, instead of refreshing themselves after their fatigues, they assisted in extinguishing the fire; which was not done without great danger and difficulty. The citadel soon after surrendered; and Dion allowed Apollocrates the tyrant's son, who commanded there, to retire with five galleys to his father. As soon as Dion entered the citadel, he was met by his sister and wife Arete, whom he received with affection, notwithstanding her having lived so long with Timocrates. He then left the Syracusians in possession of the citadel, rewarded his followers, dismissed his guards, and continued to live like a private citizen.

46
A second
massacre,
and the city
set on fire.

47
The Dionysians
defeated
with
great
slaughter by
Dion.

48
Dion be-
comes me-
lancholy,
and is mur-
dered.

49
Dionysius
restored.

50
Surrenders
to Timo-
leon, and
keeps a
school at
Corinth.

leon, by whom he was sent to Corinth; where at last he was reduced to the necessity of teaching a school for his support.

After the expulsion of the tyrant, Timoleon withdrew to Catania, leaving only 400 Corinthians, under the command of an experienced officer named Leon, to guard the citadel. These were immediately besieged by Ictas and the Carthaginians, but Timoleon found means to relieve them in spite of all opposition; and having dispersed emissaries through the army of Mago the Carthaginian general, exhorting the mercenary Greeks to forsake him, he was so much intimidated, that in spite of all the remonstrances Ictas could make, he set sail for Africa, leaving his colleague to carry on the war in the best manner he could.

The day after the departure of Mago, Timoleon assaulted the city so briskly, that the troops of Ictas were driven from the walls, and the Corinthians became masters of the place. Timoleon, by found of trumpet, invited the inhabitants to come and assist in demolishing the citadel and other castles, which he called the *nest of tyrants*; after which he caused edifices to be erected in the place where the citadel had stood, for the administration of justice. He found the city in a most miserable situation: for many having perished in the wars and seditions, and others having fled to avoid the oppression of tyrants, Syracuse, once so wealthy and populous, was now become almost a desert; inasmuch that the horses were fed on the grass which grew on the market-place. Timoleon supplied the city with inhabitants from Corinth and other cities of Greece, at the same time that great multitudes from Italy and the other parts of Sicily resorted thither. Timoleon distributed the lands among them gratis; but sold the houses, and with the money arising from the sale established a fund for the support of the poor. Having thus restored Syracuse, he in like manner delivered all the Greek cities of Sicily from the tyrants who had taken possession of them, all of whom he put to death. After this he resigned his authority, and led a retired life, honoured in the highest degree by the Syracusians, and by all the cities in Sicily. After his death he was honoured as a god; the expense of his funeral was defrayed by the public; sports, with horse-races and gymnastic exercises, were held annually on the day of his death; and it was decreed, that whenever the Syracusians were at war with the barbarians, they should send to Corinth for a general.

For 20 years the Syracusians enjoyed the fruits of Timoleon's victories; but new disturbances arising, in a short time another tyrant started up, who exceeded all that had gone before him in cruelty and other vices. This was the celebrated Agathocles, of whose exploits against the Carthaginians a full account is given under the article CARTHAGE, n° 33—53. He was poisoned by one Mænon in the year 289 B. C. after having reigned 28 years and lived 95. A succession of tyrants followed, till at last the city, being held by two rivals, Tæmon and Sosistratus, who made war within the very walls, Pyrrhus king of Epirus was invited into Sicily, in order to put an end to these distractions. He willingly complied with the invitation; and was everywhere received with loud acclamations, as the deliverer not only of Syracuse, but of all Sicily. As he had a

55
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56
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Syracuse. fine army of 30,000 foot and 5000 horse, with a fleet of 200 sail, he drove the Carthaginians from place to place, till he left them only the two strong posts of Eryx and Lilybæum. The former of these he took by assault, and was himself the first man who mounted the walls, after having killed a great number of Africans with his own hand. The Mamertines likewise, who had conquered a considerable part of the island, were everywhere defeated and driven out, till at last they were shut up in the city of Messina. The Carthaginians, alarmed at the rapidity of his conquests, sent ambassadors with proposals of peace upon very advantageous terms; but Pyrrhus, puffed up with the expectation of reducing the whole island, refused to hearken to any terms unless they would instantly abandon it. So firm was he in the belief of this, that he caused his son take upon him the title of *king of Sicily*; but in the mean time, having displeased the Sicilians by his arbitrary behaviour, they deserted from him in such numbers that he was glad to set out for Italy, for which retreat the embassies he received from the Samnites, Tarentines, and other Italians, furnished him with an honourable pretext. He embarked in the ships which he had brought with him from Italy; but was met at sea by the Carthaginians, who sunk 70 of his vessels, and dispersed or took the rest; so that he saved himself in Italy only with 12 vessels, the poor remains of a fleet of 200 sail. No sooner were the Mamertines apprised of his departure, than they dispatched a body of 18,000 men to harass him after his landing. These, having passed the straits before him, posted themselves in the road which Pyrrhus must take in marching by land to Tarentum; and concealing themselves among woods and rocks, attacked him unexpectedly, and with great resolution. But Pyrrhus behaved on this occasion with his usual bravery. The attack being made on his rear, he hastened thither, and made a dreadful slaughter of the enemy, till a wound on his head obliged him to retire. As he was supposed to be disabled by this wound, a proud Mamertine, of an extraordinary size, and shining in bright armour, advanced, and with a loud voice challenged the king of Epirus, if he was yet alive, to a single combat. Pyrrhus immediately turned about, and making a dreadful appearance by reason of the blood which ran down his face, flew at this new champion, on whose head he discharged such a furious blow, that he cleft his body asunder; one half falling to the right, and the other to the left. This incredible feat, which has since been ascribed to other warriors, perhaps with as much truth as to Pyrrhus, so much intimidated the Mamertines, that they allowed the Epirots to continue their march unmolested.

57 Conquers a great part of the island.

58 Behaves in a haughty manner, and is obliged to return into Italy.

59 Harassed by the Mamertines.

60 Astonishing exploit of Pyrrhus.

61 Hiero chosen general of the Syracusan forces.

Syracuse. all, that he was invested with the whole civil as well as military power in the state. Soon after this, he married the daughter of one of the first citizens; and having distinguished himself by his exploits against the Mamertines, was unanimously elected king of Syracuse, in the year 265 B.C.

62 Is elected king of Syracuse.

63 Lives in strict friendship with the Romans.

64 Hieronymus allies with the Carthaginians.

Hiero died in the year 211 B.C. and was succeeded by his grandson Hieronymus; but he imprudently forsook the counsels of his grandfather, and entered into an alliance with the Carthaginians. Soon after this he was murdered, in consequence of his tyranny and cruelty, and the greatest disorders took place in the city; which Hannibal, though then in Italy, found means to foment, in hopes of keeping the Syracusians in his interest. This indeed he effected; but as his own affairs in Italy began to decline*, he could not prevent Marcellus from landing in Sicily with a formidable army, which the Sicilians could by no means resist. Syracuse was soon invested; but the machines invented by Archimedes baffled all attempts to take it by assault. It was 22 miles in compass, and consisted properly of five cities in one, viz. Ortigia, Achradine, Tyche, Neapolis, and Epipolæ—Ortigia was a small island very near the continent, and might be called the *citadel of Syracuse*, being joined to Achradine by a bridge. The immense preparations which the consul had made for taking the city by storm, could not have failed to accomplish his purpose, had the place been otherwise defended than by the contrivance of Archimedes. The Roman fleet consisted of 60 quinqueremes, besides a far greater number of other ships. The decks were covered with soldiers armed with darts, slings, and bows, to drive the besieged from the ramparts, which on the side of Achradine were washed by the sea, and to facilitate the approach to the walls. But a machine of Marcellus's own invention was what he chiefly depended on. He had fastened together sidewise eight galleys of different lengths, which made but one large body, and were rowed only by the oars of the outermost galleys. These eight galleys thus joined, served only as a basis for a machine, which was raised up higher than the highest towers of the walls, and had at the top a platform guarded with parapets in front, and on each side. This machine was called a *sambuca*, from its resemblance to a musical instrument of that name, not unlike an harp. The consul's design was to bring his sambuca to the foot of the walls of Achradina; but, while

* See *Curthage*, vol. 12, p. 123.

65 Syracuse machines invented by Archimedes.

66 Great force of the Romans by land.

67 Machine invented by Marcellus.

68
Destroyed
by Archi-
medes.

69
Incredible
effects of
the ma-
chines of
Archime-
des.

it was at a considerable distance (and it advanced very slow, being moved only by two ranks of rowers), Archimedes discharged from one of his engines a vast stone, weighing, according to Plutarch's account, 1250 pounds, then a second, and immediately after a third; all which, falling upon the sambuca with a dreadful noise, broke its supports, and gave the galleys upon which it stood such a violent shock that they parted, and the machine which Marcellus had raised upon them at a vast trouble and expence, was battered to pieces. At the same time several other machines, which were not visible without the walls, and consequently did not lessen the confidence of the Romans in the assault, played incessantly upon their ships, and overwhelmed them with showers of stones, rafters, and beams pointed with iron; inasmuch that Marcellus, being at a loss what to do, retired with all possible haste, and sent orders to his land-forces to do the same; for the attack on the land-side was attended with no better success, the ranks being broken and thrown into the utmost confusion by the stones and darts, which flew with such noise, force, and rapidity, that they struck the Romans with terror, and dashed all to pieces before them.

Marcellus, surpris'd, though not discouraged, at this artificial storm, which he did not expect, held a council of war, in which it was resolv'd, the next day before sun-rise, to come up close under the wall, and keep there. They were in hopes by this means to secure themselves against this terrible storm of stones and darts which fell on the ships when at a distance. But Archimedes had prepared engines which were adapted to all distances. When the Romans therefore had brought their ships close under the wall, and thought themselves well covered, they were unexpectedly overwhelmed with a new shower of darts and stones, which fell perpendicularly on their heads, and obliged them to retire with great precipitation. But they were no sooner got at some distance, than a new shower of darts overtook them, which made a dreadful havoc of the men, while stones of an immense weight, discharged from other machines, either disabled or broke in pieces most of their galleys. This loss they sustained, without being able to revenge it in the least on the enemy. For Archimedes had placed most of his engines behind the walls, and not only out of the reach, but even out of the sight, of the enemy; so that the Romans were repulsed with a dreadful slaughter, without seeing the hand that occasioned it; as if they had been fighting, to use Plutarch's expression, not with men, but with the gods themselves. What most harraided the Romans in the attack by sea, was a sort of crow with iron claws, fastened to a long chain, which was let down by a kind of lever. The weight of the iron made it fall with great violence, and drove it into the planks of the galleys. Then the besieged, by a great weight of lead at the other end of the lever, weighed it down, and consequently raised up the iron of the crow in proportion, and with it the prow of the galley to which it was fastened, sinking the poop at the same time into the water. After this the crow letting go its hold all of a sudden, the prow of the galley fell with such force into the sea, that the whole vessel was filled with water, and sunk. At other times the machines, dragging ships to the shore by

hooks, dashed them to pieces against the points of the rocks which projected under the walls. Other vessels were quite lifted up into the air, there whirled about with incredible rapidity, and then let fall into the sea, and sunk, with all that were in them. How these stupendous works were effected, few, if any, have hitherto been able to comprehend.

The troops under the command of Appius suffered no less in this second attack than the fleet. In the whole space of ground which the army, when formed, took up, the last files as well as the first were overwhelmed with showers of darts and flints, against which they could not possibly defend themselves. When they had with infinite trouble brought the mantelets and covered galleries, under which they were to work the rams, near the foot of the wall, Archimedes discharged such large beams and stones upon them as crushed them to pieces. If any brave Roman ventured to draw too near the wall, iron hooks were immediately let down from above, which, taking hold of his cloaths or some part of his body, lifted him up in the air and dashed out his brains with the fall. Marcellus, though at a loss what to do, could not however forbear expressing himself with pleasantry: Shall we persist, said he to his workmen, in making war upon this Briareus, upon this giant with an hundred hands? But the soldiers were so terrified, that if they saw upon the walls only a small cord, or the least piece of wood, they immediately turned their backs and fled, crying out, that Archimedes was going to discharge some dreadful machine upon them.

The consuls, finding themselves thus defeated in every attempt, turned the siege into a blockade, re-duced most of the other places in the island, and defeated the forces which were sent against them; and at last Marcellus made himself master of Syracuse itself, of which the following account is given by Mr Hooke. "He took the opportunity of a festival, when the soldiers and citizens had drunk plentifully, to make a detachment scale the walls of Tyche, and that part of it which was nearest to Epipolæ, and which was ill guarded. He presently after possessed himself of Epipolæ; whereupon the inhabitants of Neapolis, as well as Tyche, sent deputies to him, and submitted. Marcellus granted life and liberty to all of free condition, but gave up those quarters of the city to be plundered.

"Notwithstanding this, there was a great deal yet to do. Achradina and Ortigia, which were strongly fortified, still held out; Hippocrates and Himilco arrived with their troops to the relief of the besieged; and the Romans were forced to exert all their bravery and skill to maintain the advantages they had gained.

"But now a plague made terrible havoc in both armies. At the first breaking out of the pestilence, the Sicilians, who served under Hippocrates and Himilco, disbanded themselves, and returned to their respective homes; but all the Carthaginian soldiers perished, together with those two generals. The Romans suffered less by the infection; because, having been a long time before Syracuse, they were seasoned to the air and water of the country.

"About this time Bomilcar arrived on the coast of Sicily from Carthage with a fleet of 130 galleys and 700 ships of burden; but was long hindered by con-

trary winds from doubling the cape of Pachynum. Epicydes, fearing the Carthaginian might sail back to Africa, left the command of Achradina to the generals of the mercenaries, and went to Bomilcar, in order to persuade him to fight the Roman fleet. The admiral would not engage, but failed away to Tarentum with all his galleys, ordering his ships of burden to return to Africa. Epicydes, thus frustrated of his hopes, and knowing himself unable to defend a city already half taken, retired to Agrigentum; whereupon the Syracusians massacred the commanders appointed by him, chose new pretors to govern in the town, and sent deputies to Marcellus to treat of peace. In the mean time the deserters, fearing to be given up to the vengeance of the Romans, persuaded the mercenaries that they also would have the same fate. Instantly the soldiers ran to arms, put to death the new pretors, together with many of the Syracusians, and plundered part of the city. After this slaughter they chose six generals, three to command in Achradina, and three in Ortygia. Upon the return of the deputies from Marcellus, the mercenaries finding that their case was different from that of the deserters, and that there was no design against their lives, became perfectly satisfied, and the negotiation went on. During the course of the treaty, Marcellus found means to corrupt Mericus, a Spaniard, one of the six generals chosen by the soldiers, and engaged him to admit the Romans into that part of the city where he commanded. Mericus, the better to accomplish this design, feigned an extraordinary zeal for the preservation of that place; pretended not to like that deputies should have leave to go out and in at pleasure; and proposed, that for the greater security of the town, each general should have a distinct quarter assigned him, and be responsible for any neglect of duty in it. The motion was agreed to; and upon the division, that district of Ortygia which extended from the fountain of Arethusa to the mouth of the great port fell to his care. Marcellus, informed of what was done, took his measures accordingly. He sent a body of troops to that side where Mericus commanded, and the Spaniard admitted them at the gate of Arethusa. At the same time the proconsul ordered a false attack to be made on Achradina; which drawing almost all the soldiers of the garrison thither, Ortygia was in a manner left defenceless. Foreseeing this, he had detached another party of soldiers to take advantage of it. These entered Ortygia almost without fighting; upon which the deserters made their escape, the Romans giving them way; and the Syracusians in Achradina, thus delivered from the fear of the deserters, immediately opened their gates to Marcellus, who thereby became master of the whole city.

72
The city
plundered,
and Archi-
medes kill-
ed.

“And now the conqueror, who is said to have wept during the siege with compassion for the inhabitants, gave up both Ortygia and Achradina to be plundered by his army, after he had secured the late king's treasures for the use of his republic, and the statues, paintings, and principal ornaments of Syracuse to illustrate his triumph. The soldiers had orders to spare the lives of the citizens; but they were cruel in their avarice, slew many of them, and among the rest the incomparable Archimedes. He was very in-

tent on a demonstration in geometry, and calmly drawing his lines, when a soldier entered the room, and clapped a sword to his throat. “Hold! (said Archimedes), one moment, and my demonstration will be finished.” But the soldier, equally regardless of his prayer and his demonstration, killed him instantly. There are different accounts of the manner of his death; but all agree that Marcellus regretted it extremely, and showed a singular favour to his relations for his sake.”

The city of Syracuse continued subject to the western empire till its declension, when the island of Sicily, being ravaged by different barbarians, the capital also underwent various revolutions; and till at last, in the 9th century, it was so destroyed by the Saracens, that very few traces of its ancient grandeur are now to be seen.

93
Syracuse
destroyed
by the Sa-
racens.

SYRIA, a very ancient kingdom of Asia, lying between the Mediterranean on the west, the Euphrates on the east, and Arabia Deserta, Phœnice, and Palestine on the south.

In ancient times this country was called *Aram*, from Aram the youngest son of Shem, who settled here; but in process of time the name came to be changed into *Syria*, from one *Syrus*, according to some; tho' others think it is only a contraction of the word *Assyria*. At first it was undoubtedly parcelled out into several petty states; all of which seem afterwards to have been reduced under subjection to the four principal ones, Zobah, Damascus, Hamath, and Geshur. Afterwards the whole country was divided into two parts only, viz. Cœle Syria and Phœnicia; though the Phœnicians, Idumæans, Jews, Gazites, and Azotites, or the whole country of the Philistines, was included. After the death of Alexander, Syria, in the great extent of the word, was divided, according to Strabo, into Comagene, Seleucia of Syria, Cœle Syria, Phœnicia on the sea-coast, and Judea in the mid-land. Ptolemy, however subdivides these; and in the proper Syria reckons only Comagene, Pieria, Cyrristrica or Cyrrhætica, Seleucia, Cassiotes or Castotes, Chalybonitis, Chalcidice or Chalcidene, Apamene, Laodicene, Phœnicia Mediterranea, Cœle Syria and Palmyrene.

74
Names, di-
visions, &c.
of ancient
Syria.

The history of the ancient Syrians, till the time of their being carried away by the kings of Assyria, is totally unknown, excepting a few particulars which may be gathered from scripture, and which it is needless here to repeat. During the continuance of the Assyrian, Babylonian, and Persian monarchies, the history of this country affords nothing remarkable; but after the death of Alexander, it gave name to a very considerable empire, which makes a conspicuous figure in ancient history. At this time, however, it was not confined to Syria properly so called, but comprehended all those vast provinces of the Upper Asia which formed the Persian empire; being, in its full extent, bounded by the Mediterranean upon one side, and the river Indus on the other. The first king was Seleucus, one of the generals of Alexander the Great; who, after the death of that conqueror, Alexander being made governor of Babylon, was tempted, by the example of Alexander's other captains, to set up for himself. Eumenes, who had sincerely at heart the interest of Alexander's family, solicited his assistance against

75
Seleucus
the first
king of
Syria after
the Great.

Syria.

Syria.

76
Attempts
to destroy
Eumenes.

against Antigonus, who had openly revolted; but Seleucus not only refused this assistance, but attempted to destroy Eumenes himself with his whole army, by cutting the sluices of the Euphrates, and laying under water the whole plain where they were encamped. Eumenes, however, found means to escape the danger without the loss of a man. Upon this Seleucus endeavoured to gain over his troops: but finding that impossible, he made a truce with Eumenes, and granted him a safe passage through his province; but at the same time sent an express to Antigonus, desiring him to fall upon him before he was joined by the governors of Upper Asia. Antigonus did not fail to follow his advice; but having prevailed against Eumenes through treachery, he next thought of bringing Seleucus himself under subjection. On his return to Babylon, therefore, after having been feasted with his whole army by Seleucus, he demanded of him an account of the revenues of his province. Receiving an unfavourable answer to this question, Antigonus was so much exasperated, that Seleucus, not thinking himself a match for him at that time, thought proper to fly into Egypt.

77
Obliged by
Antigonus
to fly into
Egypt.

78
Attempts
the recovery
of Babylon
with a very slender
force.

By the flight of Seleucus, Antigonus was left master of all his provinces; but his son Demetrius being afterwards defeated by Ptolemy at Gaza, Seleucus began to think of recovering what he had lost. Being furnished by Ptolemy with 1000 foot and 200 horse, he set out with that slender force to attempt the recovery of Babylon. Nothing could have a more desperate appearance than this undertaking; yet Seleucus was not discouraged. On his arrival at Carrhæ in Mesopotamia, partly by force and partly by persuasion, he prevailed on the Macedonians who garrisoned that place to revolt from Antigonus and join him. Being thus reinforced, he entered the territories of Babylon, where new supplies were continually added to his army; his ancient subjects flocking to him from all parts, and declaring themselves ready to stand by him with their lives and fortunes. This happened in consequence of the lenity with which they had been treated by Seleucus; whereas Antigonus was universally detested on account of his severity.—As he approached the city, those who favoured Antigonus retired into the citadel, but were obliged to surrender; and in that fortress Seleucus found his children, friends, and domestics, whom Antigonus had kept prisoners ever since his flight into Egypt.

79
Becomes
master of
the city.

80
Defeats
Nicanor,
and reduces
Media and
Susiana.

Seleucus having thus made himself master of Babylon, in the year 312 B. C. began to prepare for encountering Antigonus, who he knew would soon attack him with all his force. Nicanor, governor of Media under Antigonus, first advanced against him at the head of 10,000 foot and 7000 horse; but Seleucus, with only 3000 foot and 400 horse, having drawn him into an ambush, cut off almost the whole of his army, and such of the soldiers as had escaped the slaughter willingly enlisted under his banner.

The consequence of this victory was the submission of all Media and Susiana; which alarming Antigonus, he sent his son Demetrius with an army of 5000 Macedonian foot, 10,000 mercenaries, and 4000 horse. Seleucus was then in Media; and Patrocles, whom he had left to take care of Babylon, finding his force

inadequate to that purpose, compelled the inhabitants to leave the city and disperse themselves in the adjacent countries, while he himself, with what troops he had, retired into two forts which he thought could easily be defended. When therefore Demetrius entered Babylon, he was surprised to find it deserted, upon which he instantly attacked the forts. One was quickly reduced; but as the other held out till the expiration of the time which had been allowed him by his father, he left 5000 foot and 1000 horse under the command of Archelaus to carry on the siege. With the rest he marched away, suffering his soldiers to live at discretion as he went along; which so provoked the Babylonians, that they were ever after attached to Seleucus as if he had been their natural prince.

On the return of Seleucus to Babylon, he easily drove out the troops left by Antigonus, recovered the castle which he had garrisoned, and settled his authority on such a firm foundation that it could never afterwards be moved. Having then marched again into Media, he defeated and killed with his own hand Nicanor, or Nicator, whom Antigonus had sent against him; after which, having settled the affairs of Media, he reduced all Persia, Bactria, and Hyrcania, subjecting to his new empire these and all the other provinces on this side the Indus which had been conquered.

Seleucus being now master of all the countries which lie between the Euphrates and the Indus, took the title of king of Babylon and Media. But, not satisfied with these possessions, ample as they were, he crossed the Indus, in order to conquer those regions which had submitted to Alexander beyond that river. But, during the time that the generals of Alexander had been making war upon his family and upon one another, one Sandracottus, a native of India, had driven out the Macedonians, and made himself master of the whole country. He opposed Seleucus with an army of 600,000 men, and a prodigious number of elephants; which intimidated the Macedonian so much, that he offered to leave Sandrocottus in quiet possession of his dominions, provided he would furnish him with 500 elephants. To this Sandrocottus readily assented; upon which Seleucus marched back into the west against Antigonus, and, in conjunction with Lysimachus and Ptolemy, engaged and totally defeated and killed him at Ipsus. After this Seleucus marched into Upper Syria, which he reduced entirely, and built the city of Antioch on the Orontes. In the same country he built several other cities; one of which he called *Seleucia*, from his own name; another *Apamea*, from his wife Apamea, the daughter of one Artabazus a Persian; and a third *Lasdicea*, from his mother Laodice. He first entered into an alliance with Demetrius, and married Stratonice his daughter; but soon after assisted Lysimachus and Ptolemy to deprive him of the best part of his dominions. Thus Demetrius being reduced so low that he could give him no farther jealousy, Seleucus betook himself to the building of another city, which he called likewise *Seleucia*, and which stood on the place where the city of Bagdad now stands. Besides these, he built a great many others; 16 of which he called *Antioch*, from the name of his brother Antiochus; nine *Seleucia*, from his own name; three

81
Nicanor
again de-
feated and
killed.

82
Cedes India
to Sandro-
cottus for
500 ele-
phants.

83
Defeats
Antigonus,
and builds
many cities.

Apamea.

Syria.

Apamea, from *Apama* his first wife; one *Stratonicea*, from his second wife *Stratonice*; and six *Laodicea*, from his mother *Laodice*.

In 284 *Seleucus* entered into a war with *Lyfimachus*, with whom he had hitherto lived in strict amity. Out of 36 general officers left by *Alexander the Great*, they two only survived, and both were upwards of 70 years old. Nevertheless they were both filled with the ambition and animosity of young men. The two armies met at a place called *Eurepedion* in *Phrygia*, where an obstinate engagement took place. Victory was long doubtful: but at last *Lyfimachus* was run through with a spear, and died on the spot; on which his troops betook themselves to flight, and left *Seleucus* master of their baggage. This victory added to the possessions of *Seleucus* all those provinces which had formerly been subject to *Lyfimachus*. The former exulted much in his good fortune; being chiefly pleased that he was now the last of *Alexander's* captains, and by this victory became, as he styled it, *the conqueror of conquerors*; and on this account he is generally called *Nicator*, or *the Conqueror*. His triumph, however, on this occasion, was but short-lived; for, seven months after, as he was marching towards *Macedon* to take possession of that kingdom, he was treacherously murdered by *Ptolemy Ceraunus*, on whom he had conferred innumerable favours. *Philetærus* prince of *Fergamus* purchased his body at a great price from *Ptolemy*, and sent it to his son *Antiochus*; who, with extraordinary pomp, burned it in *Seleucia* on the sea-coast, erecting on the place a magnificent chapel, which he called from his surname *Nicatorium*.

84
Defeats
and kills
Lyfimachus.

85
Is himself
treacherously
murdered.

86
Antiochus
Soter.

87
Antiochus
Theos.

88
Seleucus
Calinicus.

Seleucus was succeeded by his son *Antiochus Soter*, who held the empire 19 years. He resigned to *Antigonos Gonatus* all pretensions to the crown of *Macedon*; and having engaged in a war with *Eumenes* king of *Pergamus*, he was defeated by him, and obliged to yield up part of his dominions. He died in 261 B. C. and was succeeded by his son *Antiochus Theos*; who having engaged in a war with *Ptolemy Philadelphus* king of *Egypt*, the *Parthians* and *Bactrians* took an opportunity to revolt, and could never afterwards be reduced. In 246 B. C. he was poisoned by his wife *Laodice*, whom he had divorced for *Berenice* daughter to *Ptolemy*, with whom he made peace on the revolt of the *Bactrians*. On the death of *Ptolemy*, *Antiochus* divorced *Berenice*, and took back *Laodice*; who, to secure herself against the effects of his fickle disposition, poisoned him, as we have just mentioned, and raised to the throne her own son, named *Seleucus Callinicus*. Not thinking herself safe, however, as long as *Berenice* lived, *Laodice* began immediately to concert measures for putting both her and her son to death. *Berenice* attempted to save herself by retiring to *Daphne*, where she shut herself up in an asylum built by *Seleucus Nicator*. There she was closely besieged by the sons of *Seleucus*; of which the cities of *Asia* having intelligence, formed a confederacy in her favour. Her brother the king of *Egypt* also hastened to her relief with a considerable army; but before either of these could come to her assistance, both she and her son were barbarously murdered, with all the *Egyptians* who attended them.

Ptolemy, on hearing the melancholy news of his

sister's death, determined to take the most severe vengeance on her murderers. Joining his forces to those of the *Asiatics*, he carried every thing before him. Having in the first place put an end to the life of *Laodice*, he made himself master of all *Syria* and *Cilicia*; then passing the *Euphrates*, he subdued all the country as far as *Babylon* and the *Tigris*; and had not the progress of his arms been interrupted by a sedition which obliged him to return to *Egypt*, it is more than probable that he would have subdued the whole *Syrian* empire. As soon as he was returned, *Seleucus* attempted to revenge himself; but his fleet being destroyed by a violent storm, and his land-army defeated by *Ptolemy*, he concluded a truce for ten years. During all this time the *Parthian* prince had established himself so firmly on the throne, that it was in vain to think of dispossessing him. However, as soon as his other affairs would permit, *Seleucus* undertook an expedition against *Araces* the *Parthian* monarch; by whom he was utterly defeated, taken prisoner, and carried into *Parthia*, where he died four years after. He was succeeded by his eldest son *Seleucus Ceraunus*, a weak prince, who was poisoned by a conspiracy of two of his officers, when he had reigned one year; after which his brother *Antiochus*, surnamed the *Great*, ascended the throne in 225 B. C.

In the very beginning of his reign, two of his generals, *Alexander* and *Molo*, rebelled against him. The former had been appointed governor of *Persia*, and the latter of *Media*; but they, despising the king's youth, refused to obey. The occasion of this revolt is said to have been their dread of the cruelty of *Hermias* the king's prime minister; and as they hoped to draw into their schemes *Achæus* governor of the provinces of *Asia Minor*, they doubted not of success. In this, however, they failed; but this did not discourage them from proceeding in their rebellion. *Epigènes*, the commander of the troops about the king's person, advised him to march without delay against the rebels; but as *Hermias* reproached him with treachery and a design to betray the king into the hands of his enemies, *Antiochus* sent two of his generals into the east, while he himself undertook an expedition against *Ptolemy Philadelphus*, with a view of recovering *Cælysia*. In this attempt, however, he was disappointed; and the generals whom he had sent into the east were totally defeated, and their troops cut off: upon which he determined to lay aside for the present his *Syrian* enterprise, and march in person against the rebels. This was again opposed by *Hermias*; but as he found it impossible to alter the king's mind, the treacherous minister found means to get *Epigènes* the author of this project executed, under pretence of holding a correspondence with *Molo* one of the rebel chiefs. *Antiochus* in the mean time pursued his march against the rebels, whom he defeated in a pitched battle; upon which their chiefs laid violent hands on themselves. On his return he received the submission of the *Atropati*, a barbarous people in *Media*; and put to death his prime minister *Hermias*, whom he found hatching treacherous designs against him. During his lifetime, however, the traitor, by accusing *Achæus* of treason, had obliged him to revolt in his own defence; so that the king had still two im-

Syria.

89
Great part
of his do-
minions
conquered
by Ptolemy
Euergetes.

90
Seleucus
defeated
and taken
prisoner by
the Par-
thians.

91
Antiochus
the Great.

92
Undertakes
an unsuccess-
ful ex-
pedition
against
Egypt.

93
Suppresses
one rebellion,
but is em-
barrassed
by another.

im-

Syria.

important wars on his hands, viz. that with Ptolemy king of Egypt, and the other against Achæus. After some deliberation, he resolved to march first against the king of Egypt; and was at first very successful, reducing many cities in Cæleſyria and Palestine, and defeating the Egyptians in a pitched battle: but in the year 217 B. C. being worsted in the battle of Raphia, he was obliged to abandon all his conquests; of which Ptolemy immediately took possession, and Antiochus was obliged to cede them to him, that he might be at leisure to pursue the war against Achæus.

Antiochus having made vast preparations for his expedition, soon reduced Achæus to such distress, that he was obliged to shut himself up in the city of Sardis, which he defended for some time with great bravery; till at last, being betrayed by two Cretans, he was delivered up to the king, and by his order put to death. Antiochus then undertook an expedition against the Parthians, whom he obliged to conclude a peace on very advantageous terms. He then turned his arms against the king of Bactria, whom he also compelled to agree to his terms; one of which was, that he should give him up all his elephants. For the confirmation of the treaty, the king of Bactria sent his son to Antiochus; who being taken with his majestic mien and agreeable conversation, gave him one of his daughters in marriage. He then crossed Mount Caucasus, and entered India; where having renewed his alliance with the king of that country, he received also of his elephants, which increased his flock to 150. From India he marched into Arachosia, Drangiana, and Carmania, establishing order and discipline in those countries: then passing through Persia, Babylonia, and Mesopotamia, he returned to Antioch, after an absence of seven years.

In the year 204 B. C. Antiochus entered into a league with Philip of Macedon, on purpose to deprive Ptolemy Epiphanes, the infant-king of Egypt, of all his dominions. The Egyptians, however, put the young king under the tuition of the Romans; who immediately required the confederate princes to desist from any enterprise against the king of Egypt, under the penalty of incurring the displeasure of the republic. After delivering this message, M. Emilius Lepidus, one of the ambassadors, repaired to Egypt, where he took upon himself the office of regent and guardian to the young king. Having regulated affairs there in the best manner he could, he returned to Rome, after having appointed one Aristomenes, an Acarnanian, to be chief minister to the king. Aristomenes being a man of prudence and fidelity, acquitted himself very well in his new station. Having taken care to recruit his army as well as he could, he sent one Scopas, a man of great authority among the Ætolians, into that country, to raise auxiliaries. Scopas soon raised an army of 6000 Ætolians, at that time reputed the best soldiers in the world; and having joined the Egyptian army, reduced all Judea, put a garrison into the castle at Jerusalem, and, on the approach of winter, returned to Alexandria loaded with booty. These exploits, however, were performed when Antiochus was absent in Asia Minor; and no sooner was he returned than the face of affairs was changed. Scopas was defeated in a pitched battle, where one half of his men were destroyed. He him-

self escaped to Sidon, where he shut himself up with 10,000 of his soldiers; but Antiochus having invested the place, Scopas was reduced to the necessity of surrendering at discretion. The king pursued his conquests; recovered all Palestine and Cæleſyria; after which he invaded Asia Minor, in hopes of reducing it also, and restoring the Syrian empire to the same extent it had in the time of Seleucus Nicator. The free cities in Asia Minor immediately had recourse to the Romans, who sent an embassy to Antiochus on the occasion; but as both parties put on those haughty and imperious airs to which they thought the greatness of their power gave them a right, no satisfaction was given, but every thing tended to an open rupture. While matters were in this situation, Hannibal the Great being obliged to leave his own country, fled to Antiochus; from whom he met with a gracious reception. As Hannibal had, while a child, sworn perpetual enmity with the Romans, he used all his eloquence to persuade Antiochus to make war with them; and as the many victories which he had gained over them left no room to doubt of his capacity, Antiochus doubted nothing of being able, by his assistance, to conquer that haughty people. Several embassies passed between the two nations; but chiefly with a design, on the part of Antiochus, to gain time. Hannibal endeavoured to draw his countrymen into the confederacy against Rome, but without effect. Antiochus having strengthened himself by several alliances, at last resolved to begin the war in earnest.

To consult on the measures proper to be taken, he called a council of war; but excluded from it the only man whose advice he ought to have followed; namely, Hannibal the Carthaginian. The reason of this was, that he had become jealous of him from the too great intimacy, as he thought, which he had kept with the Roman ambassadors. However, in this council it was agreed that the war should be immediately commenced. The king himself was prevailed upon by the Ætolians to pass over into Greece, and at the same time entirely to reject the advice which Hannibal had formerly given, of sending him with an army into Italy. Here he was made generalissimo of all the Greek forces; but made none of those efforts that had formerly obtained him the title of Great. Indeed it now plainly appeared, not only that he was incapable of carrying on war against such enemies as the Romans, but even of accepting proper advice when it was given him. In another council, into which Hannibal was admitted, that commander advised the king, before he undertook any thing else, to use his utmost endeavours to gain over Philip of Macedon; which, he said, was a step so important, that if it could be gained, they might, without much ado, become masters of all Greece. But if Philip could not be prevailed on to make war on the Romans, he was of opinion that the king should send his son Seleucus into Macedon at the head of an army, and thus prevent Philip from giving the Romans any assistance. But he still maintained, that the only way to defeat the Romans was to send an army into Italy. This advice was again rejected; and the king imprudently became the aggressor, by falling on a body of 500 Romans before war had been declared. He also made king Philip his enemy, by entertaining the regent of Atha-

Syria.

69

His conquests checked by the Romans.

99

Hannibal flies to him for protection.

100

Antiochus neglects the advice of Hannibal.

94
Is defeated by the Egyptians, but suppresses the rebellion.

95
His successes in the east.

96
Enters into a league with Philip of Macedon against the king of Egypt.

97
Destroys the Egyptian army.

manis,

Syria. 101
His shameful behaviour.

mania, who was a pretender to the crown of Macedonia. To complete all, he himself fell in love, tho' above 50 years of age, with a beautiful young woman of Chalcis, whom he married; and became to great a slave to this passion, that he entirely neglected his affairs; the army gave themselves up entirely to dissipation and debauchery, and every trace of military discipline evanished.

102
Is defeated by the Romans at Thermopylae.

In the year 191 B. C. Antiochus was raised from his lethargy by a declaration of war against him at Rome, and set out for Ætolia. His army at this time amounted to no more than 10,000 foot and 500 horse. He had been made to believe that he would receive a vast reinforcement in Ætolia: but when he came to make the experiment, he soon found his mistake; all the troops he could raise there amounted to no more than 4000 men. With this force, so exceedingly inadequate to the purpose, he was obliged to oppose the Roman army, who were advancing in conjunction with the Macedonians, and had already made surprising progress. Antiochus seized the Straits of Therinopylae; but was driven from them by the Romans, the king himself being the first that fled. Almost his whole army was destroyed in the battle or in the pursuit, and Antiochus returned with disgrace into Asia.

103
His fleet defeated by that of the Romans.

Soon after his return, Antiochus equipped a fleet of 200 sail; on which he immediately embarked for the Thracian Chersonesus, now Crim Tartary, where he fortified the cities of Lyfmachia, Sestus, and Abydos, with others in that neighbourhood, to prevent the Romans from crossing the Hellespont. In the mean time Polyxenas the Syrian admiral sent intelligence to the king that the Roman fleet had appeared off Delos; upon which he desired him to seek them out and engage them at all events. He did so, and was defeated with the loss of 40 ships taken or sunk in the engagement. This was soon after revenged by the destruction of the Rhodian fleet by the artifice of Polyxenas; but in the end the king's affairs went every where to wreck. Having laid siege to the city of Pergamus, he was obliged to raise it with loss; the Phœnician fleet commanded by Hannibal was defeated by the Rhodians; and soon after the Syrian fleet under Polyxenas was utterly defeated by the Romans. Antiochus was so much disheartened by these repeated defeats, that he appeared like one infatuated. Instead of fortifying more strongly those cities which lay on the frontiers of his kingdom, he entirely deserted them: and thus Lyfmachia and Abydos, the two keys to Asia, fell into the hands of the Romans without the least resistance.

104
Meets with two other defeats, and becomes like one infatuated.

The arrival of the Romans in Asia struck Antiochus with such terror, that he instantly sued for peace. The terms he offered were indeed very advantageous, but by no means agreeable to the expectations of the Romans. They therefore gave him this final answer: 1. That since he had drawn upon himself the war, he should defray the whole expense of it; 2. that he should restore liberty in general to all the Greek cities in Asia; and, 3. that to prevent future hostilities, he should relinquish all Asia on this side Mount Taurus. These terms, however, still appeared to him so intolerable, that he resolved to continue the war; and determined also to take the most imprudent me-

thod of carrying it on, namely, by hazarding all on the event of a general engagement. The king encamped near Magnesia, and strongly fortified his camp. The Romans insulted him in his trenches, and proposed to attack his fortifications if he continued to decline an engagement. At last the king, thinking it would be shameful for him longer to refuse an engagement, being at the head of an army far more numerous than that of the enemy, in a friend's country, and in the midst of his allies, resolved at all events to accept the challenge, and accordingly prepared for a decisive battle.

106
Battle of Magnesia.

The Roman army consisted of four legions, partly Romans and partly Latins, each legion at this time containing 5500 men, and of 7000 auxiliaries sent by the kings of Pergamus and Macedon; but of these 2000 were ordered to guard the camp during the action. The Romans were posted in the centre, and the Latins in the two wings, the left of which extended to the river. On the side of the right wing, to cover and support it, the consul posted the auxiliary troops of Eumenes, a small body of horse, and some Trallians and Cretans lightly armed. Sixteen elephants which the Romans had were placed behind the army by way of corps-de-reserve, the consul not thinking it proper to oppose them to those of the enemy, which were far more numerous, being in all 52, and besides excelled the Roman elephants in strength, height, and courage, the former being brought from India and the latter from Africa. As for the Syrian army, all the nations of the east seemed to be assembled to support the cause of Antiochus. But the main strength of it consisted in 16,000 foot, armed after the Macedonian manner, who composed the phalanx. This body faced every way, was armed with long pikes, and taught to fight in close order, as the soldiers of Alexander the Great had formerly been. Antiochus did not draw up his phalanx as usual, but divided it into 10 companies separated from each other, placing, in the spaces between each of the companies, an elephant loaded with a tower full of armed men. On the right of the phalanx was drawn up in a line part of the cavalry, viz. 1500 Asiatic Gauls, 3000 horse armed cap-a-pie, and 1000 more, the flower of the Median cavalry. At some distance from these followed the cavalry of the king's household richly clothed, and wearing bucklers plated over with silver. In the same line twelve hundred Scythians on horseback, armed with bows and arrows, made a great figure, being all chosen men, and of an extraordinary size. The light-armed troops, to the number of 3000, partly Trallians and partly Cretans, with 10,000 Myrian archers and 4000 men more, partly Cyrtæans armed with slings, partly Persians armed with bows, and partly Arabians mounted on dromedaries, closed the right wing, which was led on by the king in person, surrounded by a body of Syrians and Lydians well mounted, but not heavily armed. The left wing was commanded by Seleucus and Antipater; the former the king's son, and the latter his nephew, and disposed thus: Close to the phalanx were posted 1500 Galatians and 2000 Cappadocians, which king Ariarathes had sent to the assistance of his father-in-law. Next to these were placed 2700 auxiliaries sent from different countries; these

Syria.

these were followed by 3000 cuirassiers well mounted; and, lastly, in the flank of this wing marched 2000 horse lightly armed. At some distance were placed several small bodies of light-armed troops both foot and horse; among which were 2500 Galatian horse, some Tarentines, Cretans, Carians, Cilicians, &c. The phalanx, which was in the centre, was commanded by three officers of distinction, viz. Minio, Zeuxis, and Philip. A vast number of chariots, armed with hooks and scythes, were drawn up before the first line, as were likewise a great many elephants carrying towers with several floors, all filled with slingers and archers; besides many camels, animals then unknown to the Roman troops, mounted by Arabians armed with swords six feet long, that the riders might from their backs reach the enemy. The Romans had never seen a more numerous army, nor one more finely adorned; nevertheless they never showed so great a contempt for an army as for this which they were now going to attack.

On the day of the battle the weather proved very favourable to the Romans; for a thick fog rising in the morning, the day was almost turned into night, so that the Syrian commanders could not have all the corps under their command in view, on account of their great extent, nor send them proper orders in time; whereas the fog was not thick enough to prevent the Roman generals from seeing their several bodies at the greatest distance, as they took up but little ground. Besides, the damp which was occasioned by the fog slackened the strings of the enemy's bows, so that the Asiatics who used them could shoot their darts and arrows but faintly. The whole dependence of Antiochus in the first attack was on his armed chariots, which were to cut their way into the Roman army. For this purpose they had long halberds fastened to their poles, and sharp hooks to their axletrees; the former were about the height of a man's head, and the latter almost swept the ground, and cut off the legs of all who stood in their way. But Eumenes undertook to render them useless, and even fatal to the enemy. This brave prince, putting himself at the head of the bowmen and slingers, ordered them to charge, not in a body, but divided in platoons, and to aim only at the horses in the chariots. Accordingly, as soon as the chariots moved, Eumenes advanced at the head of his men, who pouring on them from every quarter, darts, stones, and javelins, and at the same time, shouting as loud as they could, so frightened the horses that they could no longer be kept in order, but, scouring up and down, and turning against their own troops, fell on the Arabians who supported them, which occasioned a great confusion in that quarter. Those in the Syrian army who were at a distance, hearing the noise and outcries, and not knowing the cause of them, were struck with no small terror. After this advantage, the Roman cavalry advanced, and fell on those whom the chariots had put in disorder. The Syrians being already intimidated, after a faint resistance, gave way; and the Romans made a great slaughter of their men and horses, both being borne down with the weight of their heavy armour. Eumenes charged the left wing, in which Seleucus commanded, with such vigour, that he put it to flight; and the fugitives flying to the phalanx for protection, put

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that body likewise in disorder: which Domitius observing, advanced against it at the head of his legions, but could not break it till he ordered his men to attack the elephants; which, as before observed, were placed in the spaces between the companies. The Romans had learnt, in their wars with Pyrrhus and Hannibal, not to fear those monsters which were once so terrible to them. They attacked them, therefore, with great resolution; and driving them against the phalangites, put that body into disorder, by means of those very animals which had been posted there for its defence.

But in the mean time advice was brought that the left-wing of the Romans was in great danger. Antiochus, who had observed that the flanks of the left-wing were quite open and uncovered, the four squadrons which covered it having joined the rest of the cavalry to fall upon the enemy's left-wing, had charged it at the head of all his auxiliaries, not only in front but in flank. The Roman infantry, seeing themselves in imminent danger of being surrounded and hemmed in on all sides, fled in great disorder to their camp, which was guarded by 2000 men under the command of a legionary tribune called *Emilius*. This man seeing the Romans flying towards him, marched out at the head of all his troops to meet them; and after having bitterly reproached them for their cowardice and ignominious flight, ordered his men to draw their swords, and cut in pieces such as should advance one step farther, or refuse to face about against the enemy. This order, given so seasonably, and put in execution without mercy against some, had the desired effect. Those who were flying first halted; and then, being both reinforced and encouraged by *Emilius*, returned under his conduct to wipe off the dishonour of their flight. At the same time *Antalus* the brother of *Eumenes*, having left the right-wing on his receiving advice that the left was in danger, arrived very seasonably with 200 horse. Antiochus observing that the troops which had fled were returning to the battle, and that the enemy's right-wing was ready to fall upon him, turned his horse about and fled. This served in a manner as a signal for the rest of the troops, for the whole Syrian army immediately turned their backs. Eumenes alone pursued them at the head of the cavalry, and made a most dreadful havoc of the fugitives. The Romans walking over heaps of dead bodies, especially where the phalanx stood, marched up to the Syrian camp, attacked, and plundered it. The riches they found in it are not to be defcribed: the taking of it cost the Romans a new battle, which proved more fatal to the Syrians than that in the field; for the Romans having, in spite of a most desperate resistance, forced the intrenchments, gave no quarter, but put all to the sword without distinction. There fell this day in the battle, in the pursuit, and in the plunder of the camp, 50,000 foot, and 4000 horse; 1500 were taken prisoners, and 15 elephants. In the consular army there were but 300 foot killed, and 25 horse. Eumenes had only 15 of his men killed; so that this victory, as we are told by the ancients, seemed a prodigy to all nations, both of the east and west.

Antiochus retired to Sardis with as many of his forces that had escaped the slaughter as he could draw

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together. From Sardis he soon marched to rejoin his son Seleucus, who had fled to Apamea. As for the consul, he took advantage of the king's defeat and flight, making himself master of all the neighbouring countries. Deputies hastened to him from all parts; the cities of Thyatira, Magnesia, Trallis, Magnesia in Caria, all Lydia, and Ephesus itself, though highly favoured by Antiochus, declared for the Romans. Polyxenidas, upon the news of the king's defeat, left the port of Ephesus, and sailed to Patara, where he landed with a very small guard, and returned by land into Syria. The consul took the road to Sardis, which opened its gates to him. As he stopped there, his brother Africanus, as soon as his health allowed him, came and joined him in that city, and congratulated him on the glory he had so lately acquired.

Antiochus finding his affairs in a bad situation both by sea and land, and not daring to appear before the consular army in the field, sent Antipater his brother's son, and Zeuxis, who had been governor of Lydia and Phrygia, to sue for a peace. They were ordered to treat chiefly with the elder brother, of whose clemency and good-nature Antiochus entertained a high opinion. Accordingly, on their arrival at Sardis, where the consul then was with his brother, they addressed the latter, and were by him presented to the consul. Their speech was very submissive, and such as became a vanquished people.

Hereupon a council was summoned, and after long debates the ambassadors were called in; and Scipio Africanus being desired by the consul to acquaint the deputies with the resolutions of the assembly, is said to have expressed himself in the following terms: "We are sensible that the victory which we have lately gained is owing to the gods, and therefore shall treat the vanquished with moderation, demanding little more of them now than we did at our first entering into Asia.

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Antiochus
obtains
peace on
very hard
terms.

Antiochus shall obtain a peace upon the following terms: That he give up his pretensions to Europe, confine his dominions to Asia beyond mount Taurus: and that he pay 15,000 Euboic talents for the expences of the war; 500 down, 2500 when the senate and people shall confirm the articles, and 1000 more every year for 12 years together. We also insist upon his satisfying king Eumenes, and his paying him the 400 talents he owes him, and what remains due for the corn which his father sent to the king of Syria. It is likewise the pleasure of the council that you deliver up to us Hannibal the Carthaginian, Thoas the Ætolian, Mnesiochus the Acarnanian, and Philo and Eubulus two Chalcidians; for these have been the authors of our divisions, the incendiaries who kindled the present war. Lastly, the king of Syria, for a further proof of his sincerity, shall give us 20 such hostages as we shall choose, of whom Antiochus his youngest son shall be one."

The ambassadors of Antiochus had been ordered to refuse no terms; and therefore these were accepted, and the whole affair concluded. So that the Syrian ambassadors now prepared to set out for Rome, to get the conditions of peace proposed by Scipio ratified there. In the mean time, the consul dividing his army into three bodies, put it into winter-quarters; one part continued at Magnesia, another was sent to Trallis, and the third to Ephesus, where the Scipios took

up their quarters. There they received a new embassy from Antiochus, with the hostages he had promised, the Roman prisoners and deserters, and the strangers which the consul had demanded, except Hannibal, who after the king's defeat had fled out of his dominions; and Thoas the Ætolian, who, as soon as he heard that a treaty was on foot between Antiochus and the Romans, had returned to Ætolia, where a war was likely to break out between that republic and Rome. L. Aurelius Cotta was sent with the ambassadors to Rome, to acquaint the senate with the particulars of the treaty. When they appeared before the conscript fathers, they spoke with great submission, and only desired them to ratify the articles which the Scipios had offered to their master. The senate, after examining them, ordered that a treaty of peace should be concluded with Antiochus, and the articles of it engraved on brass, and fixed up in the capitol. They only added one clause, which was, That the Syrians should change every year all their hostages, except the son of king Antiochus, who should continue at Rome as long as the republic thought fit. The peace being thus ratified, and all Asia on this side mount Taurus delivered into the hands of the Romans, the Greek cities were by them restored to their liberty, the provinces of Caria and Lydia given to the Rhodians, and all the rest that had belonged to Antiochus bestowed upon Eumenes.

Antiochus did not long survive his misfortune at his death. Magnesia. Some tell us, that being greatly puzzled how to raise the sum he had engaged to pay to the Romans, he seized on the riches which had for many ages been deposited in a temple of Jupiter Belus in the province of Elymais; upon which the populace rose in arms, and slew him and all his attendants. Others inform us, that he was killed at an entertainment by one of his guests.

Antiochus the Great died in 187, and with him the glory of the Syrian empire. The Romans now gave laws to the kings of Syria, inasmuch, that when Antiochus Epiphanes the grandson of Antiochus the Great hesitated at obeying the commands of the senate, one of the ambassadors drew a circle round him with a rod on the floor, and told him, that he should not go out of that spot before he had told him what he was to do. The most remarkable transactions of this prince are his wars with the Jews, and persecutions of them; of which a full account is given under the article Jews. After a variety of usurpers and tyrants, the kingdom of Syria fell under Tigranes king of Armenia in the year 83 B. C.; and upon his overthrow by the Romans, it became a province of the dominions of the republic. From them it was taken by the Saracens in the reign of the caliph Omar, and is now a province of Turkey in Asia.

Syria, in general, is blessed with a serene, temperate, and healthful air; being refreshed, during the hot sultry months of June, July, and August, by cool breezes from the Mediterranean. The face of the country is mostly level and delightful, and the soil naturally deep, rich, and fertile; so that it would produce in the greatest plenty, if cultivated, whatever could be wished for, either for the sustenance, pleasure, or convenience of the inhabitants; but, like all the other countries possessed by the Turks, a great part of

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comes a
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Climate,
soil, &c. of
the country.

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Syltem.

it lies waste and uncultivated. With the little culture bestowed upon it, it produces, in many places, abundance of corn, wine, oil, figs, lemons, oranges, melons, canes, dates, and cotton, with aromatic and medicinal herbs. In Syria also are bred great numbers of buffaloes and other oxen, camels, dromedaries, wild-boars, deer of all sorts, hares, rabbits, and other game; with a kind of goats whose hair is long and of a beautiful colour; and a breed of sheep, whose wool is very fine, and their tails so large that they sometimes weigh 30 pounds.

SYREN. See SIREN.

SYRINGA, LILAC, in botany, a genus of the monogynia order, belonging to the diandria class of plants. There are two species; both of them deciduous flowering shrubs, adorned with oval, heart-shaped, and spear-shaped simple leaves, and large bunches of odoriferous small funnel-shaped flowers, white, blue, and purple, in the different varieties. They are all hardy plants; and though natives of Persia, will bear the severest winters. They are easily propagated, by seed, suckers, or layers.

SYRINGE, a well-known instrument, serving to imbibe or force in a quantity of fluid, and to squirt or expel the same with violence. The word is formed from the Greek *συνεζ*, or the Latin *syrix*, "a pipe."—A syringe is only a single pump, and the water ascends in it on the same principle as in the common sucking pump. See HYDROSTATICS, n° 23, *et seq.*

SYRUP, in pharmacy, a saturated solution of sugar, made in vegetable decoctions or infusions. See PHARMACY, n° 480—500.

SYSTEM, in general, denotes an assemblage or

chain of principles and conclusions, or the whole of any doctrine, the several parts whereof are bound together, and follow or depend on each other; in which sense we say a *system of philosophy*, a *system of divinity*, &c.—The word is formed from the Greek *συστημα*, "composition, compages."

SYSTEM, in the animal œconomy, the *vascular*, the *nervous*, and the *cellular*. See ANATOMY.

SYSTEM, in music, an assemblage of the rules for harmony deduced from some common principle by which they are re-united; by which their connection one with another is formed; from whence, as from their genuine source, they natively flow; and to which, if we would account for them, we must have recourse. See the articles CHROMATIC, DIATONIC, ENHARMONIC, HARMONY, INTERVAL, and MUSIC.

SYSTEM, in botany. See BOTANY, Sect. ii. iii. iv.

SYSTEM, in astronomy. See ASTRONOMY, sect. iv.

SYSTOLE, in anatomy, the contraction of the heart, whereby the blood is drawn off its ventricles into the arteries; the opposite state to which is called the *diastole*, or *dilatation*, of the heart. See ANATOMY, n° 388.

SYSTYLE, in architecture, that manner of placing columns where the space between the two shafts consists of two diameters or four modules.

SYZYGY, SYZYGIA, in astronomy, a term equally used for the conjunction and opposition of a planet with the sun.—The word is formed from the Greek, *συσυγία*, which properly signifies "conjunction." On the phenomena and circumstances of the syzygies a great part of the lunar theory depends. See ASTRONOMY, n° 220.

T.

T, or t, the 19th letter and 15th consonant of our alphabet, the sound whereof is formed by a strong expulsion of the breath through the mouth, upon a sudden drawing back of the tongue from the fore-part of the palate, with the lips at the same time open. The proper sound of this letter is that in *tan*, *ten*, *tin*, *tun*, *fat*, *pot*, *put*, &c. When it comes before *i*, followed by a vowel, it is sounded like *s*, as in *nation*, *potion*, &c. When *h* comes after it, it has a two-fold sound; one clear and acute, as in *thin*, *thief*, &c.; the other more obtuse and obscure, as in *then*, *there*, &c.

In abbreviations, amongst the Roman writers, T. stands for *Titus*, *Titius*, &c.; Tab. for *Tabularius*; Tab. P. H. C. *Tabularius Provincia Hispanie Citerioris*; Tar. *Tarquinius*; Ti. *Tiberius*; Ti. F. *Tiberii filius*; Ti. L. *Tiberii libertus*; Ti. N. *Tiberii Nepos*; T. J. A. V. P. V. D. *tempore judicem arbitrumve posulat ad del*; T. M. P. *terminum posuit*; T. M. D. D. *terminum dedicavit*; Tr. *trans*, *tribunus*; Tr. M. or Mil. *tribunus militum*; TR. PL. DES. *tribunus plebis designatus*; TR. AER. *tribunus aerarii*; TRV.

CAP. *triumviri capitales*; T. P. or TRIB. POT. *tribunicia potestate*; Tul. H. *Tullus Hostilius*.

Amongst the ancients, T. as a numeral, stood for *one hundred and sixty*; and with a dash at top, thus T, it signified *one hundred and sixty thousand*. In music, T stands for *tutti*, "all, or altogether."

TABANUS, the BREEZE-FLY; a genus of insects belonging to the order of diptera. The most remarkable species is the *bovinus*. The head of this insect is grey; the eyes almost of a black brown, occupying the greatest part of it. The thorax is of a grey colour; the abdomen is yellowish, with a triangular white spot on the middle of every ring, which constitutes a longitudinal band of spots, the point of which is directed towards the thorax. The thighs are blackish, and the legs yellow. The wings are somewhat dusky, with brown veins of a deeper dye. This insect is the terror of horned cattle, horses, &c. Its mouth is armed with two sharp hooks which penetrate their hide; while with its proboscis, which is shaped like a ring, it sucks their blood, of which it is very fond. The puncture of the tabanus is keen and painful. The

System
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Syzygy.

insect is very common in damp woods and meadows, especially during the great heats, when it is most troublesome. The horned cattle are sometimes so molested by their stings, that they go mad, run down precipices, tear themselves on the stumps of trees, stones, &c.

TABBY, in commerce, a kind of rich silk which has undergone the operation of tabbying.

TABBYING, the passing a silk or stuff under a calender the rolls of which are made of iron or copper variously engraven, which bearing unequally on the stuff renders the surface thereof unequal, so as to reflect the rays of light differently, making the representation of waves thereon.

TABELLIO, in the Roman law, an officer or scrivener, much the same with our notaries-public, who are often called *tabelliones*.

TABERNACLE, among the Hebrews, a kind of building, in the form of a tent, set up, by express command of God, for the performance of religious worship, sacrifices, &c. during the journeying of the Israelites in the wilderness: and, after their settlement in the land of Canaan, made use of for the same purpose till the building of the temple of Jerusalem. It was divided into two parts; the one covered, and properly called the *tabernacle*; and the other open, called the *court*. The curtains which covered the tabernacle were made of linen, of several colours, embroidered. There were ten curtains, twenty-eight cubits long and four in breadth. Five curtains fastened together made up two coverings, which covered all the tabernacle. Over these there were two other coverings; the one of goat-hair, and the other of sheep-skins. The holy of holies was parted from the rest of the tabernacle by a curtain made fast to four pillars, standing ten cubits from the end. The length of the whole tabernacle was thirty-two cubits, that is, about fifty feet; and the breadth twelve cubits, or nineteen feet. The court was a spot of ground one hundred cubits long, and fifty in breadth, enclosed by twenty columns, each twenty cubits high and ten in breadth, covered with silver, and standing on copper bases, five cubits distant from one another; between which, there were curtains drawn, and fastened with hooks. At the east end was an entrance, twenty cubits wide, covered with a curtain hanging loose.

Feast of TABERNACLES, a solemn festival of the Hebrews, observed after harvest, on the fifteenth day of the month Tisri, instituted to commemorate the goodness of God, who protected the Israelites in the wilderness, and made them dwell in booths, when they came out of Egypt. On the first day of the feast, they began to erect booths of the boughs of trees, and in these they were obliged to continue seven days. The booths were placed in the open air, and were not to be covered with cloths, nor made too close by the thickness of the boughs; but so loose that the sun and the stars might be seen, and the rain descend through them. For further particulars as to the celebration of this festival, see *Levit. ch. xxiii.*

TABERNÆ, (anc. geog.) See *TRES TABERNÆ*.

TABLE, a moveable piece of furniture, usually made of wood or stone, and supported on pillars or the like, for the commodious reception of things placed thereon.

TABLE is also used for the fare or entertainment served up.

TABLE, in mathematics, systems of numbers calculated to be ready at hand for the expediting astronomical, geometrical, and other operations.

Astronomical TABLES, are computations of the motions, places, and other phenomena of the planets, both primary and secondary. See *ASTRONOMY*.

TABLE-Mountain, a mountain of Africa, being the most westerly cape or promontory in that part of the world, and near the Cape of Good Hope. The bay which is formed thereby is called the *Table bay*.

Laws of the Twelve TABLES, were the first set of laws of the Romans: thus called either by reason the Romans then wrote with a style on thin wooden tablets covered with wax; or rather, because they were engraven on tables or plates of copper, to be exposed in the most noted part of the public forum. After the expulsion of the kings, as the Romans were then without any fixed or certain system of law, at least had none ample enough to take in the various cases that might fall between particular persons, it was resolved to adopt the best and wisest laws of the Greeks. One Hermodorus was first appointed to translate them, and the decemviri afterwards compiled and reduced them into ten tables. After a world of care and application, they were at length enacted and confirmed by the senate and an assembly of the people, in the year of Rome 303. The following year they found something wanting therein, which they supplied from the laws of the former kings of Rome, and from certain customs which long use had authorized: all these being engraven on two other tables made the law of the twelve tables, so famous in the Roman jurisprudence, the source and foundation of the civil or Roman law.

TABLES of the Law, in Jewish antiquity, two tables on which were written the decalogue, or ten commandments, given by God to Moses on Mount Sinai.

TABOR (MOUNT). See *THABOR*.

TACAMAHACA, in pharmacy, a solid resin, improperly called a *gum* in the shops. It exsudes from a species of poplar; and is in repute for mitigating pain and aches, and as a vulnerary.

TACITUS (Caius Cornelius), a celebrated Roman historian, and one of the greatest men of his time, was raised for his merit to the first posts in the empire. Vespasian and Titus gave him considerable employments; he became prætor under Domitian, and two years after was made consul in the room of Virginus Rufus in the year 97. But these dignities gave him but a small share of glory, compared with that he obtained by the labour of his pen. There are still extant, 1. Five books of his history. 2. His Annals. 3. A Treatise on the different nations which in his time inhabited Germany: and, 4. The Life of Agricola his father-in-law. There is also attributed to him a Treatise on Eloquence, which is more generally allowed to have been written by Quintilian. Tacitus's other works are lost. Pliny the Younger, who was his friend, and the learned since his time, give the works of Tacitus the highest praises.

TACK, a rope used to confine the foremost lower-corners of the courses and stay-sails in a fixed position, when

Tack.

when the wind crosses the ship's course obliquely. The same name is also given to the rope employed to pull out the lower corner of a fludding-fail or driver to the extremity of its boom.

The main-fail and fore-fail of a ship are furnished with a tack on each side, which is formed of a thick rope tapering to the end, and having a knot wrought upon the largest end, by which it is firmly retained in the clue of the fail. By this means one tack is always fastened to windward, at the same time that the fleet extends the fail to the leeward. See *CHESTREE*.

TACK, is also applied, by analogy, to that part of any sail to which the tack is usually fastened.

A ship is said to be on the starboard or larboard tack, when she is close-hauled, with the wind upon the starboard or larboard side: and in this sense the distance which she sails in that position is considered as the length of the tack; although this is more frequently called *board*. See that article.

To *TACK*, to change the course from one board to another, or turn the ship about from the starboard to the larboard tack, in a contrary wind. Thus the ship *A*, being close-hauled on the larboard tack, and turning her prow suddenly to windward, receives the impression of the wind on her head-fails *a*, by which the sails off upon the line of the starboard-tack *a*. Tacking is also used in a more enlarged sense, to imply that manœuvre in navigation by which a ship makes an oblique progression to the windward, in a zigzag direction. This, however, is more usually called *heaving*, or *turning to windward*.

Thus, suppose the ship *A* bound to a port *B* lying to windward, with the wind northerly, as expressed by the arrow. The sails *a*, *b*, *c*, being braced obliquely with the keel, the wind also falls upon their surfaces in an oblique direction, by which the ship is pushed to leeward, as explained in the article *LEE-way*. Hence, although the apparently sails *W*. *N*. *W*. upon the larboard-tack, as expressed in the dotted line *Ad*, and *E*. *N*. *E*. upon the other *df*, yet if the lee-way is only one point, (and indeed it is seldom less in the smoothest water), the course will accordingly be *W*. by *N*. upon one tack, and *E*. by *N*. upon the other, as represented by the lines *Ae*, and *eg*.

If the port *A* were directly to windward of the ship, it is evident that both tacks ought to be of equal length; or, in other words, that the ought to run the same distance upon each tack: but as the place of her destination lies obliquely to windward, she must run a greater distance upon one tack than the other; because the extremities of both boards should be equally distant from the line of her true course *BA*; so the larboard tack *Ae*, crossing the course more obliquely than the other *eg*, will necessarily be much longer.

As the true course, or the direct distance from *B* to *A* is only 12 leagues, it is evident that with a favourable wind she could reach it in a few hours. On the contrary, her distance is considerably increased by the length of her boards, in a contrary wind; which, by its obliquity with her sails, operates also to retard her velocity. Thus her first board *Ae*, on a *W*. by *N*. course, is equal to 5.7 leagues. The second tack *eg* is 9.2 leagues *E* by *N*. the third tack, parallel to *Ae*, is 11.5: the fourth, parallel to *eg*,

is 9.2: and the fifth, parallel to the first, 11.7 leagues. Finally, the sixth board is 4.8 leagues parallel to the second, which brings her to the port *B*. By this scheme it appears that she has run more than four times the extent of the line *AB*, her primitive distance; and this is the most favourable circumstances of a contrary wind, viz. when the sea is smooth, and when she may carry her full topails. For if the wind blows stronger, to render it necessary to reef the topails, she will soon make two points of lee-way, and accordingly run east on one board and west on the other. In this situation she will neither approach nor recede from the place of her destination: but if the wind increases, the sea will also be enlarged; a circumstance that still farther augments the lee-way. Hence the vessel will gradually fall off from the port, in proportion to the augmentation of the wind and sea, which occasions a proportional increase of lee-way.

In order to explain the theory of tacking a ship, it may be necessary to premise a known axiom in natural philosophy, That every body will persevere in a state of rest, or of moving uniformly in a right line, unless it be compelled to change its state by forces impressed; and that the change of motion is proportional to the moving force impressed, and is made according to the right line in which that force is exerted.

By this principle it is easy to conceive how a ship is compelled to turn into any direction, by the force of the wind acting upon her sails in horizontal lines. For the sails may be so arranged as to receive the current of air either directly or more or less obliquely. Hence the motion communicated to the sails must of necessity conspire with that of the wind upon their surfaces. To make the ship tack or turn round with her head to the windward, it is therefore necessary, after she has received the first impression from the helm, that the head-fails should be so disposed as to diminish the effort of the wind in the first instant of her motion; and that the whole force of the wind should be exerted on the after-fails; which, operating on the ship's stern, carries it round like a weathercock. But since the action of the after-fails to turn the ship will unavoidably cease when her head points to the windward, it then becomes necessary to use the head-fails, to prevent her from falling-off and returning to her former situation. These are accordingly laid aback on the lee-side, to push the vessel's fore part towards the opposite side, till the has fallen into the line of her course thereon, and fixed her sails to conform with that situation.

It has been observed above, that the first effort to turn the ship in tacking is communicated by the helm, which is then put to the lee-side. This circumstance being announced by the pilot or commanding officer, who then calls out *Helm's a-lee!* the head-fails are immediately made to shiver in the wind, by casting loose their sheets or bowlines. The pilot then calls, *Up tacks and sheets!* which is executed by loosening all the ropes which confine the corners of the lower sails, in order that they may be more readily shifted to the other side. When the ship has turned her head directly to windward, as in *d*, the pilot gives the order to turn about the sails on the main and mizen masts, by the exclamation, *Haul main-fail, haul!* the bowlines.

Tack.

Tack
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Tania.

bowlines and braces are then instantly cast off on one side, and as expeditiously drawn in on the other side, so as to wheel the yards about their masts. The lower corner of the main-sail is, by means of its tack, pulled down to its station at the clewree; and all the after-sails are at the same time adjusted to stand upon the other board. Finally, when the ship has fallen off five or six points, the pilot cries, *Haul off all!* or, *Let go, and haul!* then the sails on the fore-mast are wheeled about by their braces; and as the ship has then a tendency to fall off, she is checked by the effort of the helm; which for that purpose is put hard a-lee. The fore-tack, or the lower corner of the fore-sail, being fixed in its place, the bowlines are hauled; and the other sails, which have been neglected in the hurry of tacking, are properly arranged to the wind; which exercise is called *trimming the sails*. See *LEE-WAY*, and *SAILING*.

TACK, in Scots law. See *LAW*, N° clxvii. 8—15.

TACKLE, among seamen, denotes all the ropes or cordage of a ship used in managing the sails, &c.

TACTICS, in the art of war, is the method of disposing forces to the best advantage in order of battle, and of performing the several military motions and evolutions.

TADCASTER, a town in the West Riding of Yorkshire, noted for the great plenty of limestone dug up near it. W. Long. 1. 5. N. Lat. 53. 52.

TADPOLE, a young frog before it has disengaged itself from the membranes that envelope it in its first stage of life.

TENIA, in zoology; a genus of insects, belonging to the order of vermes zoophyta. The body is of an oblong form; and composed of evident joints or articulations, in the manner of the links of a chain, with a mouth and viscera in each joint. See *PLATE* CLXXXII.

1. The lata, long tape-worm, or solitary worm, infests the intestines of man and some other classes of animals, and seems to derive its nourishment from the chyle that is prepared in the stomach.—This worm is long and flat, composed of many very short rings that are articulated to each other, and has a kind of vein running through its whole length, which is more or less apparent.—This has occasioned the Germans to give it the name of *flat spinous worm*. It is not always of the same complexion; sometimes it appears of a blueish or reddish, and sometimes simply of a white colour; now and then it manifests itself only by a spot, which is to be perceived in the middle of each ring. In some of these worms this spot is of a blackish colour, in others of a colour more tending to white; and it rises into a very small prominence on each side, that is not easily apparent, however, to the naked eye. The tail or posterior end has never been capable of examination hitherto, because the worm breaks, and the patients void portions of it occasionally, either naturally or by the means of various remedies. Its body, which is usually several ells in length, and flattened like a ribbon, becomes gradually narrow towards its upper extremity, and at length terminates in a small thread-like appearance, of a foot or more in length. The point, which to the naked eye appears very minute, when examined by the lens, seems somewhat bulbous; and when viewed through a microscope that magnifies

Simmons's
Account of
the Tenia.

powerfully, is found to be the head of the worm, and is terminated by four horns of unequal length, which are perhaps the channels through which the animal derives its nourishment. The body of the worm extends itself throughout the whole intestinal canal, and often reaches even to the anus. It has been named *solitary worm*, because there commonly exists only one in the same subject: sometimes, however, two of them are found together; and sometimes, after the expulsion of the first, there regenerates a second. It is by no means easy to remove this worm: the purgative vermifuge remedies commonly used in phycic bring away portions of it, which we are always obliged to break, in order to separate them from those which remain behind; it seldom happens that they effect a complete cure.

2. The solium, or gourd-worm, resembles the former in many particulars, and is equally met with in the intestines of animals. It will be distinguished from the preceding one, by having neither the appearance of a head nor of a longitudinal vein: its rings are much longer than those of the solitary worm, and are striated through their whole length, being furnished only with a little lateral prominence. These rings are easily detached from each other, so that they appear as so many distinct worms, which have each of them life and motion independent as it were of the rest. The form of these rings, when viewed together, varies considerably. Those of the upper extremity are much more complete, short, narrow, and thin, than those lower down; the rings gradually becoming longer as they approach the lower end. These rings are in shape not unlike the seeds of gourd, and hence the name *gourd-worm*. Like the other, it is several ells in length, and is never voided whole, but by detached portions which fall off themselves.

For the methods of destroying and expelling these worms, see *MEDICINE*, N° 493.

TAFFETY, in commerce, a fine smooth silken stuff, remarkably glossy. See *SILK*. There are tafeties of all colours, some plain, and others striped with gold, silver, &c. others chequered, others flowered, &c. according to the fancy of the workmen.

TAGUS, the largest river of Spain; which, taking its rise on the confines of Arragon, runs south-west through the provinces of New Castile and Extremadura; and passing by the cities of Aranjuez, Toledo, and Alcantara, and then crossing Portugal, forms the harbour of Lisbon, at which city it is about three miles over; and about eight or ten miles below this it falls into the Atlantic ocean.

TAHEITEE. See *O-TAHEITEE*.

TAJACU, or PECCARY, in zoology, a species of hog. See *SUS*.

TAIL, the train of a beast, bird, or fish; which in land-animals serves to drive away flies, &c. and in birds and fishes to direct their course, and assist them in ascending or descending in the air or water.

TAIL, or *Fee-tail*, in law, is a conditional estate or fee, opposed to *fee-simple*. See *SEE*.

A conditional fee, at the common law, was a fee restrained to some particular heirs exclusive of others: as to the heirs of a man's body, by which only his lineal descendants were admitted, in exclusion of collateral heirs; or to the heirs-male of his body,

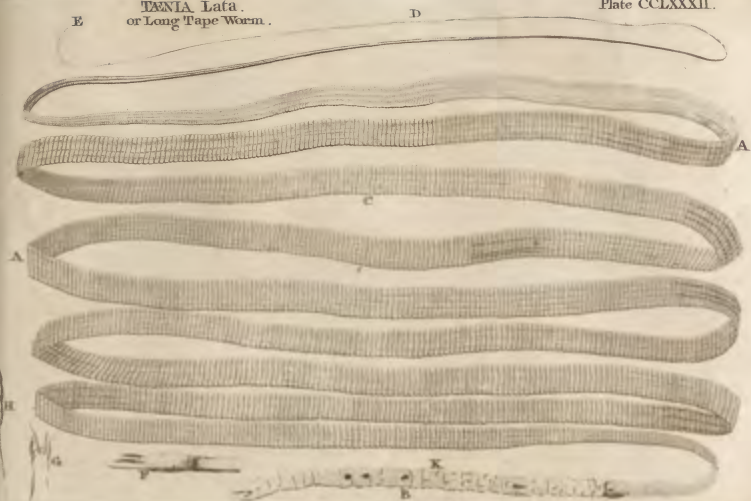
Tania
||
Tail.

TENIA Lata.
or Long Tape Worm.

Plate CCLXXXII.

E

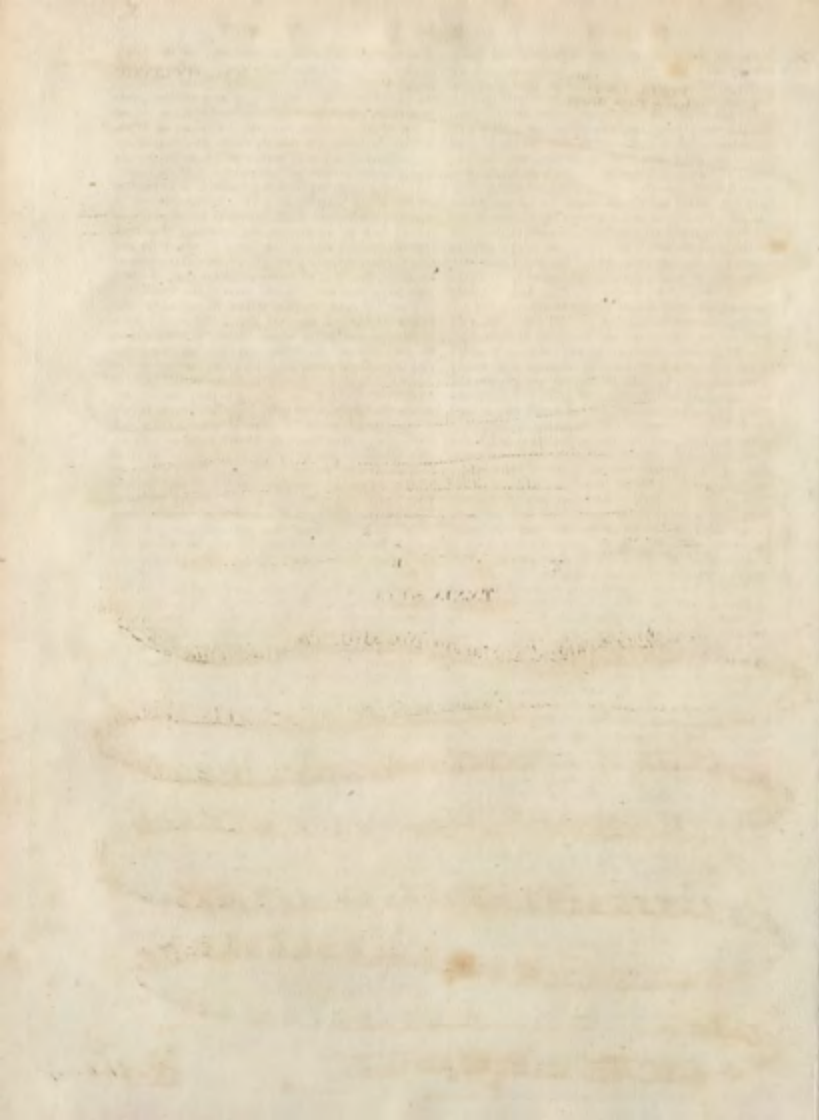
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TENIA Solium.



A. of Bell's shape.



body, in exclusion both of collaterals and lineal females also. It was called a *conditional fee*, by reason of the condition expressed or implied in the donation of it, that if the donee died without such particular heirs, the land should revert to the donor. For this was a condition annexed by law to all grants whatsoever, that on failure of the heirs specified in the grant, the grant should be at an end, and the land return to its ancient proprietor. Such conditional fees were strictly agreeable to the nature of feuds, when they first ceased to be mere estates for life, and were not yet arrived to be absolute estates in fee-simple.

With regard to the condition annexed to these fees by the common law, it was held, that such a gift (to a man and the heirs of his body) was a gift upon condition that it should revert to the donor if the donee had no heirs of his body; but if he had, it should then remain to the donee. They therefore called it a *fee-simple* on condition that he had issue. Now we must observe, that when any condition is performed, it is thenceforth entirely gone; and the thing to which it was before annexed becomes absolute and wholly unconditional. So that as soon as the grantee had any issue born, his estate was supposed to become absolute by the performance of the condition; at least for these three purposes: 1. To enable the tenant to alienate the land, and thereby to bar not only his own issue, but also the donor, of his interest in the reversion. 2. To subject him to forfeit it for treason: which he could not do till issue born longer than for his own life, lest thereby the inheritance of the issue and reversion of the donor might have been defeated. 3. To empower him to charge the land with rents, commons, and certain other encumbrances, so as to bind his issue. And this was thought the more reasonable, because, by the birth of issue, the possibility of the donor's reversion was rendered more distant and precarious: and his interest seems to have been the only one which the law, as it then stood, was solicitous to protect; without much regard to the right of succession intended to be vested in the issue. However, if the tenant did not in fact alienate the land, the course of descent was not altered by this performance of the condition: for if the issue had afterwards died, and then the tenant or original grantee had died, without making any alienation, the land, by the terms of the donation, could descend to none but the heirs of his body; and therefore, in default of them, must have reverted to the donor. For which reason, in order to subject the lands to the ordinary course of descent, the donees of these conditional fee-simples took care to alienate as soon as they had performed the condition by having issue; and afterwards repurchased the lands, which gave them a fee-simple absolute, that would descend to the heirs general, according to the course of the common law. And thus stood the old law with regard to conditional fees: which things, says Sir Edward Coke, though they seem ancient, are yet necessary to be known, as well for the declaring how the common law stood in such cases, as for the sake of annuities, and such-like inheritances, as are not within the statutes of entail, and therefore remain as the common law. The inconveniences which attended these limited and fettered inheritances were probably

what induced the judges to give way to this subtle finess (for such it undoubtedly was), in order to shorten the duration of these conditional estates. But, on the other hand, the nobility, who were willing to perpetuate their possessions in their own families, to put a stop to this practice, procured the statute of Westminster the second (commonly called the statute *de donis conditionalibus*) to be made; which paid a greater regard to the private will and intentions of the donor, than to the propriety of such intentions, or any public considerations whatsoever. This statute revived in some sort the ancient feudal restraints which were originally laid on alienations, by enacting, that from thenceforth the will of the donor be observed; and that the tenements so given (to a man and the heirs of his body) should at all events go to the issue, if there were any; or if none, should revert to the donor.

Upon the construction of this act of parliament, the judges determined that the donee had no longer a conditional fee-simple, which became absolute and at his own disposal the instant any issue was born; but they divided the estate into two parts, leaving in the donee a new kind of particular estate, which they denominated a *fee-tail*; and vesting in the donor the ultimate fee-simple of the land, expectant on the failure of issue; which expectant estate is what we now call a *reversion*. And hence it is that Littleton tells us, that tenant in fee-tail is by virtue of the statute of Westminster the second. The expression *fee-tail*, or *feodum talliatum*, was borrowed from the feudists (See Crag. *l. s. t. 10. § 24, 25.*) among whom it signified any mutilated or truncated inheritance, from which the heirs-general were cut off; being derived from the barbarous verb *taliare*, to cut; from which the French *tailler* and the Italian *tagliare* are formed, (Spelm. *Gloss. 531.*)

Having thus shown the original of estates-tail, we now proceed to consider what things may or may not be entailed under the statute *de donis*. Tenements is the only word used in the statute: and this Sir Edward Coke expounds to comprehend all corporeal hereditaments whatsoever; and also all incorporeal hereditaments which favour of the realty, that is, which issue out of corporeal ones, or which concern or are annexed to or may be exercised within the same; as rents, estates, commons, and the like. Also offices and dignities, which concern lands, or have relation to fixed and certain places, may be entailed. But mere personal chattels, which favour not at all of the realty, cannot be entailed. Neither can an office, which merely relates to such personal chattels; nor an annuity, which charges only the person, and not the lands of the grantor. But in these last, if granted to a man and the heirs of his body, the grantee hath still a fee conditional at common law as before the statute, and by his alienation may bar the heir or reversioner. An estate to a man and his heirs for another's life cannot be entailed; for this is strictly no estate of inheritance, and therefore not within the statute *de donis*. Neither can a copyhold estate be entailed by virtue of the statute; for that would tend to encroach upon and restrain the will of the lord: but, by the special custom of the manor, a copyhold may be limited to the heirs of the body;

body; for here the custom ascertains and interprets the lord's will.

As to the several species of estates-tail, and how they are respectively created; they are either general or special. Tail-general is where lands and tenements are given to one, and the heirs of his body begotten: which is called *tail-general*; because, how often soever such donee in tail be married, his issue in general, by all and every such marriage, is, in successive order, capable of inheriting the estate-tail *per formam doni*. Tenant in *tail-special* is where the gift is restrained to certain heirs of the donee's body, and does not go to all of them in general. And this may happen several ways. We shall instance in only one; as where lands and tenements are given to a man and the heirs of his body, on Mary his now wife to be begotten. Here no issue can inherit but such special issue as is engendered between them two; not such as the husband may have by another wife; and therefore it is called *special tail*. And here we may observe, that the words of inheritance (to him and his heirs) give him an estate in fee; but they being heirs to be by him begotten, this makes it a fee-tail; and the person being also limited, on whom such heirs shall be begotten (*viz.* Mary his present wife), this makes it a fee-tail special.

Estates in general and special tail are farther diversified by the distinction of sexes in such entails; for both of them may either be in tail male or tail female. As if lands be given to a man, and his heirs-male of his body begotten, this is an estate in tail male general; but if to a man, and the heirs-female of his body on his present wife begotten, this is an estate in tail female special. And in case of an entail male, the heirs-female shall never inherit, nor any derived from them; nor, *e converso*, the heirs-male in case of a gift in tail female. Thus, if the donee in tail male hath a daughter, who dies leaving a son, such grandson in this case cannot inherit the estate-tail; for he cannot deduce his descent wholly by heirs-male. And as the heir-male must convey his descent wholly by males, so must the heir-female wholly by females. And therefore if a man hath two estates-tail, the one in tail male the other in tail female, and he hath issue a daughter, which daughter hath issue a son; this grandson can succeed to neither of the estates, for he cannot convey his descent wholly either in the male or female line.

As the word *heirs* is necessary to create a fee, so, in farther imitation of the strictness of the feudal donation, the word *body*, or some other words of procreation, are necessary to make it a fee-tail, and ascertain to what heirs in particular the fee is limited. If, therefore, either the words of inheritance or words of procreation be omitted, albeit the others are inserted in the grant, this will not make an estate tail. As if the grant be to a man and the issue of his body, to a man and his seed, to a man and his children or offspring; all these are only estates for life, there wanting the words of inheritance, "his heirs." So, on the other hand, a gift to a man, and his heirs male or female, is an estate in fee-simple and not in fee-tail; for there are no words to ascertain the body out of which they shall issue. Indeed, in last wills and testaments, wherein greater indulgence is allowed, an

estate-tail may be created by a devise to a man and his seed, or to a man and his heirs-male, or by other irregular modes of expression.

There is still another species of entailed estates, now indeed grown out of use, yet still capable of subsisting in law; which are estates in *libero maritagio*, or FRANKMARRIAGE. See that article.

The incidents to a tenancy in tail, under the statute Westminster 2. are chiefly these: 1. That a tenant in tail may commit waste on the estate tail, by selling timber, pulling down houses, or the like, without being impeached or called to account for the same. 2. That the wife of the tenant in tail shall have her dower, or thirds, of the estate-tail. 3. That the husband of a female tenant in tail may be tenant by the curtesy of the estate-tail. 4. That an estate-tail may be barred, or destroyed, by a fine, by a common recovery, or by lineal warranty descending with assets to the heir.

Thus much for the nature of estates-tail: the establishment of which family-law (as it is properly styled by Pigott) occasioned infinite difficulties and disputes. Children grew disobedient when they knew they could not be set aside: farmers were ousted of their leases made by tenants in tail; for if such leases had been valid, then, under colour of long leases, the issue might have been virtually disinherited: creditors were defrauded of their debts; for, if tenant in tail could have charged his estate with their payment, he might also have defeated his issue, by mortgaging it for as much as it was worth: innumerable latent entails were produced to deprive purchasers of the lands they had fairly bought; of suits in consequence of which, our ancient books are full: and treasons were encouraged, as estates-tail were not liable to forfeiture longer than for the tenant's life. So that they were justly branded as the source of new contentions and mischiefs unknown to the common law; and almost universally considered as the common grievance of the realm. But as the nobility were always fond of this statute, because it preserved their family-estates from forfeiture, there was little hope of procuring a repeal by the legislature; and therefore, by the connivance of an active and politic prince, a method was devised to evade it.

About 200 years intervened between the making of the statute *de donis*, and the application of common recoveries to this intent, in the 12th year of Edward IV.; which were then openly declared by the judges to be a sufficient bar of an estate-tail. For though the courts had, so long before as the reign of Edward III. very frequently hinted their opinion that a bar might be effected upon these principles, yet it never was carried into execution; till Edward IV. observing (in the disputes between the houses of York and Lancaster) how little effect attainders for treason had on families whose estates were protected by the sanctuary of entails, gave his countenance to this proceeding, and suffered Taltarum's case to be brought before the court: wherein, in consequence of the principles then laid down, it was in effect determined, that a common recovery suffered by tenant in tail should be an effectual destruction thereof. These common recoveries are fictitious proceedings, introduced by a kind of *pia fraud*, to elude the statute *de donis*, which

which was found so intolerably mischievous, and which yet one branch of the legislature would not then consent to repeal : and that these recoveries, however clandestinely begun, are now become by long use and acquiescence a most common assurance of lands ; and are looked upon as the legal mode of conveyance, by which tenant in tail may dispose of his lands and tenements : so that no court will suffer them to be shaken or reflected on, and even acts of parliament have by a side-wind countenanced and established them.

This expedient having greatly abridged estates-tail with regard to their duration, others were soon invented to strip them of other privileges. The next that was attacked was their freedom from forfeitures for treason. For, notwithstanding the large advances made by recoveries, in the compass of about three-score years, towards unfettering these inheritances, and thereby subjecting the lands to forfeiture, the rapacious prince then reigning, finding them frequently re-settled in a similar manner to suit the convenience of families, had address enough to procure a statute, whereby all estates of inheritance (under which general words estates-tail were covertly included) are declared to be forfeited to the king upon any conviction of high-treason.

The next attack which they suffered, in order of time, was by the statute 32 Hen. VIII. c. 28. whereby certain leases made by tenants in tail, which do not tend to the prejudice of the issue, were allowed to be good in law, and to bind the issue in tail. But they received a more violent blow in the same session of parliament, by the construction put upon the statute of fines, by the statute 32 Hen. VIII. c. 36. which declares a fine duly levied by tenant in tail to be a complete bar to him and his heirs, and all other persons claiming under such entail. This was evidently agreeable to the intention of Henry VII. whose policy it was (before common recoveries had obtained their full strength and authority) to lay the road as open as possible to the alienation of landed property, in order to weaken the overgrown power of his nobles. But as they, from the opposite reasons, were not easily brought to consent to such a provision, it was therefore couched, in his act, under covert and obscure expressions. And the judges, though willing to construe that statute as favourably as possible for the defeating of entailed estates, yet hesitated at giving fines so extensive a power by mere implication, when the statute *de donis* had expressly declared that they should not be a bar to estates-tail. But the statute of Henry VIII. when the doctrine of alienation was better received, and the will of the prince more implicitly obeyed than before, avowed and established that intention. Yet, in order to preserve the property of the crown from any danger of infringement, all estates-tail created by the crown, and of which the crown has the reversion, are excepted out of this statute. And the same was done with regard to common recoveries, by the statute 34 and 35 Hen. VIII. c. 20. which enacts, that no feigned recovery had against tenants in tail, where the estate was created by the crown, and the remainder or reversion continues still in the crown, shall be of any force and effect. Which is allowing, indirectly and collaterally, their full force and effect with respect to ordi-

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nary estates-tail, where the royal prerogative is not concerned.

Lastly, by a statute of the succeeding year, all estates-tail are rendered liable to be charged for payment of debts due to the king by record or special contract ; as since, by the bankrupt-laws, they are also subjected to be held for the debts contracted by a bankrupt. And, by the construction put on the statute 43 Eliz. c. 4. an appointment by tenant in tail of the lands entailed to a charitable use, is good without fine or recovery.

Estates-tail being thus by degrees unfettered, are now reduced again to almost the same state, even before issue born, as conditional fees were in at common law, after the condition was performed by the birth of issue. For, first, the tenant in tail is now enabled to alienate his lands and tenements by fine, by recovery, or by certain other means ; and thereby to defeat the interest as well of his own issue, though unborn, as also of the reversioner, except in the case of the crown : secondly, he is now liable to forfeit them for high treason : and, lastly, he may charge them with reasonable leases, and also with such of his debts as are due to the crown on specialties, or have been contracted with his fellow-subjects in a course of extensive commerce.

TAILZIE, in Scots law, the same with TAIL. See LAW, N° clxxx. g.

TALC, a class of fossil bodies, composed of broad, flat, and smooth laminæ, or plates, laid evenly and regularly on one another ; easily fissile according to the site of these plates, but not at all so in any other direction ; flexible and elastic, bright, shining, and transparent ; not giving fire with steel, nor fermenting with acid menstrua ; and sustaining the force of a violent fire without calcining.

Venice talc is a soft smooth concrete, unctuous or spongy to the touch, of a whitish or pale-greenish colour, with a silver-like lustre, generally found in small pieces. It may be split into numerous fine plates or leaves ; which, singly, prove somewhat flexible and elastic, and perfectly pellucid, though the entire mass is commonly opaque, or at most only semitransparent. The smallest pieces are to be preferred ; the larger, however white and apparently pure on the outside, being apt to have specks or veins of heterogeneous matter in the internal part. This mineral has received the epithet *Venetian*, not from its being originally the product of Venice, but probably from that city having formerly been a principal mart for it. Though it may perhaps be met with in some parts of the Venetian dominions, it is more common in other countries ; in Muscovy, England, Norway, Hungary, Bohemia, Spain, and the Eastern nations.

Mr Newman examined talc with all the mineral acids, and with alkaline lixivia, which some report to have a greater action on it ; but without finding that either of them had any action at all ; the talc remaining undiminished in weight, and neither the talc or the liquors suffering any sensible alteration. He calcined it also with sulphur and common salt, with nitre, with sal ammoniac ; without any other effect than a little change in its colour. On trying to melt it with twice its weight of borax, the talc fell to the bottom as soon as the borax came into fusion. Alkaline salts,

Talc,
Talent.

and caustic alkalis taken in four times the weight of the talc, succeeded no better; this refractory earth refusing to unite with them: the salts being afterwards deliquescent in the air, the addition of acids occasioned no precipitation, which they must have done if the alkalis had taken up in fusion any part of the talc.

Here Dr Lewis observes, that Newman seems to have failed in these experiments from using too large a proportion of the salts and too weak a heat. Venice talc, with half its weight of alkaline salt, may, in a strong fire, be brought into perfect fusion, though not to perfect transparency: with equal its weight, or less, of borax, it runs into a beautiful, pellucid, greenish yellow glass. Talc does not melt with any other earth, nor even bake or cohere with any but the argillaceous: Mixtures of it with them all are nevertheless brought into fusion by a remarkably less quantity of saline matter than the ingredients separately would require. Thus equal parts of talc and chalk, with only one-fourth their weight of borax, melt in no very vehement heat, into a fine transparent greenish glass, of considerable hardness and great lustre. On substituting gyffeous earths, as the lapis specularis, to chalk, the fusion was as easy, and the glass as beautiful; in colour not green, but yellow, like the topaz. Talc, with half its weight of sand, and a quantity of nitre equal to both, yielded also a transparent topaz-yellow glass. Several further experiments on talc may be seen in a Memoir by Mr Pott in the Mem. de l'Acad. de Berlin, 1746.

Talc is employed, in those places where it is found in any considerable quantity, in compositions for earthen vessels; and by some for tests and cupels. From its smoothness, unctuousity, and brightness, it has been greatly celebrated as a cosmetic; and the chemists have submitted it to a variety of operations, for procuring from it oils, salts, tinctures, magisteries, &c. for that intention. But all their labours have been in vain; and all the preparations sold under the name of *talc* have either contained nothing of that mineral, or only a fine powder of it.

The pulverization of this mineral is attended with some difficulty. The more brittle pieces may be pulverized pretty easily; but the very tough and flexible scarce at all; nor is heating the mortar and pestle red-hot, which some recommend, of any advantage. The most commodious method of reducing it into fine powder, is, by cautiously filing or grating it with a fish-skin.

Besides the white and greenish talcs treated of, there are yellow, red, and black foliaceous concretes, distinguished by the same name; but these are in general rather of the gyffeous than talcy kind. Thus the black talc mentioned by Hoffman, which laid on burning coals falls into leaves and acquires a golden colour, seems to be a species of lapis specularis. Those of a yellow colour have been called *solar talcs*, and imagined to be impregnated with a sulphur of gold; which some of the chemists have pretended to extract by spirit of salt or aqua regis. But the yellow tincture which these minerals communicate, and the red sublimate which arises on distilling the solutions, proceed entirely from a ferruginous matter, common to these with other coloured earths.

TALENT, a money of account among the ancients.

See COIN, and MONEY.—Among the Jews a talent in weight was equal to 60 maneh, or 113 lb. 10 oz. 1 dwt. and 10½ grains.

TALIACOTIUS (Gasper), chief surgeon to the great duke of Tuscany, was born at Bononia in Italy in 1553. He wrote a Latin treatise intitled *Chirurgia nota de curis membris*, in which he teaches the art of engraving noses, ears, lips, &c. giving representations of the instruments and proper bandages; tho' many are of opinion that he never put his art in practice. However, his doctrine is not singular; for he shows that Alexander Benedictus, a famous chirurgical writer, described the operation before.

TALIO, (*lex talionis*), a species of punishment in the Mosaic law, whereby an evil is returned similar to that committed against us by another; hence that expression, "Eye for eye, tooth for tooth." This law was at first inserted in the 12 tables amongst the Romans; but afterwards set aside, and a power given to the prætor to fix upon a sum of money for the damage done.

TALISMANS, magical figures cut or engraved with superstitious observations on the characters and configurations of the heavens, to which some astrologers have attributed wonderful virtues, particularly that of calling down celestial influences. The talismans of Samothrace, so famous of old, were pieces of iron formed into certain images, and set in rings; these were esteemed preservatives against all kinds of evils. There were likewise talismans taken from vegetables, and others from minerals.

TALLAGE (*tallagium*), from the French *taille*, is metaphorically used for a part or share of a man's substance carved out of the whole, paid by way of tribute, toll, or tax.

TALLOW, in commerce, the fat of certain animals melted down and clarified, so as to be fit for making candles, &c.

TALLY, is a stick cut in two parts, on each whereof is marked, with notches or otherwise, what is due between debtor and creditor, as now used by brewers, &c. And this was the ancient way of keeping all accounts, one part being kept by the creditor, the other by the debtor, &c. Hence the tallier of the exchequer, whom we now call the *teller*. But there are two kinds of tallies mentioned in our statutes to have been long used in the exchequer. The one is termed *tallies of debt*, which are in the nature of an acquittance for debts paid to the king, on the payment whereof, these tallies are delivered to the debtors, who carrying them to the clerk of the pipe-office, have there an acquittance in parchment for their full discharge. The other are *tallies of reward or allowance*, being made to sheriffs of counties as a recompence for such matters as they have performed to their charge, or such money as is cast upon them in their accounts of course, but not leviable, &c. In the exchequer there is a tally-court, where attend the two deputy chamberlains of the exchequer, and the tally-cutter; and a tally is generally the king's acquittance for money paid or lent, and has written on it words proper to express on what occasion the money is received.

TALLY-*Man*, a person that sells or lets goods, clothes, &c. to be paid by so much a week.

TALMUD, among the Jews, a collection of the doc-

Taliacotius
Talmud.

TALPA || **TAMERLANE.** doctrines of their religion and morality. It is the *corpus juris*, or body of the laws and customs of the Jews, who esteem it equal to the Scriptures themselves.

TALPA, the **MOLE**; a genus of quadrupeds belonging to the order of *feræ*. There are six fore-teeth in the upper jaw, and eight in the under jaw; with one large dog-tooth, and four smaller ones. There are two species, viz. 1. The caudata, or common mole, with a tail, and five toes on each foot. It is a native of Europe; lives under ground; burrows with vast rapidity with its fore-feet, flinging the earth back with its hind feet: has the sense of smelling exquisite, which directs it to its food, worms, insects, and roots. It does vast damage in gardens, by flinging up the soil and loosening the roots of plants. It is most active before rain, and in winter before a thaw, worms being then in motion. It breeds in the spring, and brings four or five young at a time: it makes its nest of moss, a little beneath the surface of the ground, under the greatest hillock: raises no hillocks in dry weather, being then obliged to penetrate deep after its prey. It makes a great scream when taken. *Palma christi* and white hellebore, made into a paste, and laid in their holes, destroys them. None in Ireland.

2. The *asiatica* has no tail, and but three toes on the feet. It is of a beautiful green and gold colour, variable with the light. It is a native of Asia.

TAMANDAU, in zoology. See **MYRMECOPHAGA**.

TAMARINDUS, the **TAMARIND-TREE**; a genus of the monogynia order, belonging to the triandria class of plants. There is but one species, viz. the *Indica*, a native of both the Indies, growing to a great size in those places where it is native. The stem is very large, covered with a brown bark, and dividing into many branches at the top. The branches are garnished with winged leaves, consisting of 16 or 18 pair of lobes, without a single one at the end. The lobes are about half an inch long, and $\frac{1}{8}$ th of an inch broad; of a bright green colour, a little hairy, and sit close to the midrib. The flowers come out from the side of the branches, five, six, or more together upon the same footstalk in loose bunches. They are composed of five petals, one of which is reflexed upwards like the standard in some of the butterfly-flowers; two others stand on each side like wings, and the other two are turned downwards. The flowers are succeeded by thick compressed pods, two, three, four, or five inches long; having a double skin or cover, and swell in every part where the seeds are lodged; full of an acid stringy pulp, which surrounds smooth compressed angular seeds. The plants are easily propagated by seeds, in the countries where they grow; but in this country require the treatment of other exotics. The pulp is much used in medicine as an agreeable cooling purgative. The tamarinds which come from the East Indies are black and preserved without sugar, whence they are less agreeable to the taste than the brown ones which are brought from the West Indies, and require sugar to preserve them.

TAMERLANE, the name of a celebrated conqueror among the Moguls. He was originally the son of a shepherd, but by degrees raised himself to

be the greatest monarch of the age. See **MOGULS**, n° 15. *et seq.*

TAMUS, **BLACK BRIONY**; a genus of the hexandria order, belonging to the diccia class of plants. There are two species; the most remarkable of which is the communis, or common black briony, growing naturally about hedges and in rough places in England. The young shoots are good eating when dressed like asparagus. The root is acrid and stimulating.

TAN, the bark of the oak chopped and ground in a tanning mill into a coarse powder, to be used in the tanning of leather. See **TANNING**.

TANACETUM, **TANSY**; a genus of the polygamia equalis order, belonging to the syngenesia class of plants. There are eight species; the most remarkable of which is the vulgare, or common yellow tansy, which grows naturally on the borders of fields and on dry banks in many places of Scotland and England. The stalk is three or four feet high, erect, stiff, and branched: the flowers are yellow, and terminate the branches in flat umbels. It has a bitter taste and aromatic smell. It is esteemed good for warming and strengthening the stomach; for which reason the young leaves have obtained a place among the culinary herbs, their juice being an ingredient in puddings, &c. It is rarely used in medicine, though extolled as a good emmenagogue. A drachm of the dried flowers has been found very beneficial in hysteric disorders arising from suppressions. The seeds and leaves were formerly in considerable esteem for destroying worms in children, and are reckoned good in cholics and flatulencies. In some parts of Sweden and Lapland, a bath with a decoction of this plant is made use of to assist parturition.

TANGENT of an **ARCH**, is a right line drawn perpendicularly from the end of a diameter, passing to one extremity of the arch, and terminated by a right line drawn from the centre through the other end of that arch, and called the *secant*. See **GEOMETRY**.

TANGIER, a port-town of Africa, in the empire of Morocco and kingdom of Fez, situated at the entrance of the Straits of Gibraltar, in W. Long. 7°. N. Lat. 35. 40. In 1662, this place belonged to the Portuguese, and was given to king Charles II. upon his marriage with the Infanta of Portugal: but he, growing weary of the charge of keeping it, caused it to be blown up and destroyed in 1684; ever since which time it has been only a poor fishing town. Anciently it was called *Tingis*, and gave name to the province of Mauritania Tingitana.

TANNER, one who dresses hides by tanning them. See **TANNING**.

TANNER (Dr Thomas), an English prelate and celebrated antiquarian, born in 1674. He was admitted of Queen's college Oxford, where a similarity of taste for antiquities produced a close friendship between him and Edmund Gibson afterwards bishop of London. In 1697, he was chosen fellow of his college; and having already published some specimens of his skill in the antiquarian way, soon after became known to Dr Moore bishop of Norwich, who made him chancellor of his diocese. In 1722, he was made arch-

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deacon of Norwich, and in 1731 bishop of St Asaph. He died at Oxford in 1735; and after his death was published an elaborate work, said to have employed him for 40 years, under this title, *Bibliotheca Britannica Hibernica, sive de Scriptoribus qui in Anglia, Scotia et Hibernia, ad seculi XVII. initium floruerunt, &c.*

TANNING, is the art of preparing raw hides or skins for the hand of the currier, or for immediate use without any further operation.

The former part of this definition includes all leather used for the upper part of shoes, coaches, coach-harness, saddler-leather, &c. and the latter the manufacture of bin or backs, &c.

A considerable improvement has been made in the method of tanning leather by the late Dr Macbride of Dublin, from whose account of his discovery in the Philosophical Transactions, the following is extracted.

“The use of tanning is two-fold; first, to preserve the leather from rotting; and, secondly, to render it impervious to water.

“An infusion of any strongly-astringent vegetable will serve to tan leather, so far as to prevent its rotting; but if this vegetable does not contain a good deal of gum-resin, it will not answer for enabling it to keep out water: and hence it is that oak-bark, which is more abundant in the gummy-resinous part than any of our common indigenous astringents, is preferred to all other substances for the purpose of tanning.

“The tanners prepare their bark by gently drying it on a kiln, and grinding it into a very coarse powder. They then either use it in the way of infusion, which is called *ooze*; or they strew the dry powder between the layers of hides and skins, when these are laid away in the tan-pits.

“The *ooze* is made by macerating the bark in common water, in a particular set of holes or pits, which, to distinguish them from the other holes in the tan-yard, are termed *letches*.

“The first operation of the tanner is to cleanse his hides from all extraneous filth, and remove any remains of flesh or fat which may have been left behind by the butcher.

“The hair is next to be taken off; and this is accomplished either by steeping the hides for a short time in a mixture of lime and water, which is termed *liming*; or by rolling them up close and piling them in heaps, where they quickly begin to heat and putrify. The hair being loosened, is scraped off; and the tanner proceeds to the operation called *skipping*, which consists in a further scraping with a particular kind of knife contrived for the purpose, and cutting away the jagged extremities and ossal parts, such as the ears and nostrils.

“The raw leather is then put into an alkaline ley, in order to discharge the oil or fat, and render its pores more capable of imbibing the *ooze*. The tanners of Ireland generally make their ley of pigeon's dung: but a more active one may be prepared from kelp or pot-ash; taking care, however, not to make it too strong of the ashes, nor to allow the leather to remain too long in the ley.

“The oil being sufficiently discharged, the leather is ready for the *ooze*, and at first is thrown into smaller holes, which are termed *handlers*; because the

hides or skins, during this part of the process, are taken up from time to time, and allowed to drain: they continue to work the leather in these handlers, every now and then stirring it up with the utensil called a *plunger*, which is nothing more than a pole with a knob at the end of it, until they think proper to lay it away in the vatts. In these holes, which are the largest in the tan-yard, the leather is spread out smooth, whereas they toss it into the handlers at random; and between each layer of leather they sprinkle on some powdered bark, until the pit is filled by the leather and bark thus laid in *stratum super stratum*: *ooze* is then poured on, to fill up interstices; and the whole crowned with a sprinkling of bark, which the tanners call a *heading*.

“In this manner the leather is allowed to macerate, until the tanner sees that it is completely penetrated by the *ooze*; when this is accomplished (which he knows by cutting out a bit of the thickest part of the hide) the manufacture is finished, so far as relates to tanning, since nothing now remains but to dry the goods thoroughly, by hanging them up in airy lofts built for the purpose. Such in general is the process for tanning calf-skins, and those lighter sorts of hides which are called *batts*; but the large, thick, heavy hides, of which the strongest and most durable kind of sole-leather is made, require to have their pores more thoroughly opened before the *ooze* can sufficiently penetrate them. For this purpose, while the hides are in the putrescent state, from being allowed to heat in the manner already mentioned, and well soaked in an alkaline ley, they are thrown into a four liquor, generally brewed from rye, in order that the effervescence which necessarily ensues may open the pores.

“The tanners term this operation *raising*, as the leather is considerably swelled, in consequence of the conflict between the acid and alkali. This is an English invention; for it appears from M. De la Lande, who was employed by the Royal Academy of Sciences to write on the art of tanning, that the foreign tanners know nothing of this branch of the business: indeed, their whole process, according to his account, is slovenly, and even more tedious than our common method, and must make but very indifferent leather.

“When the raising is accomplished, the leather is put into the handlers, and worked in them for the requisite time; then laid away in the vatts, and there left to macerate until the tanning is found to be completely finished, which, for the heaviest kind of leather, such as this of which I am now speaking, requires from first to last full two years.

“It is this tediousness of the process which enhances the value of leather; and the returns being so slow, the trade of tanning never can be carried on to advantage but by persons possessed of a large capital: therefore, one sure way of increasing the number of tanners, and of course of bringing down the price of their manufacture, is to shorten the process; and if at the same time we can improve the quality of the leather, and save somewhat in the expence of tanning materials, the public will be essentially benefited in respect to one of the necessary articles of life.

“All this can be done by pursuing the following method, which may be introduced into any common tan-yard.

“With

Tanning.

" With respect to time, it is possible, in the way that I have found out, to finish leather in a fourth part of what is required in the ordinary process; for I have repeatedly had calf-skins tanned in a fortnight or four weeks, which in the common way could not be done in less than from two to four months.

" I shall not pretend, however, to affirm, that that business can be carried on in the large way with such expedition; because a great deal of this abridgment of time was probably owing to frequent handling and working of the leather: but I am confident, and know it from four years experience, that in the ordinary course of business, and in a common tan-yard, the tanner may save at least four months out of twelve, produce better leather, and find his bark go much farther than in the old way of tanning.

" As the new method of tanning depends on this principle, 'That lime-water extracts the virtues of oak-bark more completely than plain water;' the first thing in which the tanner is to be instructed, is the making of lime-water.

" 1. Provide a large vessel, in the nature of a cistern, whose depth shall be at least twice its diameter, and of a capacity adapted to the extent of the tan-yard.

" 2. This cistern must be fixed in a convenient corner of the yard, under a shed; and should stand so as that the liquor which is to be drawn off from it may run freely into the latches.

" 3. There must be a cock fixed in the side of the cistern, about a foot from the bottom, to let off the contents; and there must be a hole in the bottom of it, of five or six inches diameter, which is to be stopped with a plug. Let this hole open over a gutter.

" 4. The cistern must be covered with a flooring of boards, strong enough to bear a man's weight; and from side to side of this lid there must be an opening of two or three feet wide.

" 5. If it can be so contrived that a water-pipe may be led into the cistern, it will save the servants a good deal of trouble; but if this cannot be done, a pump must be fixed in the most convenient way, for the purpose of filling it from time to time.

" 6. The cistern being once fixed (which is all the additional apparatus that the new method of tanning requires) the making of lime-water will be found extremely simple and easy.

" 7. You are first to fill the cistern with water; and then, for every hoghead that it may contain, throw in ten or a dozen pounds weight of unslaked lime.

" 8. Mix the lime thoroughly with the whole body of the water, by stirring it exceedingly well from the bottom, with a bucket and plunger, until you perceive that the lime is completely diffused, and the whole mixture grows as white as milk; leave it then to settle for a couple of days, that the undissolved part of the lime may entirely subside, and the water become perfectly limpid, and clear as rock-water. Your lime-water will then be fit for immediate use.

" 9. The cock, as already mentioned, is to be fixed at least twelve inches from the bottom of the cistern, in order that only the limpid part of the lime-water may run off; and the use of the hole in the bottom, which is ordered to be stopped with a plug, is to

let off the gross and insoluble remains of the lime, as often as it may be found necessary to clean out the cistern.

" 10. When the first brewing (as it may be termed) of lime-water is all expended, you are to fill up the cistern with water a second time; stir up the lime from the bottom with the bucket and plunger, so as to mix it thoroughly with the whole body of the water, as before directed, and then leave it to subside for the requisite time. Thus you will have a second brewing of lime-water; and you may go on in the same manner to make a third, fourth, fifth, or perhaps a sixth or more brewings, from the original quantity of lime; provided you shall find the lime-water continue sufficiently strong.

" 11. There are two ways of knowing when lime-water is sufficiently strong. The one is by the taste, and this a little practice will teach you to distinguish; the other is, by observing a certain solid scum, like the flakes of very thin ice, which collects and forms itself on the surface of the lime-water.—As long as you find this solid scum floating on the top of the water in the cistern, so long you may conclude that there is no necessity for throwing in fresh lime.

" 12. But when the scum ceases to appear, or you find from the taste that the lime-water is not so strong as it ought to be, you must then take out the plug from the bottom of the cistern, and clear it by sweeping away the gross remains of lime: and after you have cleaned the cistern, begin your brewings of lime-water anew, and proceed in the manner already directed, as to stirring up the lime, and leaving it to settle for the necessary time, so as to have your lime-water perfectly limpid. In this manner you may go on from year to year, and constantly keep yourself in stock with respect to lime-water.

" 13. It is this lime-water which is now to be used in making your ooze instead of the plain common water; and this is all the difference between the old and the new method of tanning; for when your ooze is prepared, by steeping your bark in lime-water (in the latches, as you do at present, only running it through two latches) you are to make use of it in the very same way that you have hitherto used the common ooze, there not being the least variation required with respect to any of the previous management before the skins or hides are fitted for the ooze. Every thing that relates to cleaning, liming, fleshing, &c. is to be conducted precisely as in the old or common method of tanning; and the goods are to be worked in the handlers for the requisite time, and then laid away in the wats, with layers and headings of bark, just as you now practice; and when you observe that the leather is sufficiently penetrated with the ooze, that is to say, completely tanned, you will take it up, dry it, and afterwards dress it according to the different uses for which it is intended. You are always to observe, however, that the ooze is to be turned from one lutch on another before it is used, otherwise it will be apt to blacken the leather.

" 14. What has been hitherto said relates only to butts and calf-skins: as to soal-leather, which is prepared for the ooze by steeping it in some sour liquor, in order to open its pores, and raise it (according to the

Tanning. the tanner's phrase), the new method requires a different practice from the old one.

"15. In the old method, the tanners made use of sourings brewed generally from rye or some other grain. But these liquors are not only troublesome to brew and to ferment, but they are always uncertain as to the degree of sourness or strength, which depends on the state of the weather and other variable circumstances: these liquors are moreover exceedingly apt to rot the leather; and, without great care, may injure it very materially in its texture.

"16. To obviate these inconveniences, you are to imitate the bleachers of linen, who make use of a sour prepared by diluting the strong spirit of vitriol (vulgarly, but improperly, termed *oil of vitriol*) with a sufficient quantity of plain water.

"17. It was not without much difficulty that the bleachers could be prevailed on to quit their old sourings, made either, like yours, of rye or barley, or of four butter-milk, from a groundless fear that the vitriolic souring would corrode their cloth; but the experience of many years has convinced them of their error, and now no other souring is used. In like manner the tanners at first may some of them be afraid to use the vitriol; but a little practice will show how far superior this souring is to what they have hitherto used. They will never find it subject to any change, in respect to strength, from variations of weather or different degrees of heat; and so far from tending to rot the leather, it gives unusual firmness; and the soles which are raised by the vitriolic sourings are remarkably found, and always free from the slightest degree of rotteness. Besides, the same sour may do for many parcels of leather, by adding a little vitriol to it; and it need only be thrown away, when it becomes too dirty for use by the frequent succession of hides.

"18. A wine-pint of the strong spirit of vitriol, which will not cost more than nine or ten pence, is sufficient for fifty gallons of water to prepare the souring at first: therefore all you have to do, in raising the soles, is only to prepare them before-hand in the usual way; and, when they are fitted for the souring, mix up a quantity of vitriol and water, according to the number of hides that you require to have raised, still observing the proportion of a pint to fifty gallons, which will be enough if the vitriol be of the due degree of strength. The hides may lie in the souring till you find them sufficiently raised: for they will be in no danger of rotting, as they would be in the common corn-sourings, which in time might turn putrid, and rot the leather; whereas the vitriolic souring keeps off putrefaction.

"19. When you find your hides sufficiently raised, put them directly into the ooze, and go on with the tanning as in the old way; and you will see that the lime-water ooze penetrates raised leather even faster than it does butts or calf skins, allowance being made for their different degrees of thickness.

"20. Let it be now supposed that you have your cistern fixed, your lime-water prepared, and some latches full of lime-water ooze, which has been run through two latches in order that the lime-water may completely spend its force on the bark; you are not to throw away what common ooze you have in stock

in the yard, but only as it shall be spent; then, indeed, you are to throw it away, and supply its place with the lime-water ooze.

"21. In a very few days you will perceive the difference between the activity of the two oozes, the new and old, with respect to penetrating the leather: and thus, without any kind of loss or waste, you will get rid of all your old liquors, and come speedily into a full stock of the ooze made with lime-water; and after you have got the new method established, your business will go in a regular course, and one parcel of goods will succeed another, as fast as you can manufacture and dispose of them.

"22. Though it is possible to tan small parcels of leather, by way of experiment, by the use of lime-water ooze, in a fourth part of the time which is required if only common ooze be made use of; yet the business of a large tan-yard cannot be carried on with so much expedition: but even in large works, and in the common course of business, soal-leather can be completely tanned and finished in from eleven to fifteen months, according to the different weight and thickness of the hides; butts, in from eight to twelve months; and calf-skins, in from six to twelve weeks: in general, the tanner may save at least a third of the time that has hitherto been required.

"23. The leather which is manufactured in the new way is of a superior quality to that of the old tannage, especially the soal-leather, which wears remarkably well, and never shows the least sign of rotteness.

"24. Let it always be remembered, that the lime-water is never to be used but when it is sufficiently strong, and as clear as rock-water.

"25. Whenever you make fresh ooze, you must always use fresh lime-water, and run the ooze through two latches; and the lime-water ooze, when spent from laying on the leather, is never to be returned back upon the bark which is in the latches, (as you now return your spent ooze), but must always be thrown away, as being entirely useless; for which purpose you must contrive a gutter in the tan-yard to carry off the spent ooze.

"26. The latches ought to be under cover, lest the rain get into them and weaken the ooze; and if the handlers are sheltered, it will be so much the better; but it is of no importance to cover the vats, provided, when the leather is laid away in them, they are kept constantly full to the brim.

"27. You must always take care to have a sufficient stock of unslaked lime by you, (for if it be slaked it will not answer to make lime-water): therefore get your lime fresh, if possible, from the kiln, and immediately pack it in any kind of old dry casks. Weigh one of these casks, and it will enable you to ascertain the quantity of lime necessary to be thrown into the cistern each time you begin a fresh brewing of your lime-water, and thus save you the trouble of repeated weighings; not that there need be much nicety about the quantity of lime, a score of pounds over or under making no sensible difference in the strength of the lime-water.

"28. Any expence you may be at in procuring lime, which even in the largest tan-yards can amount but to a trifle, will be amply compensated by the saving

Tanning,
Tantalus.

of bark; because that lime-water so completely exhausts the bark, and makes it go so much farther than when the ooze is made only of plain water. As a proof of this, you may make a pretty strong ooze from the tan or spent bark, which you now consider as completely exhausted, by infusing in it lime-water."

The leather, when only tanned, is not sufficiently soft and pliable to answer a number of purposes. The currier's province is to reduce the leather to the proper thickness, pliability, and colour, requisite for the different uses to which it is applied: and though there is a material difference in the method of manufacturing the several kinds, and a good deal of dexterity required; yet what could be here said of them would be of little use to those who are unacquainted with the business. We shall therefore reduce all we are to say on this subject to a general detail of the process.

The leather, after it has dripped some time from the tan-pit, is shaven on an upright beam with a knife whose edge is turned on the one side, and with which the currier can take down the leather in the same manner as a wrignt can take a shaving from a piece of wood with his plane. After the currier has thus levelled the hide or skin to his purpose, (which is always done on the flesh-side), he spreads it out on a stone or table made for the purpose, and there scours it on the grain-side from all the loose tan, and other stuff that may hurt the beauty of the grain. He then puts on a certain quantity of oil on both grain and flesh-side, for the purpose of softening the fibres, and at the same time making them tough, and hangs it up to dry. When it is sufficiently dry, there is a thin shaving again taken off the flesh-side, in order to clean or brighten it up; and then it is rubbed backward and forward upon a table by the currier with a nicked or furrowed board, keeping the leather always doubled at the place where he rubs, till it be made soft and pliable to his intention. This last part of the operation is properly called *currying*, and it is from this that the business gets its name. As to the colour, the leather is fair or dark in proportion to the quantity of oil laid on, if the tanning has been properly performed, and the currier do not neglect some material part of his duty. Carriers seldom dye any colour but black, which is done with copperas and a very little logwood.

TANTALUS, in fabulous history, king of Phrygia and Paphlagonia, was the son of Jupiter and the nymph Pluto. He one day entertained the gods at his table; when, to prove their divinity, he served up his son Pelops cut in pieces. All the deities, except Ceres, perceived his cruelty and impiety, and would not touch his provisions. That goddess, whose thoughts were solely employed about her daughter Proserpine, inadvertently eat a part of his left shoulder. Pelops, however, was restored to life; and an ivory shoulder given him in the room of that which had been eaten; while Tantalus was thrown into Tartarus, where he was punished with perpetual hunger and thirst. He was chained in a lake, the water of which reached up to his chin, but retired when he attempted to drink. The branch of a tree loaded with fruit hung down even to his lips, but on his attempting to pluck the fruit the branch sprang upwards.

TANTALUS, in ornithology, a genus of birds belonging to the order of grallæ. The bill is long, subulated, and

somewhat crooked; the nostrils oval, the fore-part of the head bald from the eyes; the feet have four toes palmed on the under-part. There are seven species; of which the most remarkable is the ibis of the Egyptians. Mr Hasselquist informs us that it is of the size of a raven-hen. This bird is found in Lower Egypt, and is seen in great numbers during the overflowing of the Nile, in those places which the water does not reach, and afterwards in the places the water has deserted. It feeds on insects and small frogs, which abound in Egypt during the inundation of the Nile and for some time after, being by this means of great service to the country. They often assemble, especially mornings and evenings, in the gardens, in such numbers as to cover whole palm-trees. When this bird rests, it sits upright, so as to cover its feet with its tail, and raises the breast and neck.

TANTALUS's Cup. See **HYDROSTATICS**, n° 38.

TANZY, or **TANSY**, in botany. See **TANACETUM**.

TAPE-WORM. See **TENIA**.

TAPESTRY, a curious kind of manufacture, serving to adorn a chamber or other apartment, by covering or lining the walls thereof. It is a kind of woven hangings of wool and silk, frequently raised and enriched with gold and silver, representing figures of men, animals, landscapes, histories, &c.

The invention of tapestry is said to have come to us from the Levant; and this seems the more probable, in that the workmen concerned in it were called, at least in France, *sarrafins*, or *sarrafinois*. It is supposed that the English and Flemish, who were the first that excelled in making tapestry, might bring the art with them from some of the croisades, or expeditions against the Saracens. Be this as it will, it is certain that these two nations, especially the English, were the first who set on foot this noble and rich manufacture in Europe, now one of the finest ornaments of palaces, churches, &c. and therefore, if they may not be allowed the inventors, they have at least the glory of being the restorers of this so curious and admirable art, as gives a kind of life to wools and silks, scarce inferior to the paintings of the best masters.

Tapestry-work is distinguished by the workmen into two kinds, viz. that of high and that of low warp; though the difference is rather in the manner of working than in the work itself; which is in effect the same in both: only the looms, and consequently the warps, are differently situated; those of the low warp being placed flat and parallel to the horizon, and those of the high warp erected perpendicularly. The English anciently excelled all the world in the tapestry of the high warp; and they still retain their former reputation, tho' with some little change: their low warps are still admired; but as for the high ones, they are quite laid aside by the French. The French have three considerable tapestry-manufactures, besides that of the Gobelins; the first at Aubusson in Auvergne, the second is at Felletin in the Upper Marche, and the third at Beauvais. They were all equally established for the high and the low warp; but they have all laid aside the high warp excepting the Gobelins. There are admirable low warps in Flanders, generally exceeding those of France; the chief and almost only Flemish manufactures are at Brussels, Antwerp, Oudenard, Lille, Tournay, Bruges, and

Tantalus
||
Tapestry.

Vas.

The usual widths of tapestries are from two ells to three ells Paris-measure.

The Manufacture of TAPESTRY of the High Warp. The loom whereon it is wrought is placed perpendicularly: it consists of four principal pieces; two long planks or cheeks of wood, and two thick rollers or beams. The planks are set upright, and the beams across them, one at the top, and the other at the bottom or about a foot distance from the ground. They have each their trunnions, by which they are suspended on the planks, and are turned with bars. In each roller is a groove from one end to the other, capable of containing a long round piece of wood, fastened therein with hooks. The use of it is to tie the ends of the warp to. The warp, which is a kind of worsted, or twisted woollen thread, is wound on the upper roller; and the work, as fast as wove, is wound on the lower. Within side the planks, which are seven or eight feet high, fourteen or fifteen inches broad, and three or four thick, are holes pierced from top to bottom, in which are put thick pieces of iron, with hooks at one end, serving to sustain the coat-stave: these pieces of iron have also holes pierced, by putting a pin in which, the stave is drawn nearer or set further off; and thus the coats or threads are stretched or loosened at pleasure. The coat-stave is about three inches diameter, and runs all the length of the loom; on this are fixed the coats or threads, which make the threads of the warp cross each other. It has much the same effect here as the spring-stave and treddles have in the common looms. The coats are little threads fastened to each thread of the warp with a kind of sliding knot, which forms a sort of mesh or ring. They serve to keep the warp open for the passage of broaches wound with silks, woollens, or other matters used in the piece of tapestry. In the last place, there are a number of little sticks of different lengths, but all about an inch in diameter, which the workman keeps by him in baskets, to serve to make the threads of the warp cross each other, by passing them across; and, that the threads thus crossed may retain their proper situation, a packthread is run among the threads above the stick.

The loom being thus formed, and mounted with its warp, the first thing the workman does, is to draw on the threads of this warp, the principal lines and strokes of the design to be represented on the piece of tapestry; which is done by applying cartoons, made from the painting he intends to copy, to the side that is to be the wrong side of the piece, and then, with a black-lead pencil, following and tracing out the contours thereof on the thread of the right side; so that the strokes appear equally both before and behind.

As for the original design the work is to be finished by, it is hung up behind the workmen, and wound on a long staff from which a piece is unrolled from time to time as the work proceeds.

Besides the loom, &c. here described, there are three other principal instruments required for working the silk or the wool of the wool within the threads of the warp; these are a broach, a reed, and an iron-needle.

The broach is made of a hard wood, seven or eight inches long, and two-thirds of an inch thick, ending in a point with a little handle. This serves as a shuttle;

the silks, woollens, gold, or silver, to be used in the work being wound on it.

The reed or comb is also of wood, eight or nine inches long, and an inch thick on the back, whence it grows less and less to the extremity of the teeth, which are more or less apart, according to the greater or less degree of fineness of the intended work. Lastly, the needle is made in form of the common needle, only bigger and longer. Its use is to press close the wool and silks when there is any line or colour that does not fit well.

All things being prepared for the work, and the workman ready to begin, he places himself on the wrong side of the piece, with his back towards the design; so that he works as it were blindfold, seeing nothing of what he does, and being obliged to quit his post, and go to the other side of the loom whenever he would view and examine the piece, to correct it with his pressing-needle. To put silk, &c. in the warp, he first turns and looks at the design; then, taking a broach full of the proper colour, he places it among the threads of the warp, which he brings cross each other with his fingers, by means of the coats or threads fastened to the staff; this he repeats every time he is to change his colour. Having placed the silk or wool, he beats it with his reed or comb; and when he has thus wrought in several rows over each other, he goes to see the effects they have, in order to reform the contours with his needle, if there be occasion. As the work advances, it is rolled upon the lower beam, and they unroll as much warp from the upper-beam as suffices them to continue the piece: the like they do of the design behind them. When the pieces are wide, several workmen may be employed at once.

We have but two things to add: the first is, that the high-warp tapestry goes on much more slowly than the low warp, and takes up almost twice the time and trouble. The second is, that all the difference that the eye can perceive between the two kinds, consists in this, that in the low warp there is a red fillet, about one-twelfth of an inch broad, running on each side from top to bottom, which is wanting in the high-warp.

TAPIR, in zoology, by some accounted a species of *HIPPOTAMUS*, has the fore-hoofs divided into four, and the hind-hoofs into three parts. The nose extends far beyond the lower jaw, is slender, and forms a sort of proboscis; it is capable of being contracted or extended at pleasure, and its sides are fulcated. The extremities of both jaws end in a point, and there are ten cutting teeth in each. Between them and the grinders there is a vacant space; and there are 10 grinders in each jaw. The ears are erect, the eyes small, and the body is shaped like that of a hog. The back is arched; the legs are short; and the hoofs small, black, and hollow. The tail is very small. The animal grows to the size of a heifer half a year old. The hair is short: when young, it is spotted with white; when old, of a dusky colour.—It inhabits the woods and rivers of the eastern side of South America, from the Ithmus of Darien to the river of Amazons. It sleeps during day, in the darkest and thickest forests adjacent to the banks; and goes out in the night-time in search of food. It lives on grass, sugar-

Tapping gar. canes, and on fruits. If disturbed, it takes to the water; swims very well; or sinks below, and, like the hippopotame, walks on the bottom as on dry ground. It makes a sort of hissing noise. The Indians shoot it with poisoned arrows; they cut the skin into bucklers; and eat the flesh, which is said to be very good. It is a salacious, slow-footed, and sluggish animal. Gumi-la says, it will make a vigorous resistance if attacked, and scarce fails slaying the dogs which it can lay hold of.—Dampier and Bancroft give very faulty descriptions of this beast, imagining it to be the same with the hippopotame.

TAPPING, in general, the act of piercing a hole in a vessel, and applying a tube or canula in the aperture, for the commodious drawing off the liquor contained therein.

TAPPING, in surgery. See there, n° 487, 488.

TAR, a thick, black, unctuous substance obtained chiefly from old pines and fir-trees by burning them with a close smothering heat, much used in coating and caulking ships, &c. It is prepared in different parts of Germany, in North America, and in all countries where there is much wood. The wood is inclosed in a large oven, to the quantity of ten or more loads at a time: this stands within another oven called the *mantle*, the space between them receiving the fire. From the bottom of the inner oven there runs a gutter, by which the tar is conveyed off in proportion as it melts out from the wood. Along with the tar there runs out an acid spirit or juice, by means of which part of the oily matter becomes soluble in water; and it is owing to this that tar infused in water communicates to it a medical virtue. Tar when distilled yields a kind of essential oil called *oleum pini* and *oleum tade*, which is greatly valued by painters, varnishers, &c. on account of its drying quality: it soon thickens of itself almost to the consistence of a balsam.

Of late it has been found that the empyreumatic oil produced from pitcoal or culm answers the purposes of tar distilled from wood. There is, however, the same difference between the two that there is between a vegetable and a bituminous empyreumatic oil. The process is much the same as when wood is used.

TARANTO, a sea-port town of Italy, in the kingdom of Naples, and in the Terra de Otranto. It is a strong and populous place, with an archbishop's see, and the title of a principality. It is seated on a peninsula, and is defended by a strong castle; but the harbour is choked up, which has hurt it very much. From this town the spiders called *tarantulas* have their name, whose bite it was said could not be cured but by music and dancing; but this is now found to be false †. E. Long. 17. 25. N. Lat. 40. 45.

TARACON, an ancient, populous, and large town of France, in Provence, with a well-built castle, and a chapter composed of 15 canons; seated on the river Rhone, in a pleasant fertile country, over-against Beaucaire, with which it communicates by a bridge of boats. E. Long. 4. 45. N. Lat. 43. 48.

TARAZONA, a strong town of Spain, in the kingdom of Arragon, and on the frontiers of Old Castile, with a bishop's see. It is seated partly on a rock, and partly in a fertile plain, on the river Chiles. It was

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taken from the Moors in 1110. W. Long. 1. 29. N. Lat. 41. 55.

TARE, is an allowance for the outside package, that contains such goods as cannot be unpacked without detriment: or for the papers, threads, bands, &c. that inclose or bind any goods imported loose; or tho' imported in casks, chests, &c. yet cannot be unpacked and weighed neat.

TARGET, a kind of shield or weapon of defence made use of by the ancients.

TARGUM, a name whereby the Jews call the Chaldee paraphrases or expositions of the Old Testament in the Chaldee language. See BIBLE.

TARIF, a table or catalogue containing the names of different sorts of merchandize, with the duties to be paid as settled by authority amongst trading nations.

TARPA (Spurius Mecius), a Latin critic in the time of Julius Cæsar and Augustus. He had his tribunal in the temple of Apollo, where, with four assistants, he passed sentence on the works of the poets. Cicero and Horace make honourable mention of this critic.

TARPAULIN, a piece of canvas, well tarred over, to keep off the rain from any place. The term is also often applied in a burlesque sense to a person that has been all his life bred to the sea.

TARPEIAN, in Roman antiquity, an appellation given to a steep rock in Rome; whence, by the law of the twelve tables, those guilty of certain crimes were precipitated.

The rock took its name from Tarpeia, a vestal virgin who was killed by the Sabines, as related under the article ROME, n° 24.

TARQUIN the ELDER, king of Rome, succeeded Ancus Martius 615 B. C. He instituted a new order of senators, under the title of *Patres minorum gentium*. He signalized himself as a general, and discovered great taste and magnificence in embellishing the city of Rome. Pliny, who lived 800 years after him, speaks with astonishment of the subterraneous aqueducts which he caused to be constructed to carry off the filth from the city. Assassinated by the sons of Ancus Martius, 577 B. C. See ROME, n° 35—40.

TARQUIN the Proud, a tyrant and usurper, had rendered himself odious to the Romans by his pride and cruelty, when his son, Sextus Tarquinius, having ravished Lucretia, occasioned that well-known revolution which put an end to the monarchy, and established the republic of Rome. See the article ROME, n° 49, 51, &c.

TARTAR, the saline incrustation deposited on the insides of casks in which wine is kept. See CHEMISTRY, n° 291.

TARTAR Chalybeated. See CHEMISTRY, n° 299.

TARTAR Emetic. See CHEMISTRY, n° 455.

TARTAR Soluble. See CHEMISTRY, n° 294.

TARTAR Vitriolated. See CHEMISTRY, n° 119.

TARTARY, or **TATARY**, a very large country of Asia, situated between 57° and 160° of E. Long. reckoning from the west end of the isle of Ferro, and between 37° and 55° of Lat. It is bounded on the north by Siberia, or that part of Asia which belongs to Russia; on the west by the rivers Don, the Wol-

Tartary. ga, and Kama, which separate it from Russia; on the south by the Euxine and Caspian Seas, Kazarm, the two Buckarias, China, and Korea; and on the east, by the Oriental or Tartarian ocean. It extends from east to west the space of 104 degrees in longitude, or 4145 geographical miles; but its breadth is not proportionable, being not above 960 miles where broadest, and where narrowest 330.

This vast region is divided into two great parts; the one called the *Western*, the other the *Eastern Tartary*.

Western Tartary, which is much more extensive than the Eastern, containing 139 degrees of longitude out of 161, is inhabited by a great number of nations, or tribes of people, who are called *Mungles*, or *Mangals*, by themselves; and *Moguls* or *Tartars*, indifferently, by other nations.

The principal mountains, or rather chains of mountains, found in this part of Great Tartary, may be divided into three classes: first, those which run along the northern borders of it; and though, perhaps, not always contiguous, or of the same denomination, go under the general name of *Ulug Täg*, or *Dag*, that is, the *Great Mountain*. Secondly, those which make the southern bounds, and are called *Kichug Täg*, or the *Lesser Mountain*. The third great chain is called *Mount Altay*, lying nearly in the middle, between the Caspian Sea and Eastern Tartary, and extending between the other two, in about the 110th degree of longitude.

The principal rivers of Western Tartary, besides the Dnieper, Don, and Wolga, are the Jaik, or Yaik, and Yem, both descending from the *Ulug Täg*, and falling into the Caspian Sea on the north side: the river Ili, or Khonghis, which rises out of the *Kichug Täg*, on the borders of Little Buckaria, and runs north-west into the lake Palkasi, which is about 40 miles long, and 30 broad, in latitude 48°, longitude 97°, reckoning from the isle of Ferro: on this river the khan of the Eluths, or Kalmuks, usually resides: the river Irtsih, Irtis, or Erchi, which rises in Mount Altay, and runs westward, inclining to the north, between two branches of it, into the lake Sayfan, Saffan, or Ifan, called also *Honhotu-Nor*, 90 miles long from west to east, and 40 broad, in latitude 47° 30', longitude 104°; from whence issuing again, it passes north-west, through part of Siberia, and falls into the Obi, which has its source in the same mountain, about one degree to the north of that of the Irtsih; and seven or eight degrees to the north-east rises the Kem, or Jenisca, which runs westward for the space of seven or eight degrees, and then turning northward enters Siberia. The next river of note is the Selinga, which rises out of the lake Kofogol, Hutükto, or Khütükütö, which is 70 miles long from south to north, and 20 broad, in latitude 52°, longitude 118°, not far from the source of the Janisca, and taking a sweep southward, round by the east, falls northward into the lake Baykäl in Siberia, about 30 leagues north-west of the city Selinghinskoy, which stands upon it. Into the Selinga runs the Orkon, coming from the south-west; and into the Orkon the Tula, rising eastward in Mount Kentey. On the same mountain rises also two other rivers, viz. the Onon, called also by the Tartars *Saghalian Ula*, or the Dragon river, and by the Russians

Amür; which running north-eastward, and then taking a large sweep by the south, rolls along the bounds of Eastern Tartary, and falls into the eastern Ocean. On its banks stand two cities: Nerchinskoy, or Nipchew, a frontier of the Russians, almost due north of Pekin in China; and Saghalian Ula, possessed by the Chinese. Another large river in the Kerlon, or Kerulon, which running north-eastward, falls into the lake Kulon, or Dalay, which is 60 miles long from south-west to north-east, and 27 broad, in latitude 48° 30', longitude 135°, and issuing out again under the name of *Ergona*, or *Argun*, joins the Saghalian Ula, about 170 miles beyond Nerchinskoy. To these let us add the river Kalka, from whence, tho' small, the Kalka-Moguls, or Mongols, take their name. It rises in the mountains, separating Eastern from Western Tartary, and, running westward, falls into the lake Pair, and then into that of Kulon, before spoken of.

In the middle of a desert, on the banks of the river Irtsih, is a remarkable piece of antiquity called *SEDMY PALATY*, or *the seven palaces*. See that article.

Above the *Sedmy Palaty*, towards the source of the Irtsih, grows the best rhubarb in the world, without the least culture. In a plain of this country also, about eight or ten days journey from Tomsk in Siberia, are found many tombs and burying-places of ancient heroes, who in all probability fell in battle. These tombs are easily distinguished by the mounds of earth and stone raised over them; the Tartars say, Tamerlane had many engagements in this country with the Kalmuks, whom he in vain endeavoured to conquer. Many persons go from Tomsk, and other parts, every summer, to these graves, which they dig up, and find among the ashes of the dead considerable quantities of gold, silver, brass, and some precious stones, but particularly hilts of swords and armour. They find also ornaments of saddles and bridles, and other trappings for horses; and sometimes those of elephants. Whence it appears, that when any general or person of distinction was interred, all his arms, his favourite horse and servant, were buried with him in the same grave; this custom prevails to this day among the Kalmuks and other Tartars, and seems to be of great antiquity. It appears from the number of graves, that many thousands must have fallen in those places; for the people have continued to dig for treasure many years, and still find it unexhausted. They are, indeed, sometimes interrupted, and robbed of all their booty, by parties of Kalmuks, who abhor disturbing the ashes of the dead. Armed men on horseback, clad in brass, of no mean design and workmanship, with the figures of deer cast in pure gold, have been dug out of these tombs. They once discovered an arched vault, where they found the remains of a man, with his bow, lance, and other arms, lying on a silver table. On touching the body, it fell to dust. The value of the table and arms was very considerable.

Great quantities of a kind of ivory, called by the natives *Mammens-horn*, are found in this country and in Siberia, on the banks of the Obi. They are commonly found on the banks of rivers that have been washed by floods. Some of them are very entire and fresh, like the best ivory in all respects, excepting only the colour, which is of a yellowish hue. In Siberia,

Tartary. ria they make snuff-boxes, combs, and divers sorts of turnery ware of them. Some have been found weighing above 100 pounds English.

The most considerable tribes in Western Tartary, next to the Kalmucks, are the Kalkas and Mungls, or Mongals, properly so called. The country of the Kalkas extends eastward, from mount Altay to the source of the river Kalka, whence they derive their name, in the borders of Eastern Tartary, and 139th degree of longitude. The territories of the Mungls, or Mongals, lie to the south of those of the Kalkas, between them and the great wall of China, to which empire both nations are subject. Besides these tribes, who are idolaters, of the religion of the Delay Lama, there are others, who possess that part of Western Tartary called *Turkestan*, the original country of the Turks and Turkmans, situated to the north of Great Bukharia and Karazm, between those countries and the dominions of the Eluths. Under Western Tartary also is comprehended Tibet, Thibet, or Tobutt, subject to the Delay Lama, or great high-priest of the Pagan Tartars and Chinese.

In all the vast region of Western Tartary there are but few towns, most of the inhabitants living under tents, especially in summer, and moving from place to place with their flocks and herds. They generally encamp near some river, for the convenience of water.

The air of this country is temperate, wholesome, and pleasant, being equally removed from the extremes of heat and cold. As to the soil, tho' there are many mountains, lakes, and deserts in it, yet the banks of the rivers, and the plains, some of which are of great extent, are exceeding fertile. The mountains, woods, and deserts, abound with venison, game, and wild fowl; and the rivers and lakes both with fish and fowl. In particular, here are wild mules, horses, and dromedaries, wild boars, several kinds of deer, a species of goats with yellow hair, squirrels, foxes; an animal called *hautchan*, resembling an elk; another called *chulon*, or *chelson*, that seems to be a sort of lynx; and a creature called *tael-pe*, as small as an ermine, of whose skins the Chinese make mantles to keep out the cold. Among other birds of extraordinary beauty, bred in this country, there is one called the *shonkar*, which is all over white except the beak, wings, and tail, which are of a very fine red. Notwithstanding the soil in many parts of Tartary is so luxuriant, yet, we are told, it does not produce a single wood of tall trees of any kind whatever, excepting in some few places towards the frontiers; all the wood that is found in the heart of the country consisting of shrubs, which never exceed the height of a pike, and even these are rare.

It is remarkable, that in all the vast dominions of Mongolia, there is not so much as a single house to be seen. All the people, even the prince and high-priest, live constantly in tents, and remove their cattle from place to place, as conveniency requires. These people do not trouble themselves with ploughing or digging the ground in any fashion, but are content with the produce of their flocks, though the soil is exceeding fine, and capable, by proper culture, of producing grain of several sorts.

In the country of the Mongals the grafs is very

thick and rank, and would, with little labour, make excellent hay. This grafs is often set on fire by the Mongals in the spring, during high winds. At such times it burns most furiously, running like wild-fire, and spreading its flames to the distance of perhaps 10 or 20 miles, till its progress is interrupted by some river or barren hill. The rapidity of those flames, their smoke and crackling noise, cannot easily be conceived by those who have not seen them. When any person finds himself to the leeward of them, the only method by which he can save himself from their fury, is to kindle immediately the grafs where he stands, and follow his own fire. For this purpose, every person is provided with flints, steel, and tinder. The reason why the Mongals set fire to the grafs, is to procure early pasture to their cattle. The ashes left upon the grafs sink into the earth at the melting of the snow, and prove an excellent manure; so that the grafs in the spring rises on the lands which have been prepared in this manner, as thick as a field of wheat. Caravans, travellers with merchandise, but especially armies, never encamp upon this rank grafs; and there are several instances of considerable bodies of men being put in confusion, and even defeated, by the enemy's setting fire to the grafs.

Eastern Tartary, according to the limits usually assigned it by historians and geographers, is bounded to the west by Western Tartary, or by that part possessed by the proper Mungls and Kalkas; on the north, by Siberia; on the east, by that part of the Oriental Ocean called the *Tartarian Sea*; and on the south by the same sea, the kingdom of Korea, and the Yellow Sea, which separates it from China. It is situated between the 137th and 160th degrees of longitude, being about 900 miles long from south to north, and near as many in breadth from west to east, yet but thinly peopled. This large region is at present divided into three great governments, all subject to the Chinese, viz. Shin-yang, or Mugden, Kurin-ula, and Taitikar.

The government of Shin-yang containing all the ancient Lyau-tong or Quan-tong, is bounded on the south by the great wall of China and the Yellow Sea; on the east, north, and west, it is inclosed by a wooden palisade, seven or eight feet high, fitter to mark its bounds and keep out petty robbers, than to oppose an army.

The lands of this province are, for the general, very fertile, producing abundance of wheat, millet, roots, and cotton. They also afford pasture to great numbers of sheep and oxen, which are rarely seen in any of the provinces of China. They have indeed but little rice; yet, to make amends, there is plenty of apples, pears, hazel-nuts, filberds, and chestnuts, even in the forests. The eastern part, which borders on the ancient country of the Manchews and kingdom of Korea, is full of deserts and bogs. The principal cities of this government are Shing-yang or Mugden, Fong-whang-ching, Inden, Ichew, and Kingchew. This country was the original seat of the Tartar tribe of the Manchews, who have been masters of China above 100 years.

The government of Kirin-ula-hotun is bounded westward by the palisade of Lyau-tong; on the east, by the Eastern Ocean; southward, by the kingdom of

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Korea; and on the north by the great river Saghalien: so that it extends no fewer than 12 degrees, and almost 20 degrees in longitude, being 750 miles in length, and 600 in breadth.

This vast country abounds in millet and oats, with a sort of grain unknown in Europe, called by the Chinese *may-sen-mi*, as being of a middle kind between wheat and rice. It is wholesome, and much used in those cold regions. There is but little wheat or rice here; but whether that is the fault of the soil or the inhabitants, we cannot assert. The cold begins much sooner in these parts than at Paris, whose latitude is near 50 degrees. The forests, which are very thick and large the nearer you advance to the Eastern Ocean, contribute not a little to bring it on and keep it up. The banks of the rivers here, in summer, are enamelled with a variety of flowers common in Europe, excepting the yellow lilies, which are of a most lively colour, in height and shape exactly resembling our white lilies, but are of a much weaker scent. But the plant which is most esteemed, and draws a great number of herbalists into these deserts, is the gin-seng*, called by the Manchews *arhota*; that is, the chief or queen of plants. It is highly valued for its virtues in curing several diseases, and all decays of strength proceeding from excessive labour of body or mind. For this reason it has always been the principal riches of Eastern Tartary; what is found in the north of Korea being consumed in that kingdom.

Formerly the Chinese used to get into the gin-seng country among the mandarins and soldiers continually passing; but, in 1700, the emperor Kang-hi, that his Manchews might reap this advantage, ordered 10,000 of his soldiers, encamped without the great wall, to go and gather it, on condition that each should give him two ounces of the best, and take an equal weight of fine silver for the remainder: by which means the emperor got in that year 20,000 pounds of it for less than one-fourth of the price it bears at Pekin. The root is the only part that is used medicinally. Its value is enhanced by its age, for the largest and firmest are the best. This country abounds also in fine fables, grey ermines, and black foxes.

One of the tribes of Tartars inhabiting this country are called the *Tu-pi Tartars*, whose manner of life is somewhat extraordinary. All the summer they spend in fishing: one part of what they catch is laid up to make oil for their lamps; another serves for their daily food; and the rest, which they dry in the sun, without salting, for they have no salt, is laid up for their winter's provisions, whereof both men and cattle eat when the rivers are frozen. Notwithstanding this diet, a great deal of strength and vigour appears in most of these poor people. Their raiment consists of the skins of fish, which, after dressing and dyeing of three or four colours, they shape and sew in so delicate a manner, that one would imagine they made use of silk, till, on ripping a stitch or two, you perceive an exceeding fine thong, cut out of a very thin skin. When the rivers are frozen, their sledges are drawn by dogs trained up for the purpose, and highly valued.

Although the Manchew language is as much used at the court of Pekin as the Chinese, and all public acts are drawn up in the one as well as the other; yet it began to decline, and would probably have been

lost, had not the Tartars taken great pains to preserve it, by translating Chinese books, and compiling dictionaries, under the emperor's patronage. Their language is singular in this respect, that the verb differs as often as the substantive governed by it: or, which is the same thing, to every different substantive they use a different verb; as for instance, when they would say, *make a verse, a picture, a statue*; for tho' the repetition of the same verb in discourse might be excusable, it is with them unpardonable in writing, as making a monstrous grating to their ears.

Another singularity of their language is the copiousness of it: for instance, besides names for each species of animals, they have words to express their several ages and qualities. *Judagen* is the general name for a dog; but *taiba* signifies a dog who has very long and thick hair both on his ears and tail; and *yolo*, a dog with a long thick muzzle and tail, large ears, and hanging lips. The horse, as more serviceable to them, has 20 times more names than the dog; almost every motion of him giving occasion to a different name. Where they could get that astonishing multitude of names and terms, is not easy to determine.

On the west are the Mungle, but in the two languages there are scarcely eight words alike. They understand nothing of the language of a few savage nations on the east and north. As to the Koreans, their language and letters being Chinese, have no resemblance to the Manchews. It is said, they have above 60 letters in their alphabet, but only one sort of character. They write from the top to the bottom of the paper, like the Chinese, but four different ways, according to the occasion, as in other countries. They commonly write with a pencil, though some use a kind of bamboo pen; but the pencil holds ink better, and moves more freely on the paper. The Manchews think their language the most elegant, as well as the most copious, in the world; and imagine there is no rendering the sense of it, much less the majesty of its style, in any other language: yet they cannot express all sounds, as they want the letters B and D, using P and T in their stead; nor can write words in which two consonants come together, without inserting a vowel between them. Their transitions likewise are so few, that they are much puzzled how to connect their written discourses. In other respects it must be allowed to be a masterly language, and as full of terms perhaps as the Arabic itself.

This country is but thinly peopled, and contains only four cities, namely, Kirinula-hotun or Khotun, Pedne or Petuna, Ningûta, and Putay-ula-hotun, which are very ill-built, and encompassed with no better than mud-walls. The first stands on the river Songari, and is the residence of the Manchew general, who has all the privileges of a viceroy, and commands the mandarines as well as the troops. Ningûta, which the family now reigning in China considers as its ancient patrimony, is situated on the Hûrkapira, which runs northward into the Songari. Its name is compounded of two Tartarian words which signify seven chiefs, to express the rise of the Manchew kingdom, which was first established by seven brothers of the late emperor Kanghi's great-grandfather's father.

The tribe of the Manchews, who inhabit a part of

* See
PANAS.

Tartary. of Eastern Tartary, and are lords of all the other inhabitants thereof, are called by the Russians *Bogdoy*; and the emperor of China, *Bogdoy khan*, and *Amulon Bogdoy khan*.

The third government into which Eastern Tartary is divided, is that of *Tsitikar*. It is 740 miles long, and 600 broad; and belongs partly to China, and partly to Russia. The people are great hunters, dexterous archers, and pay their tribute in fable skins; each family being affixed two or three, or more a-year, according to the numbers of able persons.

This province is inhabited chiefly by three sorts of Tartars, the Manchews, the Solons, and *Taguri*, of whom the first are masters. The *Taguri* are a large robust people, but not very numerous. They live in houses or huts, and cultivate barley, oats, and millet. Their cattle are principally horses, dromedaries, oxen, cows, and sheep. They make much use of their oxen to ride on.

The Solons also are a brave robust people. Their dress is a short jacket of wolves skins, with a cap of the same; and they have long cloaks, made of fox or tigers skins, to defend them against the cold, especially of the night. They hang their bows at their backs. Their women ride on horseback, drive the plough, hunt stags and other game.

Besides the country towns or villages, there are three cities in the province of *Tsitikar*, namely, *Tsitikar*, *Merghen*, and *Saghalian-ula-hotun*. The garison of *Tsitikar*, the capital, consists of Manchews; but the inhabitants are mostly Chinese. According to their own account, they are all shamans, or conjurors, and invoke the devil with frightful cries. They give their dead two burials, first leaving a hole at top of the grave, where the relations daily bring victuals, which they convey to the mouth of the deceased with a spoon, and leave drink in small tin cups, standing round the grave. This ceremony holds for several weeks, after which they bury the body deeper in the ground.

Several rivers in this country produce pearls, which, tho' much cried up by the Tartars, would be little valued by Europeans, on account of their defects in shape and colour.

The kingdoms or countries of *Corea*, *Lyau-tong*, and *Nyu-che*, forming a part of *Katay*, *Kitay*, or *Cathay*, and by some included under Eastern Tartary, are more properly provinces of China, tho' they lie without the great wall.

Uzbek Tartary. To the north and north-east of Persia lie the countries of *Karasm*, and Great and Little *Bukharia*, which being mostly subject to and inhabited by the tribe of *Uzbek* Tartars, are commonly known by the general name of *Uzbek Tartary*.

The kingdom of *Karasm* was known to the ancient Greeks, as appears from *Herodotus*, *Ptolemy*, and other authors of that nation, by the name of *Khorasmia*. At present it is bounded on the north by the country of *Turkistan*, and the dominions of the great khan of the *Eluths* or *Kalmuks*; on the east, by Great *Bukharia*, from which it is separated partly by the mountains of *Irdar*, and partly by the deserts of *Karak* and *Gaznah*; on the south, by the provinces of *Asterabad* and *Khorasan*, belonging to *Iran*, or *Persia* at large, from which it is divided by the river *Jihun*

or *Amu*, and sundry deserts of a vast extent; and on the west by the *Caspian Sea*.

It may be about 440 miles in length from south to north, and 300 from west to east; being situated between the 39th and 46th degrees of north latitude, and the 71st and 77th degrees of east longitude. The country consists, for the most part, of vast sandy plains, some of which are barren deserts, but others afford excellent pasture. There is good land in several of the provinces, where vines grow, and wine is made; but water being scarce, a great part of the country turns to no account.

Karasm owes all its fertility to three rivers and a lake. The rivers are the *Amu*, *Khesil*, and *Sir*. The *Amu*, as it is called by the *Uzbeks* and *Persians*, is the *Jihun* of the *Arabs*, and *Oxus* of the ancient *Greeks*. It has its source in those high mountains which separate Little *Bukharia* from the dominions of the Great *Mogul*; and, after passing through Great *Bukharia* and *Karasm*, divides into two branches, one of which falls into the *Khesil*, and the other into the *Caspian Sea*, towards the borders of the province of *Asterabad*. The *Amu* abounds with all sorts of excellent fish, and its banks are the most charming in the world. Along them grows those excellent melons and other fruits so much esteemed in *Persia*, the *Indies*, and *Russia*.

The river *Khesil* rises in the mountains to the north-east of the province of *Samarkant*, and falls into the lake of *Aral* or *Eagles*, 50 or 60 miles below its junction with a branch of the *Amu*. Its banks are exceeding fertile wherever they are cultivated.

The *Sir*, or *Daria*, rises in the mountains to the east of Little *Bukharia*, and after a long course westward, along the borders of the *Bukharis* and *Karasm*, falls at last into the lake *Aral*.

Karasm is at present inhabited by three sorts of people, the *Sarts*, *Turkmans*, and *Uzbek* Tartars. With regard to the first of these, we are told, that they are the ancient inhabitants of the country, or those who were settled there before the *Uzbeks* became masters of it; and that they support themselves like the *Turkmans*, by their cattle and husbandry. The *Turkmans*, or *Turkomans*, came originally from *Turkellan*, or the parts of *Tartary* to the north of *Karasm* and Great *Bukharia*, towards the 11th century. They divided into two parties; one of which went round the north side of the *Caspian Sea*, and settled in the western parts of the *Greater Armenia*, from thence called *Turkomania*, or the country of the *Turkomans*. The second party turned south, and rested about the banks of the river *Amu* and the shores of the *Caspian Sea*, where they still possess a great many towns and villages, in the countries of *Karasm* and *Asterabad*.

The name of *Uzbeks*, which the ruling tribe of the Tartars of *Karasm* and Great *Bukharia* bear at present, is derived from one of their khans. The *Uzbeks* of *Karasm* are divided into several hords, and live for the most part by rapine; resembling in all respects those of Great *Bukharia*, excepting that they are much more rude and uncivilized. Like the *Turkmans*, they dwell in winter in the towns and villages which are towards the middle of *Karasm*; and in summer the greater part of them encamp in the neighbourhood.

Tartary.

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bourhood of the Amu, or in other places where they can meet with pasture for their cattle, always watching for some convenient opportunity to rob and plunder. They never cease making incursions upon the adjacent territories of Persia or Great Bukharia, and are to be restrained by no treaties or engagements whatsoever. Although they have fixed habitations, yet, in travelling from one place to another, they carry with them all their effects of value, conformable to the way of living in use among their ancestors before they had settled dwellings.

Their Tartars, it is said, never ride without their bow, arrows, and sword, although it be in hawking or taking any other diversion. They have no arts or sciences among them, neither do they till or sow. They are great devourers of flesh, which they cut in small pieces, and eat greedily by handfuls, especially horse-flesh.

Their chief drink is four mare's milk, like that in use with the Nogays. They eat their victuals upon the ground, sitting with their legs double under them; which is their posture also when they pray.

All these tribes have abundance of camels, horses, and sheep, both wild and tame. Their sheep are extraordinary large, with great tails weighing 60 or 80 pounds. There are many wild horses in the country, which the Tartars frequently kill with their hawks. These birds are taught to seize upon the head or neck of the beast, which being tired with toiling to get rid of this cruel enemy, the hunter, who follows his game, comes up and kills him. Some travellers tell us, that the inhabitants of this country have not the use of gold, silver, or any other coin, but barter their cattle for necessities. Others tell us, that they have money, particularly a piece of silver called *tanga*, the value near the fourth-part of a crown. It is round, and has on one side the name of the country, and on the other that of the khan with the year of the hejrah. There are also, it is said, small pieces of copper, of different sizes, which answer to our pence, half-pence, and farthings.

As to the government of Karafm, the Usbecks being masters, it is commonly vested in divers princes of that tribe of the same house; of whom, notwithstanding, only one has the title of *khan*, with a kind of superiority over the others. This khan has no sort of dependence on him of Great Bukharia, or any other prince.

Bukharia, Bokharia, Bokaria, Bogaria, or Boharia, is the name given to all that region or tract of land lying between Karafm and the Great Kobi, or Sandy Desert, bordering on China. It is divided into the Great and Little Bukharia; for an account of which see the article BUKHARIA.

TARTINI (Signior), a very celebrated Italian composer and performer on the violin, was born at Pirano in Istria in 1692; where, having in his early youth manifested an attachment to an unworthy object, his father shut him up: it was during this confinement, that, amusing himself with musical instruments, he accidentally discovered the seeds of his musical talents. He was engaged in 1722 as a performer in the church of St Anthony at Padua, in which capacity he officiated as long as he lived; and wrote several treatises on music. A singular anecdote is re-

lated of him, which serves to show to what a degree his imagination was animated by a genius for composition. He dreamed one night, in 1713, that he had made a compact with the devil, who promised to be at his service on all occasions; and in the course of their acquaintance presented his new friend with his violin to try what kind of a musician he was. To his great astonishment, he heard the devil play a solo so exquisitely beautiful, that he awaked in a transport, and, seizing his fiddle, endeavoured in vain to express what he thought he had just heard: however, he then composed a piece, which is perhaps the best of all his works; and called it *The devil's sonata*. He died in 1770; and left to the professor Colombo the care of a posthumous work, of which, as Dr Burney relates, though it is chiefly mathematical, the theory of sound makes a considerable part.

TASSO (Torquato), a justly celebrated Italian poet, was born at Sorrento in the kingdom of Naples, in 1544. He was the son of Bernardo Tasso, the author of several ingenious compositions both in verse and prose; and of Portia de Rossi, a lady of an illustrious family of Naples.

His father being obliged to accompany the prince of Salerno to the emperor Charles V. upon a deputation from Naples to remonstrate against erecting the inquisition there, committed the care of his son, then three years old, to Angeluzza, a man of great learning; who, we are told, at this tender age began to teach him grammar: at four he was sent to the Jesuits college, and at seven was well acquainted with Latin and Greek. At 12 years of age he went from Rome to Mantua, where his father had entered into the service of the Duke Guglielmo Gonzaga: he had then completed his knowledge of the Latin and Greek languages; he was well acquainted with rhetoric and poetry, and a master of Aristotle's ethics; he had also studied the precepts of Mauritio Cataneo with particular attention, and ever after revered him as a second father.

He was soon after sent to the university of Padua; and, in his 18th year, published his *Rinaldo*, a poem written upon the plan of Homer's *Odyssey*. This extended his reputation throughout all Italy; but greatly displeased his father, who foresaw that it would seduce him from studies of more advantage. He went to Padua, to remonstrate against his apparent purpose of giving himself up to philosophy and poetry, and made use of many very harsh expressions, which Tasso heard with a patience and tranquillity that made the old gentleman still more angry: "Of what use is that philosophy on which you value yourself so much?" "It has enabled me (replied Tasso) to endure the harshness of your reproaches."

He soon after went to Bologna, by the invitation of the city and college; but in a little time returned to Padua at the pressing instances of Scipio Gonzaga, who had been elected prince of the academy that had been established in that city by the name of the *Ætherei*. He was incorporated into this society, and took upon himself the name of *Pentio*.

In this retreat he formed the design of his *Jerusalem Delivered*, invented the fable, disposed the parts, and determined to dedicate it to the house of Este; but whether to Alphonso II. the last duke of Ferrara,

Tasso.

rara, or his brother the cardinal Luigi, to whom he had already dedicated his *Rinaldo*, he was yet in doubt. Being pressed by both the brothers to reside with them at Ferrara, he consented. The duke gave him an apartment in his palace, where he lived in peace and affluence, and prosecuted his work; which he now determined to dedicate to the duke, and which was published by his patrons, book by book as he finished them.

When he was about 27, he published a pastoral comedy called *Aminta*; which was received with universal applause, as a master-piece in its kind, and is the original of the *Pastor Fido* and *Filli di Sciro*.

In the 30th year of his age he finished his *Jerusalem*, and the whole was reprinted and published together: the success of it was astonishing; it was translated into Latin, French, Spanish, and even the Oriental languages, almost as soon as it appeared.

But it was Tasso's fate to become wretched from the moment that he gained the summit of reputation: very soon after his *Jerusalem* was published, he lost his father, who died at Ostia upon the Po, the government of which place had been given him by the duke of Mantua; his *Jerusalem* was attacked by a swarm of ignorant, but petulant critics, who gave the preference to the rhapsodies of Pulci and Boyardo; and the perfidy of a friend drew upon him much greater misfortunes.

This friend was a gentleman of Ferrara, to whom Tasso had indifferently communicated some transactions of a very delicate nature concerning his patron the duke, with whom he lived. This secret being betrayed, Tasso reproached his friend for his treachery; and this reproach was retorted in such a manner as provoked Tasso to strike him. A challenge immediately ensued, and the opponents met and engaged; but during the encounter, three brothers of Tasso's antagonist came up, and all fell upon him together: Tasso defended himself so well, that he wounded two of them, and kept his ground against the others till some people came up and parted them. This made a great noise at Ferrara, where nothing was talked of but the valour of Tasso; and it became a kind of proverb, "That Tasso, with his pen and his sword, was superior to all men."

The duke being informed of the quarrel, banished the brothers from his dominions, confiscated their estates, and Tasso himself he shut up in prison under pretence of securing him from any future attacks of his enemies.

Tasso found means to escape from this confinement, after having suffered it about a year; and, being now about 34 years of age, retired to Turin, where he was soon known and recommended to the duke of Savoy, who showed him many marks of esteem and affection: but Tasso, fearing that the duke of Ferrara would require him to be delivered up, and that then the duke of Savoy would choose rather to comply than forfeit the friendship of that prince, precipitately set out for Rome alone, and without proper necessities for such a journey.

He got safe, however, to Rome; where he went directly to his friend Maurizio Cataneo, who received him with great kindness, and the whole city seemed to rejoice at the presence of so extraordinary a person.

He was visited by princes, cardinals, prelates, and all the learned in general. But being impatient of exile, he took measures to make his peace with the duke, and succeeded.

The duke received him with great appearance of satisfaction, and gave him fresh marks of his esteem. But Tasso having made some attempts on the princess Leonora, whom he has celebrated in several of his verses, the duke her brother, believing, or pretending to believe, that his ill conduct proceeded from a disordered understanding, caused him to be strictly confined in the hospital of St Anne. Tasso applied to the duke, by every friend he had, to release him from this confinement; but the duke coldly answered, that instead of endeavouring to procure the enlargement of a person in his condition, they ought rather to exhort him to submit patiently to such remedies as was judged proper for him. Tasso was certainly disordered in his mind, whether as the effect or cause of this confinement: he was conscious that he laboured under some distemper, and he believed the cause of it to be supernatural, and fancied himself haunted by a spirit that continually disordered his books and papers; to which, however, the tricks played him by his keepers might contribute. He continued, notwithstanding, to solicit the interposition of all the powers in Italy, to whom he could find means to apply, particularly the emperor and the pope; but without success. At last, after he had been a prisoner seven years, Vincentio Gonzaga prince of Mantua came to Ferrara among other great personages, during the festivals and rejoicings that were held there on the marriage of César of Este with Virginia of Medici, procured his liberty, and took him with him to Mantua, he being then in the 42d year of his age.

At Mantua he lived about a year in great favour with the prince, and in all the splendour and affluence which the favour of great princes confers; but he was weary of a state of dependence, however splendid and luxurious; and therefore resolved to go to Naples, and endeavour to recover his mother's jointure, which had been seized by her relations when he went into exile with his father Bernardo. With this view, he procured letters of recommendation to the viceroy; and having taken leave of the prince of Mantua, he went first to Bergamo, where he staid some time, and from thence proceeded to Naples.

At Naples he immediately commenced a suit at law for the recovery of his right, and divided his time between a prosecution of that and his studies. But during the summer he retired to Bifaccio, with one Giovanni Batista Manso, with whom he had contracted an intimate friendship.

Tasso, who was now in his 45th year, appeared to Manso, while they were at Bifaccio, to be affected with a melancholy, which had very singular effects: he therefore very frequently questioned him about them; and Tasso told him that he had a familiar spirit, with whom he frequently and freely conversed. Manso treated this as an illusion, but Tasso still affirmed it to be real; and telling him that the spirit would meet and converse with him the next day, invited him to be present. Manso coming at the hour appointed, saw Tasso fix his eyes with great earnestness upon a window, and perceiving him to continue without motion.

Tasso. tion, he called him several times by his name; Tasso made no reply, but at length cried out with great vehemence, "There is the friendly spirit that is come to converse with me; look, and be convinced that what I have said is true." Manfo looked, not without some surprise, but saw nothing except the sunbeams which shone through the window: he was just going to ask where the pretended spirit was, when he was prevented by Tasso's speaking with great earnestness to some imaginary being, sometimes putting questions, and sometimes giving answers, in a manner so pleasing, and with such elevation of expression, that Manfo had no desire to interrupt him: the conversation at last ended by the supposed departure of the spirit; when Tasso, turning round to his friend, asked if his doubts were removed; to which he made no reply, being so much amazed that he gladly waived all farther conversation on the subject.

Finding his law-suit not likely to be soon determined, he went from Naples to Rome, where he continued about a year, in high favour with Pope Sextus Quintus; and then went to Florence, at the pressing invitation of Ferdinando grand duke of Tuscany, who had been cardinal at Rome when Tasso first resided there.

Having spent about another year at Florence, he returned again to Naples; and there applied himself to correct his *Jerusalem Delivered*. Soon after the publication of this work, Hippolito Aldrobandini succeeded Sextus Quintus to the papacy, by the name of *Clement the VIIIth*; and his two nephews, Cynthio and Pietro Aldrobandini, were created cardinals. Cynthio, who was a great patron of learning and genius, and had known Tasso when he last resided at Rome, prevailed with him once more to leave his retreat at Naples, and live with him in that city. Here he continued till his 50th year; and being then again weary of his situation, and desirous to prosecute his law-suit, he obtained permission to retire once more to Naples, where he took up his abode with the Benedictine fathers, in the convent of St Severin. Cardinal Cynthio, however, found means to recal him again to Rome, after a very short absence, by having prevailed with the Pope to confer upon him the honour of being publicly and solemnly crowned with laurel in the Capitol.

He set out from Naples to receive this honour, with a preface that he should never return; and arrived at Rome in the beginning of the year 1595, being then about 51 years old: he was met at the entrance of the city by many prelates and persons of distinction, and was introduced by the two cardinals to the Pope, who complimented him by saying, "That his merit would confer as much honour on the laurel he was about to receive, as the laurel had formerly conferred on others." Orders were immediately given to decorate not only the Pope's palace and the Capitol, but all the principal streets through which the procession was to pass: but Tasso, whether from an habitual dejection of mind, or a secret sensation of the first approaches of a disease which he apprehended would be fatal, declared that all these pompous preparations would be in vain.

It happened, that while they were waiting for fair weather to celebrate the solemnity, cardinal Cynthio

fell sick; and, before he was perfectly recovered, Tasso himself was taken ill, and died on the 15th day of his sickness, aged 51. His poems have acquired him an immortal reputation. The principal of them are, 1. *Jerusalem delivered*. 2. *Jerusalem conquered*. 3. *Rinaldo*. 4. *The Seven Days of the Creation*. 5. *The tragedy of Torimond*. 6. *Aminta*, &c. All Tasso's works were printed together at Florence in 1724, in six volumes folio, with the pieces for and against his *Jerusalem delivered*. A pompous edition of this last poem was printed at Venice in 1745, in folio. The best edition of Mirebaud's French translation is that of Paris in 1735, in two volumes duodecimo. His *Aminta* and *Jerusalem liberata*, have been translated into English.

TASSEL, a sort of pendant ornament at the corners of a cushion or the like.—In building, tassels denote those pieces of board that lie under the ends of the mantel-trees.

TASTE, in physiology, a peculiar sensation excited by means of the organs of taste, viz. the papillae on the tongue. See ANATOMY, n° 403.

Intellectual TASTE. See MORALS, n° 179—183.

The external sense with which nature has furnished us, and by which we distinguish and relish the various kinds of nourishment that are adapted to health and pleasure, has in all languages given occasion to the metaphorical word *taste*, by which we express our perception of beauty, deformity, or defect, in the several arts. Taste then, in general, is a quick discernment, a sudden perception, which, like the sensation of the palate, anticipates reflection; like the palate, it relishes what is good with an exquisite and voluptuous sensibility, and rejects the contrary with loathing and disgust; like the palate also, it is often doubtful, and, as it were, bewildered, not knowing whether it should relish or reject certain objects, and frequently requires the influence of habit to give it a fixed and uniform determination.

To have a taste, supposes something more than merely to perceive, and to discern with accuracy the beauty of any work or object. This beauty must be felt, as well as perceived; the mind must be touched and affected by it in a lively and sensible manner. This feeling however, in order to constitute true taste, must not be a vague and confused sensation; but must be attended with a distinct view, a quick and comprehensive discernment of the various qualities, in their several relations and connections, which enter into the composition of the object we contemplate. And in this we see another striking resemblance between the intellectual taste and the sensual one: for as a nice palate perceives immediately the mixture of different wines, so the man of taste will quickly discern the motley mixture of different styles in the same production; and, let the beauties and defects be ever so closely blended in an object, will always be capable of distinguishing the former from the latter.

As the corruption of the sensual taste discovers itself by a relish for only those delicate and high-seasoned dishes, in which all the refinements of art have been employed to excite a forced sensation of pleasure; so the depravity of the intellectual taste manifests itself by an attachment to far-fetched and studied ornaments, and by a want of relish for those beauties which

Tassel,
Taste.

Taste. which are unaffected and natural. The corruption of the sensual taste, which makes us delight in such aliments as are disgusting to those whose organs are in a good state, is in reality a kind of disease; nor is that depravity of the intellectual taste which makes many prefer the burlesque to the sublime, and the laboured stiffness of art to the beautiful simplicity of nature, less a disease in our mental frame.

The intellectual taste is much more formed by education and culture, than the sensual one: for though the latter may be brought, by habit, to relish what at first excited loathing and disgust; yet it does not seem to have been the intention of nature, that the generality of mankind should acquire by custom and experience those sensations and perceptions which are necessary to their preservation. It is otherwise with the intellectual taste: its formation requires time, instruction, and experience. A young man uninstructed in the arts of music and painting, let his natural sensibility be ever so quick and lively, will not immediately distinguish, in a grand concert of music, the various parts whose connection and relation constitute the essence and charm of the composition; nor will he perceive in a picture the gradations of light and shade, that harmony of colours, that correctness of design, which characterise a finished piece: but in process of time, and also by degrees, he learns both to hear and to see in a more perfect manner. The same uninstructed person will find a variety of emotions arise in his mind the first time he is present at the representation of a fine tragedy: but he will neither perceive the dexterity of the author in maintaining the unities; nor that exquisite art by which the drama is so managed, that no person enters upon the scene nor quits it without an evident reason; nor yet that still more nice and difficult art of making the various subordinate interests terminate and centre in one, which absorbs them all. It is only by the force of habit and reflection that he will distinguish these several objects of taste, and feel delightful sensations from circumstances of which formerly he had little or no idea.

Elegant and able artists may communicate their feelings and their discernment to others, and thus excite taste in a nation, which, without them, had never known its refined pleasures. By frequently contemplating the works of great and eminent masters in the various arts, the powers of nature arise into taste; and we imbibe, as it were, the spirit of these illustrious men, so as to come at length to look at a gallery of paintings with the eyes of a Le Brun, a Poussin, or a Le Sueur; nay, we even read works of learning and genius with a portion of that spirit that appears in their composition.

If, in the first periods of the culture of the arts and sciences, it has sometimes happened, that a whole nation have been unanimous in the praise of authors full of defects, and whom succeeding ages have beheld with indifference, and even with contempt; the reason is, that these authors had natural beauties which were perceived by all, while that just discernment that was necessary to distinguish their numerous defects, and which is less the gift of nature than the result of time, habit, and reflection, was as yet acquired by none. Thus Lucilius, who had been in the highest reputation among the Romans, sunk into oblivion when

Horace arose; and Regnier was universally admired by the French, until Boileau appeared; and if there are several ancient authors who have maintained their credit, notwithstanding the absurdities that are to be found in every page of their writings, it must be the authors of those nations among whom no judicious and correct writer has appeared to open their eyes, like Horace among the Romans, and Boileau among the French.

It is a common saying, that there is no disputing about tastes: and if by the taste here be understood the palate, which loaths certain aliments and relishes others, the maxim is just; because it is needless to dispute about what cannot be corrected, or to attempt reforming the constitution and mechanism of organs merely corporeal. But the maxim is false and pernicious, when applied to that intellectual taste which has for its objects the arts and sciences. As these objects have real charms, so there is in reality a good taste which perceives them, and a bad one which perceives them not; and there are certain methods by which we may often correct those mental defects which produce a depraved taste. But it must be granted, at the same time, that there are certain phlegmatic spirits which nothing can enliven; and also certain distorted intellects which it is impossible to rectify: with such, therefore, it is in vain to dispute about taste, because they have none at all.

In many things taste seems to be of an arbitrary nature, and without any fixed or uniform direction; such as in the choice of dress and equipage, and in every thing that does not come within the circle of the finer arts. In this low sphere it should be distinguished by the name of *fancy*; for it is fancy, rather than taste, that produces such an endless variety of new and contradictory modes.

The taste of a nation may degenerate and become extremely depraved; and it almost always happens, that the period of its perfection is the forerunner of its decline. Artists, through the apprehension of being regarded as mere imitators, strike out into new and uncommon paths, and turn aside from the beautiful simplicity of nature, which their predecessors invariably kept in view. In these efforts there is a certain degree of merit, which arises from industry and emulation, and casts a veil over the defects which accompany their productions. The public, fond of novelty, applauds their invention; but this applause is soon succeeded by satiety and disgust. A new set of artists start up, invent new methods to please a capricious taste, and depart still further from nature than those who first ventured from its paths into the wilds of fancy. Thus the taste of a people degenerates into the grossest corruption. Overwhelmed with new inventions, which succeed and efface each other with incredible rapidity, they scarcely know where they are, and cast back their eager and anxious desires towards the period when true taste reigned under the empire of nature. But they implore its return in vain; that happy period cannot be recalled; it deposits, however, in the custody of certain choice spirits, the sublime pleasures of true taste, which they cherish and enjoy in their little circle, remote from the profane eye of the depraved and capricious multitude.

There are vast countries where taste has not yet

Taste.

been able to penetrate. Such are those uncultivated wastes, where civil society has never been brought to any degree of perfection, where there is little intercourse between the sexes, and where all representations of living creatures in painting and sculpture are severely prohibited by the laws of religion. Nothing renders the mind so narrow, and so little, if we may use that expression, as the want of social intercourse; this confines its faculties, blunts the edge of genius, damps every noble passion, and leaves in a state of languor and inactivity every principle that could contribute to the formation of true taste. Besides, where several of the finer arts are wanting, the rest must necessarily languish and decay, since they are inseparably connected together, and mutually support each other. This is one reason why the Asiatics have never excelled in any of the arts; and hence also it is that true taste has been confined to certain countries in Europe.

TASTES of substances, particularly Vegetables. The ancients, particularly Aristotle, and Theophrastus, enumerate only seven primitive tastes: 1. Sweet. 2. Fat. 3. Acid. 4. Acid. 5. Austerity or harsh. 6. Acerb. 7. Salt, and bitter. These last are by Theophrastus confounded.—To these seven primitive tastes of Aristotle and Theophrastus, Pliny has added the following six, which, however, appear to be rather intermediate steps of those already enumerated, than simple tastes. 8. Agreeable (*suavis*), a mode of sweet. 9. Poignant or tart (*acutus*), a less degree of acid. 10. Bitter (*amarus*), a simple taste, confounded by the Greek naturalist, as was observed above, with a salt taste. 11. Vinous, a composition, according to Pliny, of sweet, agreeable, poignant, and austere. 12. Milky taste, composed of agreeable and fat. 13. Watery, which is almost insipid.

The school of Salerno distinguished nine simple tastes, which they characterized by their different temperaments, as follows. I. Acid, bitter, and alkaline salt: WARM. II. Watery or insipid, sweet, and fat: TEMPERATE. III. Acid, harsh or acerb, and acid salt: COLD. The moderns, by distinguishing austere from acerb, adding some things, and retrenching others, have increased the number of simple tastes to ten; which stand thus opposed to each other.

I. Insipid or watery,	} of opposite	VI. Acid, or alkaline salt.
II. Sweet,		VII. Acid.
III. Fat,		VIII. Austere.
IV. Viscous,		IX. Acerb.
V. Acid,		X. Bitter.

Tastes are distinguished by their quantum of force or intensity into steps or degrees, which are likewise, sometimes, by writers on the materia medica, used for expressing the different temperaments of those tastes. Thus the simple taste bitter has been divided into ten degrees; and we say, that the root of turmeric is bitter in the first or lowest degree, the seed of blue clematis in the tenth or highest. In the same manner, as a bitter taste indicates a warm temperament, other degrees or divisions arise from the intensity of warmth in the instances in question; and we say, that one is warm in such a degree, and the other in a different.

Some tastes affect the organ of sensation sooner than others which are of a greater degree of intensity.

Acid and bitter tastes, as vinegar and wormwood, are soon felt, and quickly gone. Acid tastes are not felt so soon, and last longer. Thus the sharpness of the seeds of clematis, although in the tenth degree, is not so quickly perceived as the bitterness of roses, although only in the second degree. Hot tastes are slower in affecting the organ of sense, and last longer than others. Thus the bitterness of the roots of black hellebore, which is in the second degree, is perceived on the slightest contact; but its heat, though in the third or fourth degree, is not felt till after two minutes; in like manner, the bitterness of elecampane although only in the fourth degree, is sooner felt than its heat, which is in the eighth.

The climax or increase which is observed in the sensation or perception of tastes, during its continuance, is different in different objects. The heat of galangal causes, at first, a slight sensation, but it is not till the end of one minute that its greatest force is perceived. Black hellebore does not attain its highest sensation till four minutes after its first contact.

The duration of the greatest force of the sensation is likewise different as the substances differ; thus the heat of black hellebore comes to its greatest intensity and diminishes in one minute; that of the root of garden-cress in the same time; that of the root of asarabacca in two minutes.

The leaves of milfoil, which are bitter in the fourth degree, and warm in the first, lose at first their bitterness, whilst their heat still continues. Acorus, or sweet rush, is hot in the first degree, aromatic in the third, and bitter in the fourth; yet its bitterness is presently extinguished; its heat lasts two minutes, and its aromatic sensation seven or eight. The heat of garden-cress endures seven or eight minutes; the bitterness of elaterium a quarter of an hour; the heat of euphorbium and black hellebore half an hour; the acid sensation occasioned by the root of arum, or cuckoo-pint, often lasts 12 hours. From these familiar examples it appears, that the sensation acquires its greatest force in four or six minutes at most from the time of contact; its duration in its decrease is often 30 or 40 minutes and upwards.

Tastes, considered with relation to the parts which they affect, are either, 1. fixed and local; 2. extend themselves to the parts in the neighbourhood of that which is first affected, without, however, relinquishing their former station; as the bitterness of the dried roots of black hellebore, which spreads from the end of the tongue to its middle; and that of the leaves of elaterium, which spreads from the tip of the tongue to its root; or, 3. are translated from one part to another, as in the roots of gentian, the bitterness of which soon relinquishes the tip of the tongue, the part first affected, and translates itself to the middle.

Sapid bodies affect differently the parts which they touch, as the lips, tongue, palate, throat, and gullet.

The lips are affected more strongly by the heat of the root of white hellebore, than any of the other parts.

The tip of the tongue is affected by most plants; gentian and colocynthis affect chiefly the middle; the leaves of elaterium, the root.

The palate is affected by the root of deadly nightshade; its impression lasts four minutes.

The

The throat is more affected than the other parts by the roots of mercury, asparagus, and jalap.

The œsophagus or gullet is particularly affected with heat by the roots of wormwood; the leaves make no impression of this kind; on which account they are not so stomatic as the roots.

As the taste of the same individual undergoes seeming alterations, according to the perfect or morbid state of the external organ; so different individuals of the same species are liable to real variations from climate, soil, and culture. Apples and pears which grow naturally in the woods, are extremely harsh and acid; wild fucory is bitter; wild lettuce disagreeable; culture renders them all sweet and esculent, and moreover produces such variety in the article of taste, that of 172 distinct kinds of pears, and 200 of apples, enumerated by authors, each kind has a peculiar taste.

All the parts of a plant have not the same taste; in some, the fruit has an acid and agreeable taste, whilst the leaves or roots are bitter and disagreeable; in others, the reverse of this happens. It is for this reason that plants can never be properly arranged by their sensible qualities; the different parts of the same plant possessing different qualities, must necessarily be disjoined and arranged under separate articles.

All plants act either by their smell upon the nerves, by their taste upon the muscular fibres, or by both upon the fluids. Sapid bodies never act upon the nerves, nor odoriferous bodies upon the muscular fibres. The former act upon the fluids and solids, and change the fluids, which are evacuated by both sapid and odoriferous substances.

The virtues and qualities of plants are commonly indicated by their taste, smell, and colour.

Insipid plants, and such as have no smell, have rarely any medicinal virtue.

Sapid and odoriferous plants, on the contrary, always possess very strong powers. In fact, to deprive a plant of its taste and smell is to rob it of its virtue, as is evident from the change effected in the fœcule and extracts of arum, calla, cassida, and elaterium.

Sweet-smelling plants are generally of innocent quality; such as are nauseous, and of a rank heavy disagreeable smell, are noxious.

The plants of the following list are striking examples of the latter. Many muskrooms, elder, herb-christopher, aconite, hellebore, asarabacca, stinking ben trefoil, thorn-apple, tobacco, hen-bane, colocintida, and hounds-tongue.

TATE (Nahum), an English poet, born about the middle of the reign of Charles II. in Ireland, where he received his education. He was made poet-laureat to king William upon the death of Shadwell, and held that place until the reign of George I. whose first birth-day ode he lived to write, and executed it with unusual spirit. He died in the mint in 1716, and was succeeded in the laurel by Mr Eusden. He was the author of nine dramatic performances, a great number of poems, and a version of the Psalms in conjunction with Dr Nicholas Brady.

TATIAN, a writer of the primitive church in the second century. He was born in Assyria, and trained up in the Heathen religion and learning. Coming over to Christianity, he became the disciple of Justin Mar-

tyr, whom he attended to Rome. While Justin lived, he continued steadily orthodox; but after Justin's death he made a schism, and became the author of a new sect, condemning marriage, enjoining abstinence from wine and animal-food, and suffering only water to be used in the holy mysteries; whence his followers were called *Encratites* and *Hydroparastate*. None of his works are now extant but his piece against the Gentiles; or, as it is usually intitled, his *Oration to the Greeks*.

TATIUS (Achilles), a native of Alexandria, was the author of a book on the sphere, which father Petau translated into Latin. There is also attributed to him a Greek romance on the loves of Leucippe and Clitophon, of which Salmassius has given a beautiful edition in Greek and Latin, with notes. Suidas says, that this Achilles Tatius was a Pagan, but that he afterwards embraced the Christian religion, and became bishop. Photius mentions him in his *Bibliotheca*.

TATTOU, a beat of a drum at night to advertise the soldiers to retreat, or repair to their quarters in the garrison, or to their tents in a camp.

TATTOING, an operation in use among the islanders in the South Sea for marking their bodies with figures of various kinds which they consider as ornamental. It is performed by puncturing the skin, and rubbing a black colour into the wounds. The instrument used somewhat resembles a comb, the teeth of which are repeatedly struck into the skin by means of a small mallet. It is very painful; but the children are forced by their relations to submit to it.

TAVERNIER (John Baptiſt), a famous French traveller, was born in 1605. In the course of 40 years he travelled six times to Turkey, Persia, and the East Indies, and visited all the countries in Europe, travelling mostly on foot. His travels have been frequently reprinted in six vols 12mo. He died on his seventh journey to the east, at Moscow, in 1699.

TAVISTOCK, a town of Devonshire in England, situated on the river Tavey or Tave, W. Long. 4. 26. N. 50. 37. It sends two members to parliament, and gives the title of *marquis* to the noble family of Russell dukes of Bedford.

TAUNTON, a town of Somersetshire in England, situated in W. Long. 3. 10. N. Lat. 51. 6. It is pleasantly seated on the river Thone; is reckoned the best town in the county; and sends two members to parliament.

TAURIS, or TEBRIS, a town of Persia, and capital of Aderbeizan. It was formerly the capital of Persia, and is now the most considerable next to Ispahan; for it contains 15,000 houses, besides many separate shops, and about 200,000 inhabitants. It is about five miles in circumference, and carries on a prodigious trade in cotton, cloth, silks, gold and silver brocades, fine turbans, and shagreen leather. There are 300 caravanseras, and 250 mosques. Some travellers suppose it to be the ancient Ecbatana; but of this there is no certainty. It is seated in a delightful plain, surrounded with mountains, from whence a stream proceeds, which runs through the city. E. Long. 46. 50. N. 38. 28.

TAURUS, a great chain of mountains in Asia, which

Taurus, which begin at the eastern part of Little Carimania, and extend very far into the India. In different places they have different names.

Taurus, in astronomy. See there, n° 206.

TAUTOLOGY, a needless repeating of the same thing in different words.

TAWING, the art of dressing skins in white, so as to be fit for divers manufactures, particularly gloves, &c.

All skins may be tawed; but those chiefly used for this purpose are lambs, sheeps, kid, and goat skins.

The method of tawing is this: Having cleared the skins of wool or hair, by means of lime, they are laid in a large vatt of wood or stone, set on the ground full of water, in which quicklime has been slaked; wherein they are allowed to lie a month or six weeks, according as the weather is more or less hot, or as the skins are required to be more or less soft and pliant.

While they are in the vatt, the water and lime is changed twice, and the skins are taken out and put in again every day: and when they are taken out for the last time, they are laid all night to soak in a running water, to get out the greatest part of the lime; and in the morning are laid together by sixes one upon another, upon the wooden leg, and are scraped stoutly one after another, to get the flesh off from the fleshy side, with a cutting two-handled instrument called a knife; and then they cut off the legs (if they are not cut off before) and other superfluous parts about the extremes. Then they are laid in a vatt or pit with a little water, where they are filled with wooden pebbles for the space of a quarter of an hour; and then the vatt is filled up with water, and they are rinsed in it.

In the next place, they are thrown on a clean pavement to drain, and afterwards cast into a fresh pit of water, out of which they rinse them well, and are laid again on the wooden leg, fix at a time, with the hair-side outmost: over which they rub a kind of whetstone very briskly, to soften and fit them to receive four or five more preparations, given them on the leg both on the flesh-side and the hair-side, with the knife, after the manner above-mentioned.

After this they are put into a pit of water and wheaten-bran, and stirred about in it with wooden poles, till the bran is perceived to stick to them, and then they are left: as they rise of themselves to the top of the water by a kind of fermentation, they are plunged down again to the bottom; and at the same time fire is set to the liquor, which takes as easily as if it were brandy, but goes out the moment the skins are all covered.

They repeat this operation as often as the skins rise above the water; and when they have done rising they take them out, lay them on the wooden leg, the fleshy side outwards, and pass the knife over them to scrape off the bran.

Having thus cleared them of the bran, they lay the skins in a large basket, and load them with huge stones to promote their draining: and when they have drained sufficiently, they give them their feeding, which is performed after the manner following.

For one hundred of large sheep-skins, and for smaller in proportion, they take eight pounds of alum, and three of sea-salt, and melt the whole with water in a vessel over the fire, pouring the solution out, while

yet lukewarm, into a kind of trough, in which is twenty pounds of the finest wheat-flower, with the yolks of eight dozen of eggs; of all which is formed a kind of paste, a little thicker than children's pap; which, when done, is put into another vessel, to be used in the following manner.

They pour a quantity of hot water into the trough in which the paste was prepared, mixing two spoonfuls of the paste with it; to do which they use a wooden spoon, which contains just as much as is required for a dozen of skins: and when the whole is well diluted, two dozen of the skins are plunged into it; but they take care that the water be not too hot, which would spoil the paste and burn the skins.

After they have lain some time in the trough, they take them out, one after another, with the hand, and stretch them out; this they do twice; and after they have given them all their paste, they put them into tubs, and there full them afresh with wooden pebbles.

Then they put them into a vat, where they are suffered to lie for five or six days, or more; then they take them out in fair weather, and hang them to dry on cords or racks: and the quicker they are dried the better; for if they be too long a-drying, the salt and alum within them are apt to make them rise in a grain, which is an essential fault in this kind of dressing.

When the skins are dry, they are made up into bundles, and just dipt in fair water, and taken out and drained: they are then thrown into an empty tub, and after having lain some time are taken out and trampled under foot.

Then they draw them over a flat iron instrument, the top of which is round like a battledore, and the bottom fixed into a wooden block, to stretch and open them; and having been opened, they are hung in the air upon cords to dry; and being dry, they are opened a second time, by passing them again over the same instrument.

In the last place they are laid on a table, pulled out, and laid smooth, and are then fit for sale.

TAX, (*Taxa* from the Greek *τάξις*, i. e. *ordo, tributum*;) a tribute or imposition laid upon the subject for the support of government. See **REVENUE**.

It is the ancient indisputable privilege and right of the house of commons, that all grants of subsidies or parliamentary aids do begin in their house, and are first bestowed by them; although their grants are not effectual to all intents and purposes until they have the assent of the other two branches of the legislature. See **COMMONS**. The general reason given for this exclusive privilege of the house of commons, is, that the supplies are raised upon the body of the people, and therefore it is proper that they alone should have the right of taxing themselves. This reason would be unanswerable, if the commons taxed none but themselves: but it is notorious, that a very large share of property is in the possession of the house of lords; that this property is equally taxable, and taxed, as the property of the commons; and therefore the commons not being the sole persons taxed, this cannot be the reason of their having the sole right of raising and modelling the supply. The true reason, arising from the spirit of our constitution, seems to be this. The lords being a permanent hereditary body, created at pleasure by the king,

Tawing,
Tax.

king, are supposed more liable to be influenced by the crown, and when once influenced to continue so, than the commons, who are a temporary elective body, freely nominated by the people. It would therefore be extremely dangerous to give the lords any power of framing new taxes for the subject; it is sufficient that they have a power of rejecting, if they think the commons too lavish or improvident in their grants. But so reasonably jealous are the commons of this valuable privilege, that herein they will not suffer the other house to exert any power but that of rejecting. They will not permit the least alteration or amendment to be made by the lords to the mode of taxing the people by a money-bill: under which appellation are included all bills by which money is directed to be raised upon the subject, for any purpose or in any shape whatsoever; either for the exigencies of government, and collected from the kingdom in general, as the land-tax; or for private benefit, and collected in any particular district, as by turnpikes, parish-rates, and the like. Yet Sir Matthew Hale mentions one case, founded on the practice of parliament in the reign of Henry VI. wherein he thinks the lords may alter a money-bill: and that is, if the commons grant a tax, as that of tonnage and poundage, for four years; and the lords alter it to a less time, as for two years; here, he says, the bill need not be sent back to the commons for their concurrence, but may receive the royal assent without farther ceremony; for the alteration of the lords is consistent with the grant of the commons. But such an experiment will hardly be repeated by the lords, under the present improved idea of the privilege of the house of commons; and, in any case where a money-bill is remanded to the commons, all amendments in the mode of taxation are sure to be rejected.

The commons, when they have voted a supply to his majesty, and settled the *quantum* of that supply, usually resolve themselves into what is called a *committee of ways and means*, to consider the ways and means of raising the supply so voted. And in this committee every member (though it is looked upon as the peculiar province of the chancellor of the exchequer) may propose such scheme of taxation as he thinks will be least detrimental to the public. The resolutions of this committee (when approved by a vote of the house) are in general esteemed to be (as it were) final and conclusive. For though the supply cannot be actually raised upon the subject till directed by an act of the whole parliament, yet no man will scruple to advance to the government any quantity of ready cash, on the credit of a bare vote of the house of commons, tho' no law be yet passed to establish it.

The taxes which are raised upon the subject are either annual or perpetual.

I. The usual annual taxes are those upon land and malt. See LAND and MALT.

II. The perpetual are, 1. The customs. 2. The excise-duty. 3. The salt-duty. 4. The post office. 5. The stamp duty. 6. House and window duty. 7. The duty on hackney-coaches and chairs. 8. That on offices and pensions.—See the articles CUSTOMS, EXCISE, SALT, POST, STAMP, HOUSE, HACKNEY, and OFFICES and PENSIONS.

As to the application of all these, see the articles REVENUE, NATIONAL DEBT, FUNDS, and Civil List.

TAXATION. See REVENUE, TAX, and FEODAL SYSTEM.

TAXUS, the YEW-TREE; a genus of the monodelphia order, belonging to the diccia class of plants. There are two species; of which the most remarkable is the *baccata*, or common yew, growing naturally in many places of England and Scotland. It is found here and there in the Highlands, in a truly wild state. At Glenlure, near Glen-Creran, in Upper-Lorn, are the remains of an old wood of it. The place takes its name from the trees which grow in it; for *Glenlure*, in the Gaelic language, is no other than a corruption of *Gleanuir*, i. e. "The valley of yew-trees."

It is an evergreen tree, of no great height; but the trunk grows to a large size. Mr Pennant has taken notice of a very remarkable decayed one in Fortingal church-yard, whose remains measured 56 feet and an half in circumference. The leaves are of a dark shining green, linear and acute, divided by a longitudinal nerve, and grow in a double series, opposed to each other, on the same plane. The flowers, both male and female, grow from the axils of the leaves. The berry is red and mucilaginous, of a singular structure, being formed out of the receptacle, which swells and becomes succulent, but does not cover the top of the seed. It has a sweet mawkish taste. The wood is red and veined, very hard and smooth, and much used by turners and cabinet-makers. The tree is very patient of the fires, and will assume almost any figure. It has generally been supposed to have a poisonous quality. We have repeated accounts of horses and cows that have died by eating it; but whether the yew was the immediate cause of their death, is a matter of some doubt. The berries are certainly not poisonous.

Our ancestors esteemed the wood of this tree as superior to any other for making bows. For this intent it was planted in almost every church-yard, for the convenience and ready use of the several parishioners.

TAY, called by the Romans *Tavus* or *Taus*, the largest river in Scotland. It rises in Braidalbin, on the frontiers of Lorn; and having in the passage of a few miles augmented its stream by the accession of several small rills, spreads itself into a lake called *Loch Dochart*; out of which having run but a little space, it expands itself again. Leaving this second lake, it rolls some miles with a considerable body of water, and then diffuses itself abroad in the spacious Loch Tay; which, reckoning from the sources of the river, is 24 miles in length, though, strictly speaking, the lake is but 13; almost as soon as it issues from hence, it receives the river Lion, coming out of Loch Lion, and running through Glen Lion; which, having travelled in a manner parallel to it, from its source, for the space of 25 miles, at length joins the Tay as it enters Athol, which it next traverses, and, directing its course in a manner due east, receives almost all the waters of that country. Bending then to the south, at the distance of six miles, it reaches Dunkeld; which, in the language of our ancestors, signifies "the hill of hazels," was the very centre of the old Caledonia, and is at present esteemed the heart of the Highlands. The river is very broad here, inasmuch that there is a ferry-boat over it at each end of the town. Declining still to the south-east, with a winding course, for above

Taylor. 12 miles, the Tay receives a large supply of waters from the county of Angus; and then running south-west for eight miles more, is joined in that space by several rivers, the most considerable of which is the Almond. Turning then to the south-east, at the distance of about three miles, this copious river comes with a swelling stream to Perth, or St Johnston's, which is the capital of the shire of that name.

The Tay, continuing still a south east course, receives, a few miles below Perth, the river Erne; which, issuing from a loch of the same name, traverses the county of Strathern, and passes by Abernethy, once the capital of the Pictish kingdom: swelled by the waters of this last river, the Tay, running next directly east, enlarges itself till it becomes about three miles broad; but contracts again before the town of Dundee; soon after which it opens into the German ocean. At the entrance of the frith, there are sands both on the north and on the south side, the former styled *Goa*, latter *Aberlay* and *Drunlan*; and before these, in the very mouth of the frith, those which are called the *Cross Sands*. At Buttouness, which is the northern promontory, there are two light-houses. The space between the north and the south sands may be near a mile, with about three fathoms water; but being within the frith, it grows deeper, and in the road of Dundee is full six fathoms. The frith of Tay is not indeed so large or so commodious as that of Forth, but from Buttouness to Perth it is not less than 40 miles; and the whole may be, without any great impropriety, be styled a harbour, which has five on one side, and the shires of Perth and Angus on the other, both very fertile and pleasant countries.

TAYLOR (Dr Jeremy), bishop of Down and Connor in Ireland, was the son of a barber at Cambridge, and there had his education. Upon entering into orders, he became divinity-lecturer of St Paul's in London; and was, by the interest of archbishop Laud, elected fellow of All-souls college, Cambridge, in 1636. Two years after he became one of the chaplains of the archbishop, who bestowed on him the rectory of Uppingham in Rutlandshire. In 1642, he was chaplain to the king; and a frequent preacher before him and the court at Oxford. He afterward attended in the king's army in the condition of a chaplain. Upon the declining of his majesty's cause, he retired into Wales, where he was permitted to officiate as minister, and to keep a school, in order to maintain himself and his children. In this retirement he wrote several of his works. Having spent several years there, his family was visited with sickness; and he lost three sons of great hopes, within the space of two or three months. This affliction touched him so sensibly, that it made him desirous to leave the country; and, going to London, he for a time officiated in a private congregation of loyalists to his great hazard. At length meeting with Edward lord Conway, that nobleman carried him over with him into Ireland, and settled him at Portmore, where he wrote his *Ductor Dubitantium*. Upon the restoration he returned to England: soon after, he was advanced to the bishopric of Down and Connor in Ireland; and had the administration of the see of Dromore granted to him. He was likewise made privy-counsellor, and vice-chancellor of the university of Dublin, which place he held

till his death. He died of a fever at Lisnegary in 1667, and was interred in a chapel of his own erecting on the ruins of the old cathedral of Dromore.

TAYLOR (Dr John), a learned dissenting minister, born in Lancashire. He settled first at Kirkstead in Lincolnshire, where he preached to a small congregation and taught a grammar-school for near 20 years. Afterward he removed to Norwich, where he preached many years in great repute, until he was invited to superintend the academy formed at Warrington in Lancashire: but a few idle differences on formal punctilios and uncertain doctrines kindled into such a flame there, as subjected him to much scurrility and ill treatment, and endangered the very being of the academy. He died in 1761; and among several other judicious performances, his Hebrew and English Concordance, 2 vols. folio, will remain a monument of his critical skill and indefatigable industry.

TAYLOR-BIRD. See MOTACILLA.

TEA, or THEA, the *Tea-plant*; a genus of the monogynia order, belonging to the polyandria class of plants.

This shrub, formerly described by Dr Breynius, in his Century of Exotic Plants, published at Dantzick in 1678, is of a very slow growth, and diminutive size. It has a black, woody, irregularly branched root. The rising stem soon spreads into many irregular branches and twigs. These at the lower end and near the ground often seem to be more in number than they really are; for several seeds being put together in one hole, it frequently happens that two, three, or more shrubs grow up together, and so close to one another, as to be easily mistaken for one, by ignorant or less attentive observers. The bark is dry, thin, weak, chestnut-coloured, firm, and adheres closely to the wood. It is covered with a very thin skin; which being removed, the bark appears, of a greenish colour, a bitter, nauseous, and astringent taste, with a smell much like the leaves of the hazel-nut tree, only more disagreeable and offensive. The wood is hard, fibrous, of a greenish colour, inclining to white, and of a very offensive smell when green. The pith is very small, and adheres close to the wood. The branches and twigs are slender, of different sizes, irregularly beset with simple leaves, standing on very small, fat, green footstalks; and resembling, when full grown, the leaves of the garden cherry-tree; but when young, tender, and gathered for use, those of the common spindle-tree, the colour only excepted. The leaves are smooth on both sides, closely and unequally sawed on the edge, of a dirty dark green colour, which is somewhat lighter on the back, where the nerves being raised considerably, leave so many hollows or furrows on the opposite side. They have one very conspicuous nerve in the middle, which is branched out on each side into five, six, or seven thin transverse ribs, of different lengths, and bent backwards near the edges of the leaves; between these transverse ribs, run a number of small veins. The leaves when fresh have no smell at all; and though astringent and bitterish, as we observed above, are not nauseous, as the bark. They differ very much in substance, size, and shape, according to their age and the situation and nature of the soil in which the shrub is planted. From the wings of the leaves come forth the flowers in autumn. These

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continue to grow till late in winter; and are composed of six petals, one or two of which are generally shrunk, and fall far short of the largeness and beauty of the others. The footstalk of the flower is about half an inch long, and ends in six very small green leaves, which serve instead of the calix or flower-cup. This description, applied by Kämpfer to the shrub, which, as he pretends, produces all the different sorts or preparations of tea, corresponds, says Linnæus, to a particular species only, termed by him *bohea*; for some tea-plants, he observes after Dr Hill, produce flowers composed of nine petals, which must therefore constitute a distinct species from such as have only six. From this circumstance is constructed the other species of that author, *thea viridis*, or green-tea, the flowers of which have always nine petals. The leaves also are much larger than those of the *bohea*, and of a brighter green.

To proceed in our description. Within the petals, which are of a very unpleasant bitterish taste, are placed many white stamina, exceeding small, as in the wild rose, with yellow heads, in shape not unlike a heart. Kämpfer reckoned in one flower 230 of these stamina. To the flowers succeed the fruits in great plenty; these are composed of one, two, but most commonly of three, capsules, of the bigness of wild-plums, adhering like the seed-vessels of the palma christi, to one common footstalk as to a centre, but divided into three pretty deep partitions. Each capsule contains a husk, nut, and seed. The kernel or seed is reddish, of a firm substance like silberds, contains a great quantity of oil, and is very apt to grow rank, which is the reason why there are scarce two in ten that will germinate when sown. The natives make no manner of use of either the flowers or kernels.

The shrub must be, at least, of three years growth before the leaves, which it then bears in plenty, are fit to be plucked. In seven years time, or thereabouts, it rises to a man's height; but as it then grows slowly, and bears but few leaves, the natives generally cut it down quite to the stem, after having first gathered what few leaves it produced. The next year, out of the remaining stem, proceed many young twigs and branches, which bear such abundance of leaves, as will sufficiently compensate for the loss of the former shrub. Some defer the operation of cutting down to the stem till the shrub is of ten years growth.

The leaves must not be tore off by handfuls, but plucked carefully, one by one; and are not to be gathered all at once, but at different times. Those who pluck their shrubs thrice a-year, begin their first gathering about the end of February. The shrub then bears but a few leaves, which are very tender and young, and not yet fully opened, as being scarce above two or three days growth. These small and tender leaves are reckoned much better than the rest, and, because of their scarcity and price, are disposed of only to princes and rich people; for which reason they are called *Imperial-tea*, and by some the *flower of tea*. The second gathering, and the first of those who gather but twice a-year, is made about the latter end of March or beginning of April: some of the leaves are then already come to perfection, others are but half-grown: both, however, are plucked off promiscuously;

though care is afterwards taken, previous to the usual preparation, to arrange them into classes, according to their size and goodness. The third and last gathering, which is also the most plentiful, is made in the end of May, when the leaves have attained their full growth, both in number and size. The leaves of this gathering are arranged in like manner as the former, according to their size and goodness, into different classes, the lowest of which contains the coarsest leaves of all, being full two months growth, and that sort which is commonly drank by the vulgar.

The preparation of the leaves consists in drying or roasting them when fresh gathered, over the fire in an iron pan, and rolling them when hot with the palm of the hand on a mat till they become curled. The particulars of this preparation, as related by the ingenious author from whom this description is extracted, are much too tedious for our purpose. The reader is therefore referred to the work itself. Vide Kämpfer's History of Japan, vol. ii. appendix 1.

The tea, after having undergone a sufficient roasting and curling, must, when cold, be put up and carefully kept from the air. In this, indeed, the whole art of preserving it chiefly consists; because the air, in those hot climates, dissipates its extremely subtle and volatile parts much sooner than it would in our colder European countries. The Chinese put it up in boxes of a coarse tin, which, if they be very large, are inclosed in wooden cases of fir, all the clefts being first carefully stopped both within and without. After this manner also it is sent abroad into foreign countries. The Japanese keep their stock of the common tea in large earthen pots, with a narrow mouth. The better sort of tea, namely, that which the emperor himself and the great men make use of, is kept in porcelain pots or vessels, which are supposed to improve its virtues. The coarse tea of the third gathering is not so easily injured by the air as the other sorts; for tho' its virtues are comparatively fewer and less sensible, yet are they more constant and fixed. The country people keep it, as well as the other sorts which they use, in straw-baskets, made like barrels, which they put under the roofs of their houses, near the hole which lets out the smoke; being of opinion that nothing is better than smoke to preserve the virtues of the leaves, and even improve them. Some put it up with common mugwort flowers, or the young leaves of a plant called *sajanqua*, which they believe renders it much more agreeable. Other odorous and aromatic substances are found, upon trial, to produce no such beneficial effect.

The tea, as it is taken inwardly, is prepared in two different ways. The first used by the Chinese, and now all over Europe, is nothing else but a simple infusion of the leaves in hot water. The other way, which is peculiar to the Japanese, is by grinding. In this preparation, the leaves are, by means of a hand-mill made of a black-greenish stone called *serpentine stone*, reduced into a fine delicate powder, which being mixed with hot water into a thin pulp is afterwards sipped. This tea is called *thick tea*, to distinguish it from the simple infusion, and is drank every day by all the rich people and great men in Japan.

The narcotic quality of the fresh unprepared leaves of tea, mentioned above, is destroyed in a great measure.

Tea
||
Te deum.

sure by a repeated and gradual roasting. This operation renders it exhilarating, refreshing, and cleansing. Kæmpfer observes, that tea is particularly serviceable in washing away that tartarous matter which is the efficient cause of calculus concretions, nephritic and gouty distempers; and affirms, that among the great tea-drinkers of Japan, he never met with any who were troubled with the gout or stone.

The leaves of tea, say writers on the *Materia Medica*, are much more used for pleasure than as medicine: the Bohea, however, is esteemed softening, nourishing, and proper in all inward decays; the green is diuretic, carries an agreeable roughness with it into the stomach, which gently astringes the fibres, and gives them such a tenuity as is necessary for a good digestion. Improper or excessive use may no doubt render this or any thing else prejudicial; but, in general, there are very few herbs employed, either in food or medicine, which, used with moderation, are better, pleasanter, or safer, than tea.

We do not find that the tea-plant grows naturally beyond the 35th degree of north latitude on the one hand, and the 45th degree on the other.

TEA-Tree of New Zealand, is a species of myrtle, of which an infusion was drank by Captain Cook's people in their voyages round the world. Its leaves were finely aromatic, astringent, and had a particular pleasant flavour at the first infusion; but this went off at the next filling up of the tea-pot, and a great degree of bitterness was then extracted; for which reason it was never suffered to be twice infused. In a fine soil in thick forests this tree grows to a considerable size; sometimes 30 or 40 feet in height, and one foot in diameter. On a hilly and dry exposure, it degenerates into a shrub of five or six inches; but its usual size is about eight or ten feet high, and three inches in diameter. In that case its stem is irregular and unequal, dividing very soon into branches which rise at acute angles; and only bear leaves and flowers at top. The flowers are white, and very ornamental to the whole plant.

TEAL, in ornithology. See ANAS.

TEARS, a lymph or aqueous humour, which is subtle, limpid, and a little salisist; it is separated from the arterial blood by the lachrymal glands and small glandulous grains on the inside of the eyelids.

TEBETH, the tenth month of the Jewish ecclesiastical year, and fourth of the civil. It answers to our month of December.

TECKLENBURG, a town of Germany, in the circle of Westphalia, capital of a county of the same name, with a castle built on a hill. It was bought by the king of Prussia in 1707. E. Long. 8. 7. N. Lat. 52. 20.

TECHNICAL, expresses somewhat relating to arts or sciences: in this sense we say technical terms. It is also particularly applied to a kind of verses wherein are contained the rules or precepts of any art, thus digested to help the memory to retain them; an example whereof may be seen in the article MIS-THORY.

TE DEUM, the name of a celebrated hymn, used in the Christian church, and so called because it begins with these words, *Te Deum laudamus*, We praise thee,

O God. It is sung in the Romish church, with great pomp and solemnity, upon the gaining of a victory, or other happy event.

TEES, a river which rises on the confines of Cumberland, and running eastward divides the county of Durham from Yorkshire, and falls into the German sea below Stockton.

TEETH. See ANATOMY, n° 26.

TEETHING in Children. See MEDICINE, p. 4867.

TEFLIS, the capital of Persian Georgia in Asia, situated on the river Kur or Cyrus, in E. Long. 47. 20. N. Lat. 43°. It is not large; but, according to Sir John Chardin, one of the finest cities in the east, with strong walls on all sides, except on the east, where it is covered by the river Kur. On the south side of it stands a large castle or fortress, built by the Turks in 1576, when they made themselves masters of the city and country, under the command of the famed Mustapha Pacha. The city is very populous, and a place of great trade, especially in furs, which are conveyed hence to Constantinople by the way of Erzerum. As for the silks of this country, they are bought up on the spot by the Armenians, and conveyed to Smyrna and other ports of the Mediterranean; but the greatest part is first sent to Erzerum to be manufactured, the Georgians being very ignorant and unskilful in that respect. From hence, likewise, great quantities of a root called *boya*, is sent to Erzerum and Indolfin, for the use of the linen dyers. There are some magnificent caravanseras, bazars, and palaces, in the city. Of the last, those of the viceroys of Carthuel and Caket are the chief. They reckon no less than 14 churches in the city; one half of them belonging to the Georgians, and the other to the Armenians. As for mosques, the Georgians, it is said, have never suffered any to be built, tho' they are under a Mohammedan government; but have always risen up in arms as often as any attempts have been made to erect such, and destroyed them. Here are some Romish Capuchins, as missionaries; but they go under the denomination of physicians, surgeons, or chemists, which three professions are in great esteem in the east. The great cures they make, and the small fees they take, which are generally in wine, meal, cattle, or young slaves, procure them some esteem, though they are often exposed to the insults of the people, especially when they attempt to make any proselytes to their church. The inhabitants of Teflis are computed at near 20,000; viz. 4000 Armenians, 3000 Mohammedans, 2000 Georgians, and about 500 Romish Armenians, who are much hated by the others: the rest are Persians or strangers, that are continually coming and going.

TEGUMENT, any thing that surrounds or covers another.

TEINTS, and SEMI-TEINTS, in painting, denote the several colours used in a picture, considered as more or less high, bright, deep, thin, or weakened and diminished, &c. to give the proper relieve, softness, or distance, &c. of the several objects.

TELESCOPE, an instrument formed by a combination of optical glasses or metallic speculums with lenses, by which distant objects may be viewed distinctly. See (Index subjoined) OPTICS.

TELL (William,) an illustrious Swiss patriot, chief in-

Tees
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Tell.

Teller,
Tempe.

instrument of the revolution which delivered the Swiss Cantons from the German yoke in 1307. Griser, the governor of these provinces for the emperor Albert, having ordered him, under pain of death, to shoot at an apple placed on the head of one his children, he had the dexterity, though the distance was very considerable, to strike it off without hitting the child. The tyrant, perceiving he had another arrow concealed under his cloak, asked him for what purpose? To which he boldly replied, "To have shot you thro' the heart, if I had had the misfortune to kill my son." The enraged governor now ordered him to be hanged; but his fellow-citizens, animated by his fortitude and patriotism, flew to arms; attacked and vanquished Griser, who was shot to death by Tell; and the association for the independency took place that instant.

TELLER, an officer of the exchequer, in ancient records called *tallier*. There are four of these officers, whose duty is to receive all sums due to the king, and to give the clerk of the pells a bill to charge him therewith. They likewise pay all money due from the king, by warrant from the auditor of the receipt; and make weekly and yearly books both of their receipts and payments, which they deliver to the lord treasurer.

TEMPE, (anc. geog.), a most pleasant place or valley of Thessaly. That there it was, appears from the epithets *Thesjalica*, (Livy); *Thesjala*, (Ovid); but in what particular district is the question. From the Phthiotica of Catullus, it should seem to be of Phthiotis; but the Peneus, which ran through Tempe, was at too great a distance, being separated from it by Mount Othrys and others. First, however, we shall define Tempe, previous to the determining the particular district in which it lay. The Peneus, according to Pliny, running down between Ossa to the south and Olympus to the north, for 500 stadia, is for half that space navigable: in the direction of this course lies what is called *Tempe*, extending in length for five miles, in breadth for almost an acre and an half, with gentle convexities rising on the right and left, beyond ken of human sight. Within glides the Peneus in its verdant light, green in its pebbles, charming in the grass on its banks, harmoniously vocal with the music of birds. In this description Strabo and Ælian agree; the last adding, that it has an agreeable variety of places of retreat; and that it is not the work of man's hand, but the spontaneous production of nature; and Strabo, that formerly the Peneus formed a lake in this spot, being checked in its course by the higher grounds about the sea; but that an opening being made by an earthquake, and Mount Ossa torn from Olympus, the Peneus gained a free course between them. But Livy, who calls Tempe a grove, remarks a degree of horror rather than amenity, with which the Roman army was struck in marching over the narrow pass; for, besides the desire, difficult to go over, which runs on for five miles, there are steep rocks on each hand, down which the prospect is apt to cause a dizziness heightened by the noise and depth of the interfluent Peneus. Hence it appears that Tempe was in the Pelasgiotis, whose extremity was formerly the Peneus, but afterwards, as is probable, allotted to Magnesia; and thus Pliny places the mouth of the Peneus not in Thessaly itself,

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but in the Magnesia of Thessaly. The name is properly *Temenos*, a sacred grove; whence the Romans formed *Tempus*, and the diminutive *Templum*, or *Templum*. The name *Tempe* became at length an appellative to denote any pleasant spot.

TEMPERAMENT, among physicians, the same with constitution, or a certain disposition of the solids and fluids of the human body, by which it may be properly denominated strong, weak, lax, &c.

In every person there are appearances of a temperament peculiar to himself, tho' the ancients only took notice of four, and some have imagined these were deduced from the theories of the four humours or four cardinal qualities; but it is more probable that they were first founded on observation, and afterwards adapted to those theories, since we find that they have a real existence, and are capable of receiving an explanation. The two that are most distinctly marked, are the sanguineous and melancholic, viz. the temperaments of youth and age.

1. *Sanguineous*. Here there is laxity of solids, discoverable by the softness of hair and succulency; large system of arteries, redundancy of fluids, florid complexion; sensibility of the nervous power, especially to pleasing objects; irritability from the plethora; mobility and levity from lax solids. These characters are distinctly marked, and are proved by the diseases incident to this age, as hæmorrhagies, fevers, &c. but these, as they proceed from a lax system, are more easily cured.

2. *Melancholic Habit*. Here greater rigidity of solids occurs, discoverable by the hardness and crispature of the hair; small proportion of the fluids, hence dryness and leanness; small arteries, hence pale colour; venous plethora, hence turgescency of these, and lividity; sensibility, frequently exquisite, but with great accuracy; moderate irritability, with remarkable tenacity of impressions; steadiness in action and slowness of motion, with great strength; for excess of this constitution in maniacs gives the most extraordinary instance of human strength we know. This temperament is most distinctly marked in old age, and in males. The sanguineous temperament of youth makes us not distinguish the melancholic till the decline of life, when it is very evident, from diseases of the veins, hæmorrhoids, apoplexy, cachexy, obstructions of the viscera, particularly of the liver, dropsies, affections of the alimentary canal, chiefly from slower and weaker influence of the nervous power. So much for the sanguineous and melancholic temperaments; the other two are not so easily explained.—The choleric temperament takes place between youth and manhood. In the

3. *Choleric*, the distribution of the fluids is more exactly balanced; there is less sensibility, and less obesity, with more irritability, proceeding from greater tension, less mobility and levity; and more steadiness in the strength of the nervous power. As to the

4. *Phlegmatic*: This temperament cannot be distinguished by any characters of age or sex. It agrees with the sanguineous in laxity and succulency. It differs from that temperament, and the melancholic, by the more exact distribution of the fluids. Again, it differs from the sanguineous, by having less sensibility, irritability, mobility, and perhaps strength, tho' some-

Tempera-
ment.

Tempera-

ment

Templars.

sometimes indeed this last is found to be great.

These are the ancient temperaments. The temperaments, indeed, are much more various; and very far from being easily marked and reduced to their genera and species, not only on account of variety of temperaments themselves, but also on account of idiosyncrasy.

TEMPERAMENT, in music, is defined by Rousseau to be an operation, which, by means of a slight alteration in the intervals, causes the difference between two contiguous sounds to disappear, makes each of these sounds seem identical with the other, which, without offending the ear, may still preserve their respective intervals or distances one from the other. By this operation, the scale is rendered more simple, and the number of sounds which would otherwise be necessary retrenched. Had not the scale been thus modified, instead of twelve sounds alone which are contained in the octave, more than 60 would be indispensably required to form what we properly call *modulation* in every tone.

It is proved by computation, that upon the organ, the harpsichord, and every other instrument with keys, there is not, and there scarcely can be, any chords properly in tune, save the octave alone. The cause is this, that though three thirds major, or four thirds minor, ought to form a just octave, those are found to surpass, and these not to reach it.

TEMPERING, in the mechanic arts, the preparing of steel and iron, so as to render them more compact, hard, and firm; or even more soft and pliant, according to the respective occasions. See IRON and STEEL.

TEMPLARS, or TEMPLERS, a religious order instituted at Jerusalem about the year 1118. Some religious gentlemen put themselves under the government of the patriarch of Jerusalem, renounced property, made the vow of celibacy and obedience, and lived like canons regular. King Baldwin assigned them an apartment in his palace. They had likewise lands given them by the king, the patriarch, and the nobility, for their maintenance. At first there were but nine of this order, and the two principal persons were Hugo de Paganis and Geoffry of St Omers. About nine years after their institution, a rule was drawn up for them, and a white habit assigned them, by Pope Honorius II. About 20 years afterwards, in the popedom of Eugenius III. they had red crosses sewed upon their cloaks as a mark of distinction; and in a short time they were increased to about 300 in their convent at Jerusalem. They took the name of *Knights Templars*, because their first house stood near the temple dedicated to our Saviour at Jerusalem. This order, after having performed many great exploits against the infidels, became rich and powerful all over Europe; but the knights, abusing their wealth and credit, fell into great disorders and irregularities. Many crimes and enormities being alleged against them, they were persecuted in France, Italy, and Spain; and at last the Pope, by his bull of the 22d of May 1312, given in the council of Vienna, pronounced the extinction of the order of Templars, and united their estates to the order of St John of Jerusalem.

TEMPLE, a general name for places of public worship, whether Pagan, Christian, or otherwise. But the word, in a restrained sense, is used to denote the places or edifices in which the Pagans offered sacrifice to their false gods. The word is formed from the Latin *templum*, which some derive from the Greek *temnos* $\tau\epsilon\mu\nu\sigma$, signifying the same thing; and others from *temno*, *abscindo*, "I cut off, I separate," in regard a temple is a place separated from common use. Others derive it from the old Latin word *templare*, "to contemplate." It is certain, the ancient augurs gave the name *templa* to those parts of the heavens which they marked out for the observation of the flight of birds.—Their formula was this: *Templa tesqua juncto*. See AUGUR.

TEMPLES, among us, denote two inns of court in London, thus called, because anciently the dwelling-house of the knights-templars. At the suppression of that order, they were purchased by the professors of the common law, and converted into *hospitia* or inns. They are called the *inner* and *middle temple*, in relation to Essex-house; which was also a part of the house of the templars, and called the *outer temple*, because situate without Temple-Bar. In the middle temple, during the time of the templars, the king's treasure was kept: as was also that of the kings of France in the house of templars at Paris. The chief officer was the master of the temple, who was summoned to parliament in 47 Hen. III. and from him the chief minister of the temple-church is still called *master of the temple*.

TEMPLES, in anatomy, a double part of the head, reaching from the forehead and eyes to the two ears. The temples are chiefly formed of two bones called *os temporis*. These parts, according to physicians, were called *tempora*, from their showing the age or time of man by the colour of the hair, which turns white in this part before any other; which Homer seems to have been aware of, by his calling men *poliocrotaphi*, *q. d.* "grey-templed."

TEMPLE (Sir William), grandson of Sir William Temple secretary to the famous earl of Essex in queen Elizabeth's time, who was a younger son of the ancient Temples of Temple-Hall in Leicestershire, was born about 1629. From his youth he discovered a solid penetrating genius, and a wonderful desire of knowledge, which his father Sir John took care to cultivate by all the advantages of a liberal education. His political principles would not suffer him to enter upon any public affairs till the way was made open for the king's reformation in 1660. He then made a distinguished figure at court; and was sent on several embassies, particularly in 1668 to the States-General, when he brought about the triple league between England, Holland, and Sweden. He had a great share in the marriage of the prince of Orange with the lady Mary the duke of York's daughter; and was also one of the plenipotentiaries at the peace of Nimeguen in 1678. But the French interest gaining the ascendant at court, he resigned his public employments, and retired into the country, where he lived in retirement, solely employed in study and the cultivation of his gardens. Mr Swift, afterwards dean of St Patrick's, Dublin, lived with Sir William as his amanuensis, and assisted in preparing his works for the press. Sir William

Temple.

See Tem.
pe, and
Templum.

Templum
Temporal-
ties.

liam died toward the end of the year 1700, at Moor-Park near Farnham in Surry, where, according to his express directions in his will, his heart was buried in a silver box under the sun-dial in his garden, opposite to the window from whence he used to contemplate the works of nature. He wrote, 1. Observations upon the United Provinces. 2. *Miscellanea*. 3. *Memoirs*. 4. An introduction to the History of England. 5. Letters on the most important transactions, 3 vols. Mr Boyer tells us, that he was "an accomplished gentleman, a sound politician, a patriot, and a great scholar. And if this great idea should perchance be shaded by some touches of vanity upon *spleen*, the reader will be so candid as to consider, that the greatest, wisest, and the best of men, have still some failings and imperfections which are inseparable from human nature." Sir William Temple had one son, John Temple, Esq; a man of great abilities and accomplishments, who on the revolution was appointed secretary at war by king William: but he had scarcely been a week in office when, on some secret discontent, he took a boat and drowned himself at London Bridge. This gentleman had married mademoiselle Du Pleffis Rombouillet, a French lady, who had by him two daughters, to whom Sir William bequeathed the bulk of his estate; but with this express condition, that they should not marry Frenchmen: "A nation," says Boyer, "to whom Sir William ever bore a general hatred, upon account of their imperiousness and arrogance to foreigners."

TEMPLUM, in antiquity, in general a place sequestered or set apart; from *Temenos*, called in the Æolic dialect *Tempos*. In a stricter sense, places allotted for religious purposes; and in a still stricter, for a space or quarter of the heavens marked out by the augur with his *lituus*; where he carefully observed the motion and singing of the birds, and in what part of this *Templum* they made their appearance. And hence a place walled round, and destined for the worship of any deity, and consecrated by the augurs, was called *Templum Augustum*; and the act itself *inauguration* or *consecration*.

TEMPORAL, a term generally used for secular, as a distinction from ecclesiastical. Thus we say temporal lords, and spiritual or ecclesiastical lords.

TEMPORALTIES of BISHOPS, are the revenues, lands, tenements, and lay-fees, belonging to bishops, as they are barons and lords of parliament.

The custody of the temporalities of bishops forms a branch of the king's ordinary revenues; (see REVENUE.)—These, upon the vacancy of the bishopric, are immediately the right of the king, as a consequence of his prerogative in church-matters; whereby he is considered as the founder of all archbishoprics and bishoprics, to whom during the vacancy they revert. And for the same reason, before the dissolution of abbeyes, the king had the custody of the temporalities of all such abbeyes and priories as were of royal foundation (but not of those founded by subjects), on the death of the abbot or prior. Another reason may also be given why the policy of the law hath vested this custody in the king; because, as the successor is not known, the lands and possessions of the see would be liable to spoil and devaluation if no one had a property therein. Therefore the law has given the king,

not the temporalities themselves, but the custody of the temporalities till such time as a successor is appointed; with power of taking to himself all the intermediate profits, without any account of the success; and with the right of presenting (which the crown very frequently exercises) to such benefices and other preferments as fall within the time of vacation. This revenue is of so high a nature, that it could not be granted out to a subject, before or even after it accrued: but now, by the statute 15 Edw. III. st. 4. c. 4 & 5. the king may, after the vacancy, lease the temporalities to the dean and chapter; saving to himself all advowsons, escheats, and the like. Our ancient kings, and particularly William Rufus, were not only remarkable for keeping the bishoprics a long time vacant, for the sake of enjoying the temporalities, but also committed horrible wastes on the woods and other parts of the estate; and to crown all, would never, when the fee was filled up, restore to the bishop his temporalities again, unless he purchased them at an exorbitant price. To remedy which, king Hen. I. granted a charter at the beginning of his reign, promising neither to sell, nor let to farm, or take any thing from, the domains of the church, till the successor was installed. And it was made one of the articles of the great charter, that no waste should be committed in the temporalities of bishoprics, neither should the custody of them be sold. The same is ordained by the statute of Westminster the first; and the statute 14 Edw. III. stat. 4. c. 4. (which permits a lease to the dean and chapter) is still more explicit in prohibiting the other exactions. It was also a frequent abuse, that the king would, for trifling or no causes, seize the temporalities of bishops, even during their lives, into his own hands: but this is guarded against by statute 1 Edw. III. st. 2. c. 2.

This revenue of the king, which was formerly very considerable, is now by a customary indulgence almost reduced to nothing: for, at present, as soon as the new bishop is consecrated and confirmed, he usually receives the restitution of his temporalities quite entire and untouched from the king; and then, and not sooner, he has a fee-simple in his bishopric, and may maintain an action for the profits.

TENAILLES, in fortification, are low works made in the ditch before the curtains. There three sorts. The first are the faces of the bastions produced till they meet, but much lower; the second have faces, flanks, and a curtain; and the third have only faces and flanks.

TENANT, one that holds lands or tenements of some lord or landlord, by rent, fealty, &c. See TENURE.

TENCH, in ichthyology. See CYPRINUS.

TENDER, a small ship in the service of men of war, for carrying men, provisions, or any thing else that is necessary.

TENDONS, in anatomy, are white, firm, and tenacious parts, continuous to the muscles, and usually forming their extremities. See ANATOMY, n° 83, c.

TENEbrio, a genus of insects belonging to the order of coleoptera. The last joint of the antennæ is roundish; the breast is somewhat convex, and margined; the head is stretched forward, and the elytra are stiff. There are 33 species, principally distinguish-

Temporal-
ties
Tenebrio.

Tenedos
Teniers.

Teniers
Tenor.

ed by their colour. The larvæ of some live in damp places under ground among rubbish; of others in flour and different kinds of food, where they perform their metamorphosis. The perfect insects are very troublesome in houses; eating bread, meat, &c. They precipitately avoid the light; resorting in troops to dark damp cellars, where putrefaction allures and nourishes them. They are all of a very dark gloomy appearance, from which circumstance they take their name.

TENEDOS (anc. geog.), an island on the coast of Troas, at the distance of 40⁰ from the continent, and 80 in compass; with a cognominal Æolian town, and a temple of Apollo Smintheus. It was no inconsiderable town, as appears from its coins, inscribed *Tenedii*, the people. Its origin is derived from Tennes, or Tene, who being exposed in a coffer or bog by his father Cygnus the Thracian, at the instigation of the mother-in-law, was by fate carried to this island, made king of it, and at length worshipped as a god on account of his virtues. The island was famous for its earthen ware, for which purpose it had an excellent red clay; and hence Bochart would derive the appellation from *tinedom*, a "red clay." *Tenedia securis*, is a proverbial saying to denote severity; from a law there passed, that persons found in the act of adultery should be put to death; a severity executed on the king's son; and therefore, in the coins of Tenedos, on one side are two heads in memorial of the king and his son, and on the reverse an ax, (Aristotle.) This island still retains its ancient name; and is one of the smallest islands of the Archipelago, situated near the coast of Lesser Asia, west of the ruins of Troy. It belongs to the Turks, and is remarkable for producing the best muscadine wine in the Levant. On the eastern side is a pretty large town, seated at the foot of a mountain, with a fine harbour commanded by a castle. E. Long. 27. o. N. Lat. 29. 30.

TENERIFF, the most considerable of the Canary islands, being about 45 miles in length and 20 in breadth, abounding with wine, different sorts of fruit, cattle, and game. It is subject to earthquakes; and in 1704 there happened one that destroyed several towns and many thousand people. It is remarkable for a very high mountain called the *Peak*, which in a clear day may be seen 100 miles off. It was formerly a volcano, and still emits hot sulphureous steams from chinks in different parts. Its height has been computed by Dr Heberden at 15,396 feet, which is but 148 yards less than three miles. On the top is found the natron, or fossil fixed alkali, and likewise some very pure natural sulphur. W. Long. 16. 22. N. Lat. 28. 30.

TENESMUS, in medicine, a name given by medical writers to a complaint which is a continual desire of going to stool, but without any stool being ready to be voided. This is properly no primary disease, but merely a symptomatic one, and differs in degree according to the disease on which it is an attendant.

TENIERS (David) the Elder, a Flemish painter, born at Antwerp in 1582. He received the first rudiments of his art from the famous Rubens, who highly esteemed him for his promising genius, and with great satisfaction examined and commended his designs. From the school of that celebrated painter Teniers went to finish his studies at Rome: he attached him-

self to Adam Elsheimer for six years; and from the instructions of two such incomparable masters, he formed to himself a peculiar style, which his son cultivated so happily afterward as to bring it to the utmost perfection. His pictures were small; and his subjects usually shops, laboratories, humorous conversations, and rural festivities. The demand for his pieces was universal; and even his master Rubens thought them an ornament to his cabinet. He died at Antwerp in 1649.

TENIERS (David) the Younger, also an admirable painter, was the son of the former, and was born at Antwerp in 1610. He obtained the name of *Ape of Painting*, from his imitating the manner of different painters with such exactness, as to deceive even the nicest judges. He improved greatly under his father, and obtained such reputation as introduced him to the favour of the great. The archduke Leopold William made him gentleman of his bed-chamber; and all the pictures of his gallery were copied by Teniers, and engraved by his direction. The king of Spain and Don Juan of Austria set so high a value on his pictures, that they built a gallery on purpose for them. William prince of Orange honoured him with his friendship; and Rubens not only esteemed his works, but assisted him with his advice. His principal talent lay in landscapes adorned with small figures. He also painted men drinking and smoking, chemists laboratories, country fairs, and the like. His small figures are superior to his large ones. He died in 1694.

The works of the father and son are thus distinguished: The latter discover a finer touch and fresher pencil, greater variety of attitudes, and a better disposition of the figures. The father retained something of the tone of Italy in his colouring, which was stronger than the son's; besides, the son used to put at the bottom of his pictures, David Teniers, junior.

Abraham, another son of David the Elder, was equal, if not superior, to his father and brother in the expression of his characters, and his understanding the *claro obscuro*; though he was inferior in the sprightliness of his touch, and the lightness of his pencil.

TENISON (Dr Thomas), archbishop of Canterbury, was born at Cottenham in Cambridgeshire in 1636; and studied at Corpus Christi college in Cambridge. In his youth, while the fanatical government lasted, he applied himself to physic; but afterward went into orders, and was some time minister of St Andrew's church, Cambridge; where he attended the sick during the plague in 1665, which his parishioners acknowledged by the present of a piece of plate. He showed himself very active against the growth of Popery by his writings both in king Charles and king James's reigns: in 1680 he was presented to the vicarage of St Martin's in the Fields, London, to which parish he made several donations; and among others, endowed a free school, and built a handsome library, which he furnished with useful books. King William and queen Mary, in 1689, presented him to the archdeaconry of London; in 1691, he was nominated to the see of Lincoln, and in 1694 he succeeded Dr Tillotson as archbishop of Canterbury. He performed all the duties of a good primate for 20 years, and died in 1715.

TENOR, or TENOUR, the purport or content of a writing or instrument in law, &c.

TENOR

Tenor || **Tenthredo.** **TENOR**, in music, the first mean, or middle part, or that which is the ordinary pitch of the voice, when neither raised to a treble nor lowered to a bass.

TENSE, in grammar, an inflection of verbs, whereby they are made to signify or distinguish the circumstance of time in what they affirm. See **GRAMMAR**.

TENT, in war, a pavilion or portable house. They are made of canvas, for officers and soldiers to lie under when in the field. The sizes of the officers tents are not fixed; some regiments have them of one size, and some of another: a captain's tent and marquee is generally $10\frac{1}{2}$ feet broad, 14 deep, and 8 high: the subalterns are a foot less; the major's and lieutenant-colonel's a foot larger; and the colonel's two feet larger. The subalterns of foot lie two a tent, and those of horse but one. The tents of private men are $6\frac{1}{2}$ feet square, and 5 feet high; and hold five soldiers each. The tents for horse are 7 feet broad, and 9 feet deep: they hold likewise five men and their horse accoutrements.—The word is formed from the Latin *tentorium*, of *tendo*, “I stretch,” in regard tents are usually made of canvas stretched out, and sustained by poles, with cords and pegs.

TENT, in surgery, a roll of lint made into the shape of a nail with a broad flat head, chiefly used in deep wounds and ulcers. They are of service, not only in conveying medicines to the most intimate recesses and sinuses of the wound, but to prevent the lips of the wound from uniting before it is healed from the bottom; and by their assistance grumous blood, fordes, &c. are readily evacuated.

TENTHREDO, the SAW-FLY; a genus of insects belonging to the order of hymenoptera. The mouth is furnished with jaws, but has no proboscis; the wings are plain and tumid; the sting consists of two serrated laminae, and the scutellum of two grains placed at a distance. The species are very numerous, differing from one another in colour and size. They are not very shy. Some, by means of their saw, deposit in the buds of flowers, others on the twigs of trees or shrubs, eggs from which are produced false caterpillars. The implement with which they are armed is nowise formidable; as it appears only destined to the purpose of depositing their eggs.

The *sylvatica* is a beautiful species. The antennae are setaceous, and have more than 20 joints. The head is blue; the trunk grey mottled with yellow; the body is black; the lines dividing the rings are brownish; the six terminatory segments are amber-coloured. The wings are brown, with a dusky edge. The legs are yellow. This delicate fly is found in damp woods and moors in August and September. When the female lays her eggs, there goes with them an acrid mucilaginous juice, which perverts the course of the sap in the plant, and makes it grow into a kind of gall; this operates as soon as emitted, and scarifies the part the saw has wounded. One may see bubbles of this soft and clammy juice always left upon the plant; the wound is oblong and crooked, and the part becomes black as if burnt. The egg increases in signification twice its size, or more, after it is lodged in the plant; nor is this strange, since it has no hard covering. The larvæ may easily be known by the number of their feet, which are always more than 16; by which they differ from caterpillars, which have 16 at most, and

never fewer than 8. In order to accomplish their metamorphose, they hide themselves in the ground, spin their cod, the inside of which is lined with a very fine down, and admit through the netted texture that moisture from the earth which they have need of in the state of chrysalids.

TENTHS, and **FIRST-FRUIT**s of *Spiritual Preference*, a branch of the king's revenue. See **REVENUE**.

These were originally a part of the Papal usurpations over the clergy of this kingdom; first introduced by Pandulph the pope's legate, during the reigns of king John and Henry III. in the fee of Norwich; and afterwards attempted to be made universal by the popes Clement V. and John XXII. about the beginning of the 14th century. The first-fruits, *primitie*, or *annates*, were the first year's whole profits of the spiritual preferment, according to a rate or *valor* made under the direction of pope Innocent IV. by Walter bishop of Norwich in 38 Hen. III. and afterwards advanced in value by commission from pope Nicholas III. A. D. 1292, 20 Edw. I.; which valuation of pope Nicholas is still preserved in the exchequer. The tenths, or *decime*, were the tenth part of the annual profit of each living by the same valuation; which was also claimed by the holy see, under no better pretence than a strange misapplication of that precept of the Levitical law, which directs, that the Levites “should offer the tenth part of their tithes as a heave-offering to the Lord, and give it to Aaron the high-priest.” But this claim of the pope met with vigorous resistance from the English parliament; and a variety of acts were passed to prevent and restrain it, particularly the statute 6 Hen. IV. c. 1. which calls it a *horrible mischief and damnable custom*. But the Popish clergy, blindly devoted to the will of a foreign master, still kept it on foot; sometimes more secretly, sometimes more openly and avowedly: so that in the reign of Henry VIII. it was computed, that in the compass of 50 years 800,000 ducats had been sent to Rome for first-fruits only. And as the clergy expressed this willingness to contribute so much of their income to the head of the church, it was thought proper (when in the same reign the papal power was abolished, and the king was declared the head of the church of England) to annex this revenue to the crown; which was done by statute 26 Hen. VIII. c. 3. (confirmed by statute 1 Eliz. c. 4.); and a new *valor beneficiorum* was then made, by which the clergy are at present rated.

By these last-mentioned statutes all vicarages under ten pounds a-year, and all rectories under ten marks, are discharged from the payment of first-fruits: and if, in such livings as continue chargeable with this payment, the incumbent lives but half a year, he shall pay only one quarter of his first-fruits; if but one whole year, then half of them; if a year and a half, three quarters; and if two years, then the whole, and not otherwise. Likewise by the statute 27 Henry VIII. c. 8. no tenths are to be paid for the first year, for then the first-fruits are due: and by other statutes of queen Anne, in the fifth and sixth years of her reign, if a benefice be under 50*l.* *per annum* clear yearly value, it shall be discharged of the payment of first-fruits and tenths.

Thus the richer clergy being, by the criminal bigotry of their Popish predecessors, subjected at first to a foreign

Tenths.

foreign exaction, were afterwards, when that yoke was shaken off, liable to a like misapplication of their revenues, through the rapacious disposition of the then reigning monarch; till at length the piety of queen Anne restored to the church what had been thus indirectly taken from it. This she did, not by remitting the tithes and first-fruits entirely; but, in a spirit of the truest equity, by applying these superfluities of the larger benefices to make up the deficiencies of the smaller. And to this end she granted her royal charter, which was confirmed by the statute 2 Ann. c. 11. whereby all the revenue of first-fruits and tithes is vested in trustees for ever, to form a perpetual fund for the augmentation of poor livings. This is usually called *queen Anne's bounty*; which has been still farther regulated by subsequent statutes.

TENURE, in law, signifies the manner whereby lands or tenements are held, or the service that the tenant owes to his lord.

Of this kingdom almost all the real property is by the policy of our laws supposed to be granted by, dependent upon, and holden of, some superior lord, by and in consideration of certain services to be rendered to the lord by the tenant or possessor of this property. The thing holden is therefore styled a *tenement*, the possessors thereof *tenants*, and the manner of their possession a *tenure*. Thus all the lands in the kingdom is supposed to be holden, mediately or immediately, of the king; who is styled the *lord paramount*, or above all. Such tenants as held under the king immediately, when they granted out portions of the lands to inferior persons, became also lords with respect to those inferior persons, as they were still tenants with respect to the king; and, thus partaking of a middle nature, were called *mesne* or *middle lords*. So that if the king granted a manor to A, and he granted a portion of the land to B, now B was said to hold of A, and A of the king; or, in other words, B held his lands immediately of A, but mediately of the king. The king therefore was styled *lord paramount*; A was both tenant and lord, or was a *mesne lord*; and B was called *tenant paravail*, or the *lowest tenant*, being he who was supposed to make avail, or profit of the land. In this manner are all the lands of the kingdom holden which are in the hands of subjects: for according to Sir Edward Coke, in the law of England we have not properly *allodium*; which we have seen in the name by which the feudists abroad distinguish such estates of the subject as are not holden of any superior. So that at the first glance we may observe, that our lands are either plainly feuds, or partake very strongly of the feudal nature.

All tenures being thus derived, or supposed to be derived, from the king, those that held immediately under him, in right of his crown and dignity, were called his *tenants in capite*, or in *chief*; which was the most honourable species of tenure, but at the same time subjected the tenants to greater and more burdensome services than inferior tenures did. And this distinction ran through all the different sorts of tenure.

There seem to have subsisted among our ancestors four principal species of lay-tenures, to which all other may be reduced: the grand criteria of which were the natures of the several services or renders

that were due to the lords from their tenants. The services, in respect of their quality, were either free or base services; in respect of their quantity and the time of exacting them, were either certain or uncertain. Free services were such as were not unbefitting the character of a soldier or a freeman to perform; as to serve under his lord in the wars, to pay a sum of money, and the like. Base services were such as were fit only for peasants or persons of a servile rank; as to plough the lord's land, to make his hedges, to carry out his dung, or other mean employments. The certain services, whether free or base, were such as were stinted in quantity, and could not be exceeded on any pretence; as, to pay a stated annual rent, or to plough such a field for three days. The uncertain depended upon unknown contingencies: as, to do military service in person, or pay an assessment in lieu of it when called upon; or to wind a horn upon the appearance of invaders; which are free services: or to do whatever the lord should command; which is a base or villen service.

From the various combinations of these services have arisen the four kinds of lay-tenure which subsisted in England till the middle of the last century; and three of which subsist to this day. Of these Bracton (who wrote under Henry the third) seems to give the clearest and most compendious account, of any author ancient or modern, of which the following is the outline or abstract: "Tenements are of two kinds, frank-tenement, and villenage. And, of frank-tenements, some are held freely in consideration of homage and knight-service; others in free-socage, with the service of fealty only. And again, of villenages, some are pure, and others privileged. He that holds in pure villenage shall do whatsoever is commanded him, and always be bound to an uncertain service. The other kind of villenage is called *villain-socage*; and these villain-socmen do villain-services, but such as are certain and determined." Of which the sense seems to be as follows: first, where the service was free, but uncertain, as military service with homage, that tenure was called the *tenure in chivalry*, *per servitium militare*, or by knight-service. Secondly, where the service was not only free, but also certain, as by fealty only, by rent and fealty, &c. that tenure was called *liberum socagium*, or *free socage*. These were the only free holdings or tenements; the others were villenous or servile: as, thirdly, where the service was base in its nature, and uncertain as to time and quantity, the tenure was *purum villenagium*, absolute or pure villenage. Lastly, where the service was base in its nature, but reduced to a certainty, this was still villenage, but distinguished from the other by the name of *privileged villenage*, *villanagium privilegiatum*; or it might be still called *socage* (from the certainty of its services), but degraded by their baseness into the inferior title of *villanum socagium*, villain-socage.

1. The military tenure, or that by knight-service, was done away by stat. 12 Car. II. For an account of this species of tenure, see *FEODAL System*, and *Knight-Service*; and for its incidents, see *AIDS*, *RELIEF*, *PRIMER-SEISIN*, *WARDSHIP*, *MARRIAGE*, *FINES*, and *ESCHEAT* (in APPENDIX).

2. The second species of tenure or free-socage, not only subsists to this day, but has in a manner absorbed

Tenure. bed and swallowed up (since the statute of Charles the second) almost every other species of tenure. See SOCAGE.

The other grand division of tenure, mentioned by Bracton is that of villenage, as contradistinguished from *liberum tenementum*, or frank-tenure. And this (we may remember) he subdivides into two classes, pure and privileged villenage: from whence have arisen two other species of our modern tenures.

3. From the tenure of pure villenage have sprung our present copyhold-tenures, or tenure by copy of court-roll at the will of the lord; in order to obtain a clear idea of which it will be previously necessary to consult the articles MANOR and VILLENAGE.

As a farther consequence of what has been there explained, we may collect these two main principles, which are held to be the supporters of a copyhold-tenure, and without which it cannot exist; 1. That the lands be parcel of and situate within that manor under which it is held. 2. That they have been demised, or demisable, by copy of court-roll immemorially. For immemorial custom is the life of all tenures by copy; so that no new copyhold can, strictly speaking, be granted at this day.

In some manors, where the custom hath been to permit the heir to succeed the ancestor in his tenure, the estates are styled *copyholds of inheritance*; in others, where the lords have been more vigilant to maintain their rights, they remain copyholds for life only; for the custom of the manor has in both cases so far superseded the will of the lord, that, provided the services be performed or stipulated for by fealty, he cannot in the first instance refuse to admit the heir of his tenant upon his death; nor, in the second, can he remove his present tenant so long as he lives, though he holds nominally by the precarious tenure of his lord's will.

The fruits and appendages of a copyhold-tenure, that it hath in common with free tenures, are fealty, services (as well in rents as otherwise), reliefs, and escheats. The two latter belong only to copyholds of inheritance; the former to those for life also. But, besides these, copyholds have also heriots, wardship, and fines. Heriots, which are agreed to be a Danish custom, are a render of the best beast or other good (as the custom may be) to the lord on the death of the tenant. This is plainly a relic of villenage-tenure; there being originally less hardship in it, when all the goods and chattels belonged to the lord, and he might have seized them even in the villen's lifetime. These are incident to both species of copyhold; but wardship and fines to those of inheritance only. Wardship, in copyhold-estates, partakes both of that in chivalry and that in focage. Like that in chivalry, the lord is the legal guardian; who usually assigns some relation of the infant tenant to act in his stead: and he, like guardian in focage, is accountable to his ward for the profits. Of fines, some are in the nature of primer-feins, due on the death of each tenant, others are mere fines for alienation of the lands; in some manors, only one of those sorts can be demanded, in some both, and in others neither. They are sometimes arbitrary and at the will of the lord, sometimes fixed by custom: but, even when arbitrary,

the courts of law, in favour of the liberty of copyholders, have tied them down to be reasonable in their extent; otherwise they might amount to dissipation of the estate. No fine therefore is allowed to be taken upon descents and alienations, (unless in particular circumstances) of more than two years improved value of the estate. From this instance we may judge of the favourable disposition that the law of England (which is a law of liberty) hath always shown to this species of tenants, by removing, as far as possible, every real badge of slavery from them, however some nominal ones may continue. It suffered custom very early to get the better of the express terms upon which they held their lands; by declaring, that the will of the lord was to be interpreted by the custom of the manor: and, where no custom has been suffered to grow up to the prejudice of the lord, as in this case of arbitrary fines, the law itself interposes in an equitable method, and will not suffer the lord to extend his power so far as to disinherit the tenant.

4. There is yet a fourth species of tenure, described by Bracton under the name sometimes of *privileged villenage*, and sometimes of *villain-focage*. See *Privileged VILLENAGE*.

Having in the present article and those referred to, taken a compendious view of the principal and fundamental points of the doctrine of tenures, both ancient and modern, we cannot but remark the mutual connection and dependence that all of them have upon each other. And upon the whole it appears, that, whatever changes and alterations these tenures have in process of time undergone, from the Saxon æra to the 12 Car. II. all lay-tenures are now in effect reduced to two species; free-tenure in common focage, and base-tenure by copy of court-roll. But there is still behind one other species of tenure, reserved by the statute of Charles II. which is of a spiritual nature, and called the tenure in *FRANK-ALMOIGN*; see that article.

TEPID, a term used by writers on mineral waters, &c. to express such of them as have a less sensible cold than common water.

TERCERA, one of the largest islands of the Azores, or Western Islands, lying in the Atlantic Ocean. It is about 40 miles in circumference; and surrounded with craggy rocks, which render it almost inaccessible. The soil is fertile, abounding in corn, wine, and fruits; and they have such plenty of cattle, that they supply the ships therewith that call there. However, their principal trade is wood. The inhabitants are lively and well made; and they pretend to a great deal of religion and gallantry at the same time. They pique themselves upon points of honour, and are extremely revengeful. It is their custom to rove about in the night-time in quest of intrigues, and seldom fail in finding women for their purpose. It is subject to Portugal; and Angra is the capital town.

TEREBINTHUS, in botany. See PISTACIA.

TEREDO, the PIERCER; a genus of insects belonging to the order of vermes testacea. There is but one species, viz. the navalis, with a slender bending shell. It inhabits the Indian seas, whence it was imported into the European. It penetrates easily into the stoutest oak-planks, and produces

Tenure
||
Teredo.

produces dreadful destruction to the ships by the holes it makes in their sides; and it is to avoid the effects of this insect that vessels require sheathing.

TERENCE, or PUBLIUS TERENTIUS AFER, a celebrated comic poet of ancient Rome, was born at Carthage in Africa. He was slave to Terentius Lucanus the senator; who gave him his liberty on account of his wit, his good mien, and great abilities. Terence, on his becoming a freed man, applied himself to the writing of comedies; in the execution of which he imitated Menander and the other celebrated comic poets of Greece. Cicero gives him the most pompous eulogiums, both for the purity of his language and the perspicuity and beauty of his compositions, which he considers as the rule and standard of the Latin tongue; and observes, that they were esteemed so fine and elegant, that they were thought to have been written by Scipio and Lelius, who were then the greatest personages and the most eloquent of the Roman people. Terence died while on a voyage into Greece, about the 17th year before the Christian æra. There are six of the comedies extant, of which the best editions are the Elzevir one 1635, 12mo; that *cum integris notis, Donati, et selectis variorum*, 1686, 8vo; Westerhovius's, in two vols 4to 1726; and that of Bentley the same year, 4to. Madam Dacier has given a beautiful French version of this author; and an ingenious and correct English translation was published in 4to, 1768, by Mr Colman.

TERM, in law, is generally taken for a limitation of time or estate; as, a lease for term of life or years.

Term, however, is more particularly used for that time wherein our courts of justice are open; in opposition to which, the rest of the year is called *vacation*.

TERM, in grammar, denotes some word or expression of a language.

TERM in the *Arts*, or TERM of Art, is a word which, besides the literal and popular meaning which it has or may have in common language, bears a further and peculiar meaning in some art or science.

TERMES, a genus of insects belonging to the order of aptera. The antennæ are fetaceous, the mouth armed with jaws; the feet are six, formed for running. There are two species.

1. The fatale, or white ant, of a yellowish colour, is a native of both the Indies; makes its nest of wood, which it draws out into a cylindrical form as it moves along; inhabits dark and shady places, never appearing in the open air. It is in the highest degree pernicious, destroying every thing of wood or cloth, whether of animal or vegetable materials, penetrating into its substance and devouring it, while the surface is left entire. It can only be destroyed by quicklime.

Of the white ants of India and Africa we have a very curious account, published in the 71st volume of the Philosophical Transactions by Mr Henry Smeathman of Clement's Inn. According to this account, the works of these insects surpass those of the bees, wasps, beavers, and another animals, as much at least as those of the most polished European nations excel those of the least cultivated savages. And, even with regard to man, his greatest works, the boasted pyramids, fall comparatively far short, even in size alone,

of the structures raised by these insects. The labourers among them employed in this service are not a quarter of an inch in length; but the structures which they erect rise to 10 or 12 feet and upwards above the surface of the earth. Supposing the height of a man to be six feet, the author calculates, that the buildings of these insects may be considered, relatively to their size and that of a man, as being raised to near five times the height of the greatest of the Egyptian pyramids; that is, corresponding with considerably more than half a mile. We may add, that, with respect to the interior construction, and the various members and dispositions of the parts of the building, they appear greatly to exceed that or any other work of human construction.

The most striking parts of these structures are—the royal apartments, the nurseries, magazines of provisions, arched chambers and galleries, with their various communications; the ranges of Gothic-shaped arches, projected, and not formed by mere excavation, some of which are two or three feet high, but which diminish rapidly, like the arches of aisles in perspectives; the various roads, sloping stair-cases, and bridges, consisting of one vast arch, and constructed to shorten the distance between the several parts of the building; which would otherwise communicate only by winding passages. These astonishing structures are the works of an insect only a quarter of an inch long, and 25 of which weigh only one grain—But these and many other curious instances of the great sagacity and powers of these insects cannot be understood, without viewing the plates in which their feeble frames, and comparatively stupendous works, are delineated.

The œconomy of these industrious insects appears to have been very attentively observed by the ingenious author, as well as their buildings. There are three distinct ranks or orders among them, constituting a well-regulated community. These are, first, the *labourers*, or working insects; next the *soldiers*, or fighting order, who do no kind of labour, and are about twice as long as the former, and equal in bulk to about 15 of them; and lastly, the winged or perfect insects, who may be called the *nobility* or *gentry* of the state; for they neither labour nor fight, being scarcely capable even of self-defence.—“These only are capable of being elected *kings* or *queens*; and nature has so ordered it, that they emigrate within a few weeks after they are elevated to this state, and either establish new kingdoms, or perish within a day or two.”

This last-mentioned order differs so much from the other two, that they have not hitherto been supposed to belong to the same community. In fact, they are not to be discovered in the nest till just before the commencement of the rainy season; when they undergo the last change, which is preparative to the formation of new colonies. They are equal in bulk to two soldiers and about 30 labourers; and are furnished with four wings, with which they are destined to roam about for a few hours; at the end of which time they lose their wings, and become the prey of innumerable birds, reptiles, and insects: while probably not a pair out of many millions of this unhappy race get into a place of safety, fulfil the first law of nature, and lay the

four-

Terms. foundation of a new community. In this state many fall into the neighbouring waters, and are eat with avidity by the Africans. The author found them delicate, nourishing, and wholesome; without sauce or other help from cookery, than merely roasting them in the manner of coffee.

The few fortunate pairs who happen to survive this annual massacre and destruction, are represented by the author as being casually found by some of the labourers, that are continually running about on the surface of the ground, and are elected kings and queens of new states. Those who are not so elected and preserved, certainly perish, and most probably in the course of the following day. By these industrious creatures the king and queen elect are immediately protected from their innumerable enemies, by inclosing them in a chamber of clay; where the business of propagation soon commences. Their "voluntary subjects" then busy themselves in constructing wooden nurseries, or apartments entirely composed of wooden materials, seemingly joined together with gums. In-to these they afterwards carry the eggs produced from the queen; lodging them there as fast as they can obtain them from her. The author even furnishes us with plausible reasons to believe, that they here form a kind of garden for the cultivation of a species of microscopical mushroom; which Mr König (in an essay on the East Indian termites, read before the Society of Naturalists of Berlin) conjectures to be the food of the young insects. But perhaps the most wonderful, and at the same time best authenticated, part of the history of these singular insects is that which relates to the queen or mother of the community, in her pregnant state.

After impregnation, a very extraordinary change begins to take place in her person, or rather in her abdomen only. It gradually increases in bulk, and at length becomes of such an enormous size as to exceed the bulk of the rest of her body 1500 or 2000 times. She becomes 1000 times heavier than her consort; and exceeds 20,000 or 30,000 times the bulk of one of the labourers. In this state, the matrix has a constant peristaltic or undulating motion; the consequence of which is (as the author has counted them) the protrusion of 80,000 eggs in 24 hours.

These eggs, says the author, "are instantly taken from her body by her attendants (of whom there always are, in the royal chamber and the galleries adjacent, a sufficient number in waiting) and carried to the nurseries—which are sometimes four or five feet distant in a straight line.—Here, after they are hatched, the young are attended and provided with every thing necessary, until they are able to shift for themselves, and take their share of the labours of the community."

Many curious and striking particulars are related of the great devastations committed by this powerful community; who construct roads, or rather covered ways, diverging in all directions from the nest, and leading to every object of plunder within their reach. Though the mischiefs they commit are very great, such is the œconomy of nature, that it is probably counterbalanced by the good produced by them; in quickly destroying dead trees and other substances, which, as the author observes, would, by a tedious

decay, serve only to encumber the face of the earth. Such is their alacrity and dispatch in this office, that the total destruction of deserted towns is so effectually accomplished, that in two or three years a thick wood fills the space; and not the least vestige of a house is to be discovered.

From the many singular accounts here given of the police of these insects, we shall select and abridge only one; respecting the different functions of the labourers and soldiers, or the civil and military establishments in this community, on an attempt to examine their nest or city.

On making a breach in any part of the structure with a hoe or pick-axe, a soldier immediately appears, and walks about the breach; as if to see whether the enemy is gone, or to examine whence the attack proceeds. In a short time he is followed by two or three others, and soon afterwards by a numerous body, who rush out as fast as the breach will permit them; their numbers increasing as long as any one continues to batter the building. During this time they are in the most violent bustle and agitation; while some of them are employed in beating with their forceps upon the building, so as to make a noise that may be heard at three or four feet distance. On ceasing to disturb them, the soldiers retire, and are succeeded by the labourers, who hasten in various directions towards the breach; each with a burden of mortar in his mouth, ready tempered. Though there are millions of them, they never stop or embarrass each other; and a wall gradually arises that fills up the chasm. A soldier attends every 600 or 1000 of the labourers, seemingly as a director of the works; for he never touches the mortar, either to lift or carry it. One in particular places himself close to the wall which they are repairing, and frequently makes the noise above-mentioned; which is constantly answered by a loud hiss from all the labourers within the dome: and at every such signal, they evidently redouble their pace, and work as fast again.

The work being completed, a renewal of the attack constantly produces the same effects. The soldiers again rush out, and then retreat, and are followed by the labourers, loaded with mortar, and as active and diligent as before. "Thus," says the author, "the pleasure of seeing them come out to fight or to work alternately may be obtained, as often as curiosity excites or time permits: and it will certainly be found, that the one order never attempts to fight, or the other to work, let the emergency be ever so great." The obstinacy of the soldiers is remarkable. "They fight to the very last, disputing every inch of ground so well as often to drive away the negroes, who are without shoes, and make white people bleed plentifully through their stockings."

Such is the strength of the buildings erected by these puny insects, that when they have been raised to little more than half their height, it is always the practice of the wild bulls to stand as sentinels upon them, while the rest of the herd is ruminating below. When at their full height of 10 or 12 feet, they are used by the Europeans as places to look out from, over the top of the grass, which here grows to the height of 13 feet upon an average. The author has stood with four men on the top of one of these build-

Terms.

Terminalia ings, in order to get a view of any vessel that might come in sight.

Terpander.

2. The *pullatorium*, or death-watch, varies in colour and size; being sometimes quite white or grey, at others of a lead colour. In some the abdomen is marked with a brown annular band, after which, near the tail, is found a brown spot. The insect is commonly found in old wood, decayed tables, or books not often looked into. It runs and even leaps a little when touched. Those met with in houses are whiter than those which may be seen in gardens and in the fields, on walls, and the trunks of trees, which are more of a brown colour, and somewhat hairy. This insect imitates the ticking of a watch, which some imagine it does by striking its head against the wain-foot; and hence Linnæus has given it the name of *pullatorium*. But this noise is occasioned by one of the *ptini*, and is an amorous invitation. By superstitious people it is thought to be a prognostic of death.

TERMINALIA, in antiquity, feasts celebrated by the Romans in honour of the god *Terminus*†.

† See *Terminus*.

TERMINI, in architecture, denote a kind of statues or columns, adorned a-top with the figure of a man's, woman's, or satyr's head, as a capital; and the lower part ending in a kind of sheath or scabbard.

TERMINUS, in Pagan worship, an ancient deity among the Romans, who presided over the stones or land-marks called *termini*, which were held so sacred that it was accounted sacrilege to move them; and as the criminal became devoted to the gods, it was lawful for any man to kill him. The worship of this deity was instituted by Numa Pompilius, who, to render land-marks, and consequently the property of the people, sacred, erected a temple on the Tarpeian mount to *Terminus*.

TERN, in ornithology. See STERNA.

TERNATE, the most northerly of the Molucca or Clove Islands in the East Indies. It abounds in cocoa-nuts, bananas, citrons, oranges, almonds, and other fruit proper to the torrid zone; but cloves are the most valuable produce. It is in the possession of the Dutch. Malaya is the capital town. E. Long. 125. 10. N. Lat. 1. 15.

TERNI, a town of Italy in the Pope's territories, and in the duchy of Spoleto, with a bishop's see. It is but a small place; though there are very beautiful ruins of antiquity, it having been a very considerable Roman colony. It is situated on the top of a high mountain, and to the west of it are fields which are extremely fertile. E. Long. 12. 50. N. Lat. 42. 4.

TERPANDER, a celebrated Greek poet and musician. The Oxford marbles tell us that he was the son of Derdeneus of Lesbos, and that he flourished in the 381st year of these records; which nearly answers to the 27th olympiad, and 671st year B.C. The marbles inform us likewise, that he taught the *nomos*, or airs, of the lyre and flute, which he performed himself upon this last instrument, in concert with other players on the flute. Several writers tell us that he added three strings to the lyre, which before his time had but four; and in confirmation of this, Euclid and Strabo quote two verses, which they attribute to Terpander himself.

The tetrachord's restraint we now despise,
The seven-string'd lyre a nobler strain supplies.

If the hymn to Mercury, which is ascribed to Homer, and in which the seven-stringed lyre is mentioned, be genuine, it robs Terpander of this glory. The learned, however, have great doubts concerning its authenticity. But if the lyre had been before his time furnished with seven strings in other parts of Greece, it seems as if Terpander was the first who played upon them at Lacedæmon.

Among the many signal services which Terpander is said to have done to music, none was of more importance than the notation that is ascribed to him for ascertaining and preserving melody, which before was traditional, and wholly dependent on memory. The invention, indeed, of musical characters has been attributed by Alypius and Gaudentius, two Greek writers on music, and upon their authority, by Boethius, to Pythagoras, who flourished full two centuries after Terpander. But Plutarch, from Heraclides of Pontus, assures us that Terpander, the inventor of *nomos* for the cithara, in hexameter verse, set them to music, as well as the verses of Homer, in order to sing them at the public games: And Clemens Alexandrianus, in telling us that this musician wrote the laws of *Lycurgus* in verse, and set them to music, makes use of the same expression as Plutarch; which seems clearly to imply a written melody.

After enumerating the airs which Terpander had composed, and to which he had given names, Plutarch continues to speak of his other compositions; among which he describes the *proems*, or hymns for the cithara, in heroic verse. These were used in after-times by the Rhapsodists, as prologues or introductions to the poems of Homer and other ancient writers. But Terpander rendered his name illustrious, no less by his performance both upon the flute and cithara, than by his compositions. This appears by the marbles already mentioned; by a passage in Athenæus, from the historian *Hellanicus*, which informs us that he obtained the first prize in the musical contests at the Carnean games; and by the testimony of Plutarch, who says, that "no other proof need be urged of the excellence of Terpander in the art of playing upon the cithara, than what is given by the register of the Pythic games, from which it appears that he gained four prizes successively at those solemnities.

Of the works of this poet only a few fragments are now remaining.

TERRA AUSTRALIS INCOGNITA, a name for a large unknown continent, supposed to lie towards the South Pole, and which for a long time was sought after by navigators. The late voyages of Captain Cook have ascertained this matter as much as it probably ever will be; and though this celebrated navigator does not deny the existence of such a climate, it is by no means probable that ever it will become inhabited, or that any valuable commodity can be produced from it. On this subject Captain Cook expresses himself as follows. "I had now made the circuit of the Southern Ocean in a high latitude, and traversed it in such a manner as to leave not the least room for the possibility of there being a continent, unless near the pole, and out of the reach of navigation. By twice visiting the tropical sea, I had not only settled the situation of some old discoveries, but made there many new ones, and left, I conceive, very little more to be done even in that.

Terra.

that part. Thus I flatter myself, that the intention of the voyage has in every respect been fully answered; the southern hemisphere sufficiently explored; and a final end put to the searching after a southern continent, which has at times ingrossed the attention of some of the maritime powers for near two centuries past, and been a favourite theory amongst the geographers of all ages. That there may be a continent, or large tract of land near the pole, I will not deny: on the contrary, I am of opinion there is; and it is probable that we have seen a part of it. The excessive cold, the many islands and vast floats of ice, all tend to prove that there must be land to the south; and for my persuasion that this southern land must lie or extend farthest to the north, opposite to the Southern Atlantic and Indian Oceans, I have already assigned some reasons; to which I may add the greater degree of cold experienced by us in these seas than in the Southern Pacific Ocean under the same parallels of latitude."

TERRA del Fuego. See *TIERRA del Fuego*.

TERRA Firma, in geography, is sometimes used for a continent, in contradistinction to islands.

TERRA Firma, otherwise called *New Castile*, or *Castilla del Oro*, a country of America, bounded on the north by the North Sea and part of the Atlantic Ocean, by the same sea and Guiana on the east, by the country of the Amazons and Peru on the south, and by the Pacific Ocean and Veragua on the west. It lies between 62 and 83 degrees of west longitude, and between the equator and 12 degrees of north latitude; being upwards of 1200 miles in length from east to west, and 800 in breadth from north to south. It had the name of *Castilla del Oro* from the quantities of gold found in the district of Uraba and other parts; and was first discovered by the celebrated Columbus in his third voyage.

The climate is neither pleasant nor healthy; the inhabitants one part of the year being scorched by the most intense and burning heat, and the other almost drowned with perpetual floods of rain, pouring from the sky with such violence as if a general deluge was to ensue.

In so large a tract of country the soil must necessarily vary. Accordingly, in some parts it is a barren sand, or drowned mangrove land, that will scarce produce any kind of grain; in others it yields Indian corn, balms, gums, and drugs, almost all manner of fruits as well of Old as of New Spain, sugar, tobacco, Brazil wood, and several kinds of dyeing woods; a variety of precious stones, particularly emeralds and sapphires; venison, and other game. The plantations of cacao, or chocolate nuts, in the district of the Caraccas, are esteemed the best in America. The mountains abound with tygers, and, according to some, with lions, and great numbers of other wild beasts. The rivers, seas, and lakes, teem with fish, and also with alligators; and the bowels of the earth were once furnished with the richest treasures, now almost exhausted. The same may be said of the pearl-fisheries on the coast, which are far from being so profitable now as formerly.

TERRA Firma is a very mountainous country. *Terra Firma* Proper, in particular, consists of prodigious high mountains, and deep valleys flooded more than half the year. The mountains in the provinces of Carthage and St Martha, according to Dampier, are

the highest in the world; being seen at sea 200 miles off; from these run a chain of hills of almost equal height, quite through South America, as far as the Straits of Magellan, called the *Cordilleras des Andes*. The province of Venezuela also, and district of the Caraccas, the most northerly parts of South America, are almost a continued chain of hills, separated by small valleys, pointing upon the coast of the North Sea. A chain of barren mountains, almost impassable, runs through the province of Popayan from north to south, some whereof are volcanos; but towards the shores of the Pacific Ocean it is a low country, flooded great part of the year.

The principal rivers of *Terra Firma* are the Darien, Chagtre, Santa Maria, Conception, Rio Grande or Magdalena, Maricao, and Oroonoko.

Terra Firma contains the provinces of *Terra Firma* Proper or Darien, of Carthage, St Martha, Rio de la Hacha, Venezuela, Comana, New Andalusia or Paria, New Granada, and Popayan.

Terra-Firma Proper lies in the form of a crescent, about the spacious bay of Panama, being the isthmus which joins South and North America; and extending in length between the two seas 300 miles, but in breadth, where the isthmus is narrowest, only 60. Here are found gold mines, gold sands, and fine pearls; and though the land is generally rough, there are some fruitful valleys, watered by rivers, brooks, and springs. The chief places are Panama and Porto Bello.

The inhabitants of *Terra Firma* have never been thoroughly subdued, and in all probability never will; as they are a brave and warlike people, have retreats inaccessible to Europeans, and bear an inveterate enmity to the Spaniards.

TERRA Japonica, or *Japan Earth*, improperly so called; being neither an earth nor the produce of Japan; but an inspissated vegetable juice, prepared in the East Indies from the fruit, as is supposed, of the areca palm-tree. It is dry and pulverable, outwardly of a reddish colour, inwardly of a shining dark brown, almost black, with some cast of red. When pure, it dissolves totally in water, and almost totally in rectified spirit; as we usually meet with it, a considerable quantity of sandy matter is left by both these menstrua. This medicine is a mild astringent, and frequently employed as such in alvine fluxes, uterine profluvia, in laxity and debility of the viscera in general, and in coughs proceeding from thin acid disfluxions. Its taste is more agreeable than that of most other substances of this class; chewed for some time, it leaves a sweetness in the mouth. The troches and tincture kept in the shops are very elegant preparations of it.

TERRÆ Filius, *Son of the Earth*, a student of the university of Oxford, formerly appointed in public acts to make satirical and jesting speeches against the members thereof, to tax them with any growing corruptions, &c.

TERRACE, a walk or bank of earth, raised in a garden or court to a due elevation for a prospect. The name is also given to the roofs of houses that are flat, and whereon we may walk.

TERRAQUEOUS, in geography, a name given to our globe, because consisting of land and water.

TERRASSON (Abbe John), a French writer born at Lyons in 1669. He distinguished himself in the

Terra.

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Terraillon.

Terrestrial
Tertullian.

dispute concerning Homer, between La Motte and Madam Dacier, by writing a *Dissertation contre l'Iliade*; he wrote a political and moral romance called *Sethor*, full of learning and philosophy; and another capital work of his is a French translation of Diodorus Siculus. He died in 1750.

TERRESTRIAL, something partaking of the nature of earth, or belonging to the globe of earth; thus we say, the terrestrial globe, &c.

TERRIER, a small hound, to hunt the fox or badger; so called, because he creeps into the ground, as ferrets do into the coney-burrows after the fox, &c.

TERRITORY, in geography, denotes an extent or compass of land, within the bounds or belonging to the jurisdiction of any state, city, or other subdivision of a country.

TERROR, or **FRIGHT**. The general effects of terror are a great contraction of all the small vessels, and a revulsion of the blood in the large and internal ones; hence the suppression of perspiration, the general oppression, trembling, and anguish, from the heart and lungs being overcharged with blood, &c. After great frights, persons rarely recover their vivacity; and epilepsies that are caused by frights are rarely, if ever, cured. When a person is affected with terror, or sudden or great frights, the principal endeavours should be to restore the circulation to its due order, to promote perspiration, and to allay the agitation or commotion in which the patient is observed to be. The custom of giving cold water in these cases is bad. Place the affrighted person in a quiet situation; a little warm liquor, such as camomile tea, or the like, should be given him to drink; the legs may be put into warm water, and there continue for some time; they should be rubbed, and the camomile tea repeated every six or eight minutes: when the skin becomes warm, and there is a tendency to perspiration, sleep may be promoted by a gentle opiate.

TERTIAN FEVER. See *MEDICINE*, n° 134. 237—248. and p. 4643.

TERTULLIAN, or **QUINTUS SEPTIMUS FLORENS TERTULLIANUS**, a celebrated priest of Carthage, was the son of a centurion in the militia, who served as proconsul of Africa. He was educated in the Pagan religion; but being convinced of its errors, embraced Christianity, and became a zealous defender of the faith. He married, it is thought, after his baptism. Afterwards he took orders, and went to Rome; where, during the persecution under the emperor Severus, he published his *Apology* for the Christians, which is, in its kind, a masterpiece of eloquence and learning; and at the beginning of the third century he embraced the sect of the Montanists. He lived to a very great age, and died under the reign of Antoninus Caracalla about the year 216. Many of his works are still extant, in all of which he discovers a great knowledge of the Holy Scriptures, a lively imagination, a strong, elevated, and impetuous style, great eloquence and strength of reasoning; but is sometimes obscure. His *Apology* and *Prescriptions* are most esteemed. The best editions of his works are those of Rigault; especially that of Venice in 1746, folio. Pamelius and Alix, Mr Thomas, and the Sieur du Fossé, have written his life; and Rigault, M. de l'Aube Epine, Father

Petau, and other learned men, have published notes on his works.

TESSELATED PAVEMENTS, those of rich Mosaic work made of curious square marbles, bricks, or tiles; called *tessele*, from their resembling dice.

TESSON, or **TESTOON**, commonly called *Tesser*, a sort of money which among the French bore the value of 18d.; but being made of brass lightly gilt with silver, in the reign of king Henry VIII. it was reduced to 12d. and afterwards to 6d.

TEST, a large kind of cupel formed of the same materials with the small ones.—Some of the German writers recommend, both for tests and cupels, a sort of friable opaque stone, called *white spath*, which appears to be a species of gypsum, or of the stones from which plaster-of-paris is prepared. The spath is directed to be calcined with a gentle fire, in a covered vessel, till the slight crackling, which happens at first, has ceased, and the stone has fallen in part into powder: the whole is then reduced into subtile powder, which is passed through a fine sieve, and moistened with so much of a weak solution of green vitriol as is sufficient for making it hold together. Gellert, however, finds, that if the stone is of the proper kind, which can be known only by trials, calcination is not necessary. Scheffer observes, that these kinds of tests are liable to soften or fall asunder in the fire, and that this inconvenience may be remedied by mixing with the uncalcined stone somewhat less than equal its weight, as eight-ninths of such as has been already used and is penetrated by the scoria of the lead, taking only that part of the old test which appears of a green-grey colour, and rejecting the red crust on the top. Tests or cupels made of the spath are said not to require so much caution in heating and heating them as the common ones: it appears, however, from Scheffer's account, that they are less durable than those made of the ashes of bones, though greatly superior to those of wood-ashes. Vegetable ashes, which stand pretty well the testing of silver, can scarcely bear any great quantity of gold, this metal requiring a considerably stronger fire than the other; but bone-ashes answer so effectually, and are among us so easily procurable, that it is not needful for the refiner to search for any other materials; though those who work off large quantities of lead, in order to gain a little silver or gold contained in it, may possibly, in places remote from populous cities, avail themselves of substances similar to the spath above-mentioned.

The test, for its greater security, is fixed in the mould in which it was formed; which is sometimes a shallow vessel made of crucible earth or cast-iron, more commonly an iron hoop, with three bars arched downwards across the bottom, about two inches deep, and of different widths, from three or four inches to fifteen or more, according to the quantity of metal to be tested at once. The ashes or earthy powder, moistened as for making cupels, are pressed down in the mould so as to completely fill it or rise a little above the sides; with care to make the mass equally solid, and to put in at once, or at least after the bottom has been pressed close, as much of the matter as will be sufficient for the whole; for any additional quantity will not unite thoroughly with the rest, but be apt to

Tesselated
Test.

part

part from it in the fire. The edges are pared smooth, and a portion cut out from the middle with a bent knife, so as to leave a proper cavity, which is smoothed by strewing some dry powder on the surface, and rolling on it a wooden or rather a glass ball.

The process of testing is often performed in the same manner as that of cupellation: but where great quantities of base metal are to be worked off from a little gold, recourse is had to a more expeditious method, that of testing before the bellows.

An oval test is placed in a cavity, made in a hearth of a convenient height, and some moistened sand or ashes pressed round it to keep it steady: the nose of a bellows is directed along its surface, in such a manner, that if ashes are sprinkled in the cavity of the test, the bellows may blow them completely out: some have an iron plate fixed before the bellows, to direct the blast downwards. To keep the surface of the test from being injured in putting in the metal, some cloths or pieces of paper are interposed. The fuel consists of billets of barked oak, laid on the sides of the test, with others laid crosswise on these: the bellows impels the flame on the metal, clears the surface of ashes or sparks of coal, halts the scorification of the lead, and blows off the scoria, as fast as it forms, to one end of the test, where it runs out through a notch made for that purpose. About two-thirds of the scorified lead may thus be collected; the rest being partly absorbed by the test, and partly dissipated by the action of the bellows. Care must be taken not to urge the blast too strongly, lest some portion of the gold should be carried away by the fumes impetuously forced off from the lead, and some minute particles of it entangled and blown off with the scoria.

TEST-AG, a statute 25 Car. II. cap. 2. which requires all officers, both civil and military, to take the oaths and test, viz. the sacrament according to the rites and ceremonies of the church of England; for the neglect whereof, a person executing any office mentioned in that statute, forfeits the sum of 500 l. recoverable by action of debt.

TESTACEOUS, in natural history, an epithet given to a species of fish which are covered with a strong thick shell, as tortoises, oysters, pearl-fish. &c.

TESTAMENT, or **LAST-WILL**. Testaments both Justinian and Sir Edward Coke agree to be so called, because they are *testatio mentis*: an etymon which seems to favour too much of conceit; it being plainly a substantive derived from the verb *testari*, in like manner as *juramentum*, *incrementum*, and others, from other verbs. The definition of the old Roman lawyers is much better than their etymology; *voluntatis nostræ sententia de eo, quod quis post mortem suam fieri velit*: which may be thus rendered into English, "the legal declaration of a man's intentions, which he wills to be performed after his death." It is called *sententia*, to denote the circumspection and prudence with which it is supposed to be made: it is *voluntatis nostræ sententia*, because its efficacy depends on its declaring the testator's intention, whence in English it is emphatically styled his *will*: it is *iusta sententia*; that is, drawn, attested, and published with all due solemnities and forms of law; it is *de eo, quod*

quis post mortem suam fieri velit, because a testament is Testament, of no force till after the death of the testator.

These testaments are divided into two sorts; written, and verbal or nuncupative: of which the former is committed to writing; the latter depends merely upon oral evidence, being declared by the testator *in extremis* before a sufficient number of witnesses, and afterwards reduced to writing.

But as nuncupative wills and codicils (which were formerly more in use than at present when the art of writing is become more universal), are liable to great impositions, and may occasion many perjuries, the statute of frauds, 29 Car. II. c. 3. enacts, 1. That no written will shall be revoked or altered by a subsequent nuncupative one, except the same be in the lifetime of the testator reduced to writing, and read over to him, and approved; and unless the same be proved to have been so done by the oaths of three witnesses at the least, who, by statute 4 & 5 Anne c. 16. must be such as are admissible upon trials at common law. 2. That no nuncupative will shall in anywise be good, where the estate bequeathed exceeds 30 l. unless proved by three such witnesses, present at the making thereof, (the Roman law requiring seven), and unless they or some of them were specially required to bear witness thereto by the testator himself; and unless it was made in his last sickness, in his own habitation or dwelling-house, or where he had been previously resident ten days at the least, except he be surprised with sickness on a journey, or from home, and dies without returning to his dwelling. 3. That no nuncupative will shall be proved by the witnesses after six months from the making, unless it were put in writing within six days. Nor shall it be proved till fourteen days after the death of the testator, nor till process hath first issued to call in the widow, or next of kin, to contest it if they think proper. Thus hath the legislator provided against any fraud in setting up nuncupative wills, by so numerous a train of requisites, that the thing itself is fallen into disuse; and hardly ever heard of, but in the only instance where favour ought to be shown to it, when the testator is surprised by sudden and violent sickness. The testamentary words must be spoken with an intent to bequeath, not any loose idle discourse in his illness; for he must require the by-standers to bear witness of such his intention: the will must be made at home, or among his family or friends, unless by unavoidable accident, to prevent impositions from strangers: it must be in his last sickness; for, if he recovers, he may alter his dispositions, and has time to make a written will: it must not be proved at too long a distance from the testator's death, lest the words should escape the memory of the witnesses; nor yet too hastily and without notice, lest the family of the testator should be put to inconvenience, or surprised.

As to written wills, they need not any witness of their publication. We speak not here of devises of lands, which are entirely another thing, a conveyance by statute, unknown to the feudal or common law, and not under the same jurisdiction as personal testaments. But a testament of chattels, written in the testator's own hand, though it has neither his name nor seal to it, nor witnesses present at its publication,

Testament. tion, is good; provided sufficient proof can be had that it is his hand-writing. And though written in another man's hand, and never signed by the testator, yet if proved to be according to his instructions and approved by him, it hath been held a good testament of the personal estate. Yet it is the safer and more prudent way, and leaves less in the breast of the ecclesiastical judge, if it be signed or sealed by the testator, and published in the presence of witnesses: which last was always required in the time of Bracton; or rather he in this respect has implicitly copied the rule of the civil law.

No testament is of any effect till after the death of the testator; *Nam omne testamentum mortis consummatum est, et voluntas testatoris est ambulatoria usque ad mortem.* And therefore, if there be many testaments, the last overthrows all the former; but the republication of a former will revoke one of a later date, and establishes the first again.

Regularly, every person hath full power and liberty to make a will, that is not under some special prohibition by law or custom: which prohibitions are principally upon three accounts; for want of sufficient discretion; for want of sufficient liberty and free-will; and on account of their criminal conduct.

1. In the first species are to be reckoned infants, under the age of 14 if males, and 12 if females; which is the rule of the civil law. For though some of our common lawyers have held that an infant of any age (even four years old) might make a testament, and others have denied that under 18 he is capable; yet as the ecclesiastical court is the judge of every testator's capacity, this case must be governed by the rules of the ecclesiastical law. So that no objection can be admitted to the will of an infant of 14, merely for want of age: but if the testator was not of sufficient discretion, whether at the age of 14 or 24, that will overthrow his testament. Madmen, or otherwise *non compos*, idiots or natural fools, persons grown childish by reason of old age or distemper, such as have their senses befogged with drunkenness,—all these are incapable, by reason of mental disability, to make any will so long as such disability lasts. To this class also may be referred such persons as are born deaf, blind, and dumb; who, as they have always wanted the common inlets of understanding, are incapable of having *animum testandi*, and their testaments are therefore void.

2. Such persons as are intestable for want of liberty or freedom of will, are by the civil law of various kinds; as prisoners, captives, and the like. But the law of England does not make such persons absolutely intestable; but only leaves it to the discretion of the court to judge upon the consideration of their particular circumstances of duress, whether or no such persons could be supposed to have *liberum animum testandi*. And, with regard to feme-coverts, our laws differ still more materially from the civil. Among the Romans there was no distinction; a married woman was as capable of bequeathing as a feme-sole. But with us a married woman is not only utterly incapable of devising lands, being excepted out of the statute of wills, 34 & 35 Hen. VIII. c. 5. but also she is incapable of making a testament of chattels, without the licence of her husband. For all her

personal chattels are absolutely his own; and he may dispose of her chattels real, or shall have them to himself if he survives her: it would be therefore extremely inconsistent to give her a power of defeating that provision of the law, by bequeathing those chattels to another. The queen-consort is an exception to this general rule, for she may dispose of her chattels by will, without the consent of her lord; and any feme-covert may make her will of goods which are in her possession in *auter droit*, as executrix or administratrix; for these can never be the property of the husband: and if she has any pin-money or separate maintenance, it is said she may dispose of her savings thereof by testament, without the controul of her husband. But if a feme-sole makes her will, and afterwards marries, such subsequent marriage is esteemed a revocation in law, and entirely vacates the will.

3. Persons incapable of making testaments, on account of their criminal conduct, are in the first place all traitors and felons, from the time of conviction; for then their goods and chattels are no longer at their own disposal, but forfeited to the king. Neither can a *felo de se* make a will of goods and chattels, for they are forfeited by the act and manner of his death; but he may make a devise of his lands, for they are not subjected to any forfeiture. Outlaws also, though it be but for debt, are incapable of making a will so long as the outlawry subsists, for their goods and chattels are forfeited during that time. As for persons guilty of other crimes, short of felony, who are by the civil law precluded from making testaments, (as usurers, libellers, and others of a worse stamp), at the common law their testaments may be good. And in general the rule is, and has been so at least ever since Glanvil's time, *quod libera sit cujusunque ultima voluntas*.

Testaments may be avoided three ways: 1. If made by a person labouring under any of the incapacities before-mentioned; 2. By making another testament of a later date; and, 3. By cancelling or revoking it. For tho' I make a last will and testament irrevocable in the strongest words, yet I am at liberty to revoke it: because my own act or words cannot alter the disposition of law, so as to make that irrevocable which is in its own nature revocable. For this, saith lord Bacon, would be for a man to deprive himself of that which of all other things is most incident to human condition; and that is, alteration or repentance. It hath also been held, that, without an express revocation, if a man, who hath made his will, afterwards marries and hath a child, this is a presumptive or implied revocation of his former will which he made in his state of celibacy. The Romans were also wont to set aside testaments as being *inefficacia*, deficient in natural duty, if they disinherited or totally passed by (without assigning a true and sufficient reason) any of the children of the testator. But if the child had any legacy, though ever so small, it was a proof that the testator had not lost his memory or his reason, which otherwise the law presumed; but was then supposed to have acted thus for some substantial cause: and in such case *no querela inefficacia testamenti* was allowed. Hence probably has arisen that groundless vulgar error of the necessity of leaving the heir a shilling, or some other express legacy, in order to disinherit him effectually: whereas, the

Testament the law of England makes no such wild supposition of forgetfulness or infancy; and therefore, though the heir or next of kin be totally omitted, it admits no *inofficiis* to set aside such a testament.

TESTAMENT, in Scots law. See LAW, N° clxxxi. 2, &c.

TESTAMENT, (Old and New). See BIBLE.

TESTATOR, the person who makes his will and testament.

TESTER. See TESSON.

TESTES, in anatomy, the testicles. See the next article.

TESTICLE (*testis*), a double part in animals of the male kind, serving for the office of generation.—See ANAT. n° 371. They are called *testicles*, by diminution of *testis*, “witnesses;” as giving testimony of virility. The Greeks call them *didymi*, or *twins*.

In man and most animals, the testicles are exterior; in some, as fowls, interior. Some men have only one, ordinarily they have two; some have naturally had three; nay, anatomists assure us they have known four.

TESTIMONY. See LOGIC, n° 29. and METAPHYSICS, n° 253.—260.

TESTIMONY, in law. See EVIDENCE.

TESTUDO, the TORTOISE, in zoology, the name of a genus belonging to the order of amphibia reptilia. It has four legs and a tail, and the body is covered with a strong shell. There are 15 species, principally distinguished by peculiarities in their feet. The midas, or common turtle, is found on the Ascension Isle, and on many other southern islands. The shell is so strong, that several men may stand on it without doing it any injury. It digs round holes in the sand, in which it lays several membranaceous eggs. It grows to a very large size; some having been found weighing 480 lb. These creatures are said to continue several weeks in the act of copulation.

The Americans find no good account in catching turtle, that they have made themselves very expert at it: they watch them from their nests on shore, in moon-light nights; and, before they reach the sea, turn them on their backs, and leave them till morning; when they are sure to find them, since they are utterly unable to recover their former posture: at other times they hunt them in boats, with a peculiar kind of spear, striking them with it through the shell; and as there is a cord fastened to the spear, they are taken much in the same manner as the whales.

TESTUDO, in antiquity, was particularly used among the poets, &c. for the ancient lyre; by reason it was originally made by its inventor Mercury, of the black or hollow of the *testudo aquatica*, or sea-tortoise, which he accidentally found on the banks of the river Nile. See LYRE.

TESTUDO, in the military art of the ancients, was a kind of cover or screen which the soldiers, *e. gr.* a whole company, made themselves of their bucklers, by holding them up over their heads, and standing close to each other. This expedient served to shelter them from darts, stones, &c. thrown upon them, especially those thrown from above, when they went to the assault.

TESTUDO, was also a kind of large wooden tower which moved on several wheels, and was covered with bullock-hides, serving to shelter the soldiers when

they approached the walls to mine them, or to batter them with rams. It was called *testudo*, from the strength of its roof, which covered the workmen as the shell does the tortoise.

TETANUS, a dreadful spasmodic disorder, in which the whole body becomes rigid and inflexible. It most commonly proves mortal. See MEDICINE, n° 387. 389.

TETHYS, a genus of insects belonging to the order of vermes mollusca. The body is oblong, fleshy, and without feet; the mouth consists of a cylindrical proboscis under the duplicature of a lip; and there are two foramina at the left side of the neck. The species are two, both inhabitants of the ocean.

TETRADYNAMIA, (*τετραγιν* “four,” and *δυναμις* “power”), four powers; the name of the 15th class in Linnaeus’s Sexual System, consisting of plants with hermaphrodite flowers, having six stamina, four of which are long, and two short; it corresponds to the *filipsose* of Ray, and *cruciformes* of Tournefort. See BOTANY, p. 1296.

TETRAGYNIA, (*τετραγιν*, “four,” and *γυν* “a woman”); the name of an order, or secondary division in the 4th, 5th, 6th, 8th, and 13th classes in the Sexual System; consisting of plants which, to the classic character, whatever it is, add the circumstance of having four styles or female organs. Herb-paris and grafs of *Parnassus* furnish examples.

TETRANDRIA, (*τετραγιν* “four,” and *ανδρ* “a man or husband”); the name of the fourth class in Linnaeus’s Sexual System, consisting of plants with hermaphrodite flowers, which have four stamina or male organs that are of equal length. In this last circumstance consists the main difference, according to Linnaeus, between the plants of the class in question and those of the 14th class, didynamia, in which the four stamina are of unequal length, two of them being long, and two short.—The orders in this numerous class are three, founded upon the number of styles or female organs. Scabious, teal, barren-wort, the starry plants of Ray, and the greater number of genera in this class, have one style; dodder, and hypericum have two; holly, and a few others, have four.

TETRAO, in ornithology, a genus of birds, belonging to the order of gallinæ, distinguished by having the part of the forehead near the eyes naked and papillose. There are many species, distinguished principally by their colour, their having rump, or naked feet, &c. The following are found in Britain, viz.

1. The urogallus, or wood-cock, inhabits wooded and mountainous countries; in particular, forests of pines, birch-trees and junipers; feeding on the tops of the former and berries of the latter; the first insects often the flesh with such a taste as to render it scarcely eatable. In the spring it calls the females to its haunts with a loud and shrill voice; and is at that time so very inattentive to its safety, as to be very easily shot. It stands perched on a tree, and descends to the females on their first appearance. They lay from 8 to 16 eggs; eight at the first, and more as they advance in age.

These birds are common to Scandinavia, Germany, France, and several parts of the Alps.—It is found in no other part of Great Britain than the Highlands

Tetanus
||
Tetrao.

lands of Scotland, north of Inverness; and is very rare even in those parts. It is there known by the name of *capercalze*, *auer-calze*, and in the old law books *caperkally*; the last signifying the horse of the woods: this species being, in comparison of others of the genus, pre-eminently large.

The length of the male is two feet eight inches; its weight sometimes 14 pounds. The female is much less, the length being only 26 inches. The sexes differ also greatly in colours. The bill of the male is of a pale yellow; the head, neck, and back, are elegantly marked, slender lines of grey and black running transversely. The upper part of the breast is of a rich glossy green; the rest of the breast and the belly black, mixed with some white feathers; the sides are marked like the neck; the coverts of the wings crossed with undulated lines of black and reddish brown; the exterior webs of the greater quill-feathers are black: the tail consists of 18 feathers, the middle of which is the longest; these are black, marked on each side with a few white spots. The legs are very strong, and covered with brown feathers; the edges of the toes are pectinated.—Of the female, the bill is dusky; the throat red: the head, neck, and back, are marked with transverse bars of red and black: the breast has some white spots on it, and the lower part is of a plain orange colour: the belly is barred with pale orange and black; the tips of the feathers are white. The tail is of a deep rust-colour barred with black, tipped with white, and consists of 16 feathers.

2. The tetrix, or black-cock, like the former species, is fond of wooded and mountainous situations; feeding on bilberries and other mountain fruits, and in the winter on the tops of the heath. In the summer they frequently descend from the hills to feed on corn. They never pair: but in the spring the male gets upon some eminence, crows and claps his wings; on which signal all the females within hearing resort to him. The hen lays seldom more than six or seven eggs. When the female is obliged, during the time of incubation, to leave her eggs in quest of food, she covers them up so artfully, with moss or dry leaves, that it is very difficult to discover them. On this occasion she is extremely tame and tranquil, however wild and timorous in ordinary. She often keeps to her nest, though strangers attempt to drag her away. As soon as the young ones are hatched, they are seen running with extreme agility after the mother, though sometimes they are not entirely disengaged from the shell. The hen leads them forward for the first time into the woods, to show them ants eggs and the wild mountain-berries, which, while young, are their only food. As they grow older their appetites grow stronger, and they then feed upon the tops of heather and the cones of the pine-tree. In this manner they soon come to perfection: they are an hardy bird, their food lies every where before them, and it would seem that they should increase in great abundance. But this is not the case; their numbers are thinned by rapacious birds and beasts of every kind, and still more by their own salacious contests.—As soon as the clutching is over, which the female performs in the manner of an hen, the whole brood follows the mother for about a month or two; at the end of which the young males entirely forsake her, and keep in great harmony together till the be-

ginning of spring. At this season they begin for the first time to feel the genial access; and then adieu to all their former friendships! They begin to consider each other as rivals; and the rage of concupiscence quite extinguishes the spirit of society. They fight each other like game-cocks; and at that time are so inattentive to their own safety, that it often happens that two or three of them are killed at a shot. It is probable, that in these contests the bird which comes off victorious takes possession of the female scragio, as it is certain they have no faithful attachments.

An old black cock is in length 22 inches, and weighs near four pounds. The bill is dusky; and the plumage of the whole body black, glossed over the neck and rump with a shining blue. The coverts of the wings are of a dusky brown; the inner coverts white; the thighs and legs are covered with dark brown feathers; the toes resemble those of the former species. The tail consists of 16 black feathers, and is much forked; the exterior feathers bend greatly upwards, and their ends seem as if cut off.—The female weighs only two pounds; and its length is one foot six inches. The head and neck are marked with alternate bars of dull red and black; the breast with dusky black and white; but the last predominates. The back, coverts of the wings, and tail, are of the same colours as the neck, but the red is deeper. The tail is slightly forked; it consists of 18 feathers variegated with red and black. The feathers under the tail are white, marked with a few bars of black and orange. This bird hatches its young late in the summer. It lays from six to eight eggs, of a dull yellowish white colour, marked with numbers of very small ferruginous specks; and towards the smaller end with some blotches of the same hue.

3. The red game, or moor-fowl, is peculiar to the British islands. The male weighs about 19 ounces; and is in length 15½ inches. The bill is black; the irides hazel-coloured. The throat is red. The plumage on the head and neck is of a light tawny red; each feather is marked with several transverse bars of black. The back and scapular feathers are of a deeper red, and on the middle of each feather is a large black spot; the breast and belly are of a dull purplish brown, crossed with numerous narrow dusky lines; the quill-feathers are dusky; the tail consists of 16 feathers of an equal length, all of them (except the four middlemost) are black, and the middle feathers are barred with red: the thighs are of a pale red, barred obscurely with black; the legs and feet clothed to the very claws with thick soft white feathers. The claws are whitish, very broad and strong. The female weighs only 15 ounces. The colours in general are duller than those of the male: the breast and belly are spotted with white; and the tips of some of the coverts of the wings are of the same colour.—These birds pair in the spring, and lay from six to ten eggs. The young brood follow the hen the whole summer; in the winter they join in flocks of 40 or 50, and become remarkably shy and wild; they always keep on the tops of the hills, are scarce ever found on the sides, and never descend into the valleys. Their food is the mountain-berries and tops of the heath.

4. The lagopus, or ptarmigan, is 15 inches in length, and weighs 19 ounces. Its plumage is of a pale brown or ash colour, elegantly crossed or mottled with small dusky spots, and minute bars; the head and neck with
broad

Tetrao. broad bars of black, rust-colour, and white: the belly and wings are white, but the shafts of the greater quill-feathers black. In the male, the grey colour predominates, except on the head and neck, where there is a great mixture of red, with bars of white. The females and young birds have a great deal of rust-colour in them. The tail consists of 16 feathers; the two middle of which are ash-coloured, mottled with black, and tipped with white; the two next black, slightly marked with white at their ends, the rest wholly black: the feathers incumbent on the tail are white, and almost entirely cover it.

Ptarmigans are found in these kingdoms only on the summits of the highest hills of the Highlands of Scotland and of the Hebrides; and a few still inhabit the lofty hills near Keswick in Cumberland. They live amidst the rocks, perching on the grey stones, the general colour of the frata to those exalted situations. They are very sily birds; so tame as to bear driving like poultry; and, if provoked to rise, take very short flights, making a small circuit like pigeons. Like the grouse, they keep in small packs; but never, like those birds, take shelter in the heath, but beneath loose stones. To the taste they scarce differ from a grouse.

These birds are called by Pliny, *laggi*, their feet being clothed with feathers to the claws, as the hare's are with fur: the nails are long, broad, and hollow. The first circumstance guards them from the rigour of the winter; the latter enables them to form a lodge under the snow, where they lie in heaps to protect them from the cold. The feet of the grouse are clothed in the same manner; but those of the two first species here described, which perch upon trees, are naked, the legs only being feathered, not being in want of such a protection.—In Scotland, they inhabit from the hill of Ben Lomond to the naked mountain of Scaraben in Caithness, the isle of Arran, many of the Hebrides and the Orkneys.

5. The perdrix, or partridge, is so well known, as to render any technical description unnecessary.

“These birds (says Willoughby) hold the principal place in the feasts and entertainments of princes; without which their feasts are esteemed ignoble, vulgar, and of no account. The Frenchmen do so highly value, and are so fond of the partridge, that if they be wanting, they utterly slight and despise the best spread tables; as if there could be no feast without them.” But however this might be in the times of our historian, the partridge is now too common in France to be considered as a delicacy; and this, as well as every other simple dish, is exploded for luxuries of a more compound invention. In England, where the partridge is much scarcer, and a great deal dearer, it is still a favourite delicacy at the tables of the rich; and the desire of keeping it to themselves has induced them to make laws for its preservation, no way harmonising with the general spirit of English legislation.

The partridge seems to be a bird well known all over the world, as it is found in every country and in every climate; as well in the frozen regions about the pole, as the torrid tracks under the equator. It even seems to adapt itself to the nature of the climate where it resides. In Greenland, the partridge, which is brown in summer, as soon as the icy winter sets in, begins to take a covering suited to the season: it is then clothed

with a warm down beneath; and its outward plumage assumes the colour of the snow amongst which it seeks its food. Thus it is doubly fitted for the place, by the warmth and the colour of its plumage; the one to defend it from the cold, the other to prevent its being noticed by the enemy. Those of Barankonda, on the other hand, are longer legged, much swifter of foot, and choose the highest rocks and precipices to reside in.—They all, however, agree in one character, of being immoderately addicted to venery; and, as some writers affirm, often to an unnatural degree. It is certain, the male will pursue the hen even to her nest; and will break her eggs rather than not indulge his inclinations. Though the young ones have kept together in flocks during the winter, when they begin to pair in spring their society disperses; and combat, very terrible with respect to each other, ensue. Their manners in other circumstances, resemble all those of poultry in general; but their cunning and insinect seem superior to those of the larger kinds. Perhaps, as they live in the very neighbourhood of their enemies, they have more frequent occasion to put their little arts in practice, and learn by habit the means of evasion or safety. Whenever therefore a dog or other formidable animal approaches their nest, the female uses every means to draw him away. She keeps just before him, pretends to be incapable of flying, just hops up, and then falls down before him, but never goes off so far as to discourage her pursuer. At length, when she has drawn him entirely away from her secret treasure, she at once takes wing, and fairly leaves him to gaze after her in despair. After the danger is over, and the dog withdrawn, she then calls her young, who assemble at once at her cry, and follow where she leads them. There are generally from 10 to 15 in a covey; and, if unmolested, they live from 15, to 17 years. There are several methods of taking them, as is well known; that by which they are taken in a net with a setting dog, is the most pleasant, as well as the most secure. The dog, as every body knows, is trained to this exercise by a long course of education: by blows and caresses he is taught to lie down at the word of command; a partridge is shown him, and he is then ordered to lie down; he is brought into the field, and when the sportsman perceives where the covey lies, he orders his dog to crouch: at length the dog, from habit, crouches wherever he approaches a covey; and this is the signal which the sportsman receives for unfolding and covering the birds with his net. A covey thus caught, is sometimes fed in a place proper for their reception; but they can never be thoroughly tamed like the rest of our domestic poultry.

6. The coturnix, or quail, is not above half the size of the partridge. The feathers of the head are black, edged with rusty brown; the breast is of a pale yellowish red, spotted with black; the feathers on the back are marked with lines of pale yellow, and the legs are of a pale hue. Except in the colours thus described, and the size, it every way resembles a partridge in shape, and, except that it is a bird of passage, all others of the poultry kind in its habits and nature.

The quail is by all known to be a bird of passage; and yet, if we consider its heavy manner of flying, and its scantiness of plumage with respect to its corpulence, we shall be surprised how a bird so apparently ill qua-

Tetrao,
Tetraodon.

lified for migration, should take such extensive journeys. This, however, is asserted: "When we sailed from Rhodes to Alexandria (says Bellonius) about autumn, many quails, flying from the north to south, were taken in our ship; and sailing at spring-time the contrary way, from the south to the north, I observed them on their return, when many of them were taken in the same manner." The same account is given by many others; who aver, that they choose a north wind for these adventures; the south wind being very unfavourable, as it retards their flight by moistening their plumage. They then fly two by two; continuing, when their way lies over land, to go faster by night than by day; and to fly very high, to avoid being surprised or set upon by birds of prey. However, it still remains a doubt whether quails take such long journeys as Bellonius has made them perform. It is now asserted by some, that the quail only migrates from one province of a country to another. For instance, in England they fly from the inland counties to those bordering on the sea, and continue there all the winter. If frost or snow drive them out of the stubble-fields or marshes, they then retreat to the sea-side, shelter themselves among the weeds, and live upon what is thrown up from the sea upon shore. Particularly in Essex, the time of their appearance upon the coasts of that country exactly coincides with their disappearance from the more internal parts of the kingdom; so that what has been said of their long flights, is probably not so well founded as is generally supposed.—These birds are much less prolific than the partridge; seldom laying more than six or seven whitish eggs, marked with ragged rust-coloured spots. But their ardour in courtship yields scarce to any other bird, as they are fierce and cruel at that season to each other, fighting most desperately, and (a punishment they richly deserve) being at that time very easily taken. Quail-fighting was favourite amusement among the Athenians. They abstained from the flesh of this bird, deeming it unwholesome, as supposing that it fed upon the white hellebore: but they reared great numbers of them for the pleasure of seeing them fight; and staked sums of money, as we do with regard to cocks, upon the success of the combat. Fashion, however, has at present changed with regard to this bird; we take no pleasure in its courage, but its flesh is considered as a very great delicacy.—Quails are easily caught by a call: the fowler early in the morning having spread his net, hides himself under it among the corn; he then imitates the voice of the female with his quail-pipe, which the cock hearing, approaches with the utmost assiduity; when he has got under the net, the fowler then discovers himself, and terrifies the quail, who attempting to get away, entangles himself the more in the net, and is taken.

TETRAODON, a genus of fishes, belonging to the order of amphibia nantes. The jaws are bony, stretched out, and cloven at the point: there is a linear aperture; no ventral fins. There are seven species; of which the most remarkable is the lineatus, called by Mr. Harselquist *Jabaka*, which is the Egyptian and Arabic name. It has of late been found in the Nile about Cairo, but was never known in former times. It is said to grow to a prodigious size. When just caught, it pricks the skin if it is taken in the bare hands, and

produces small pustules in the same manner as nettles. The flesh is poisonous. Mr. Forster confirms the account of the poisonous nature of a species of tetraodon, in his account of *New CALEDONIA*.

TETRARCH, a prince who holds and governs a fourth part of a kingdom. Such originally was the import of the title *tetrarch*; but it was afterwards applied to any petty king or sovereign.

TETRASTYLE, in the ancient architecture, a building, and particularly a temple, with four columns in its front.

TETUAN, an ancient and pleasant town of Africa, in the kingdom of Fez, and in the province of Habata. It is pretty well built, and the inhabitants are about 15,000 in number, who call themselves *Andalusians*, and almost all speak Spanish; but they are great pirates. Some say there are 30,000 Moorish inhabitants, and 5000 Jews. W. Long. 5. 18. N. Lat. 35. 25.

TEUCRIUM, **TREE GERMANDER**, a genus of the gymnospermia order, belonging to the didynamia class of plants.

There are many species; of which the most remarkable are, 1. The *flavum*, yellow shrubby *teucrium*, commonly called *tree germander*; rising with erect shrubby stalks and branches, only a foot and a half or two feet high; having small heart-shaped, obtusely serrated, foot-stalked leaves, hoary underneath, with the floral leaves concave and entire; and numerous flowers by threes, in whorls, along the upper part of the branches, of different colours in the varieties. This shrub is durable in root, stem, and branches, foliated most part of the year, and produces flowers ornamentally in July, succeeded by ripe seed in autumn. It is an exotic from Spain and Italy, long since introduced into our gardens; formerly kept as a green-house plant, but now is sufficiently naturalized to this climate to succeed in the open air all the year. 2. The *scordium*, or common water-germander, hath creeping perennial roots, sending up many square, procumbent, or trailing stalks, branching diffusely; oblong, indented, serrated, close-fitting, opposite leaves; and small redish flowers, generally two together, from the sides of the stalks and branches, in July and August. This is a medicinal herb, and smells strongly of garlic. It grows naturally in marshy places, in the isle of Ely and other parts of England, and most parts of Europe; and sometimes admitted in gardens, in moist places, for variety, and as a medical plant. 3. The *chamaedrys*, or smaller creeping germander, hath fibrous, very creeping, spreading roots; many four-cornered, very branchy, trailing stalks, near a foot long; oval, cuneiform, cut, crenated leaves on short foot-stalks; and redish flowers, growing almost in a verticillus, or whorls, round the stalk, three on each peduncle; appearing in June and July. Is a native of Germany, France, &c. 4. The *polium*, or common yellow mountain-poly, hath a fibrated perennial root; herbaceous, trailing, branchy stalks, prostrate on the ground; oblong, obtuse, crenated, downy, sessile leaves; and the branches terminated by roundish heads of yellow and other coloured flowers in the varieties; appearing in June and July. There are many varieties of this species, distinguished by some little variation in their growth,

Tetrarch
Teucrium

Teutones,
Teutonic.

growth, having all roundish heads of flowers; mostly, however, either white or yellow. It grows naturally in Spain and Portugal, &c. 5. The montanum, mountain-poly, with lavender leaves, hath a fibrous, tough, ligneous root; somewhat ligneous, weak, procumbent stalks; spear-shaped entire leaves, hoary underneath; and small white flowers in a corymbus at the termination of the branches, in June and July. They are all perennial plants, durable in root; and some of the ligneous kinds are also abiding in stalk, more particularly some of the polyiums. The leaves and seed of the chamædryas have been recommended as diuretic, sudorific, and emmenagogue; but are now very little used.

TEUTONES, or TEUTONI, (anc. geog.) a people always by historians joined with the Cimbri; both seated, according to Mela, beyond the Elbe, on the Sinus Codanus, or Baltic; and there, it is supposed, lay the country of the Teutones, now *Ditmarsh*; diversity of dialects producing the different terms *Teut*, *Tut*, *Dit*, *Tid*, and *Thod*, which in the ancient German language signified *people*. Of these Teutones, Virgil is to be understood in the epithet *Teutonicus*, an appellation which more lately came to be applied to the Germans in general, and later still the appellation *Alemanni*.

The Teutones, in conjunction with the Cimbri and Ambrones, made war on the Romans, and marched towards Italy in the year 101 B. C. We are told, that the Teutones alone were so numerous, that they were six whole days without intermission in passing by the Roman camp. In Transalpine Gaul they engaged the Roman consul Marius; but were defeated with incredible slaughter; 100,000 of them, according to the lowest calculations, being killed on the spot. According to others, the number of those killed and taken prisoners amounted to 200,000. The inhabitants of the neighbouring country made fences for vineyards of their bones. Their king Teutobochus, said to be a monstrous giant, was taken prisoner and carried to Rome. See the article *GIANT*.

TEUTONIC, something belonging to the Teutones. The Teutonic is supposed to have been the language of the ancient Germans, and hence is reckoned amongst the mother-tongues. The German or Dutch is still called the *Teutonic*.

TEUTONIC Order, an order of military knights, established towards the close of the twelfth century, on the following occasion.—When the emperor Barbarossa engaged in a crusade for the recovery of the Holy Land out of the hands of Saladin, he was followed by great numbers of German volunteers, who from various motives enlisted under his banners. After the death of Barbarossa, the Germans, who had signalized themselves before Acre or Ptolemais, resolved to choose another leader; and at last fixed their choice upon Frederic duke of Suabia, second son to the emperor and Henry duke of Brabant. Under these generals they behaved with so much bravery, that Henry king of Jerusalem, the patriarch, and several other princes, determined to reward their valour by instituting an order of knighthood in their favour. This was accordingly done; and our new knights had at first the title of the *knights of St George*; afterwards it was thought proper to put them under the tutelage of the

Virgin Mary, to whom there was already a hospital dedicated on Mount Zion, for the relief of German pilgrims. From this time they were called *Equites Mariani*, or knights of St Mary. Laws, regulations, and statutes, were drawn up for them by the Christian kings in Syria and the patriarch; and among other obligations it was required, that every person admitted to the privileges of the order should be of noble parentage; that the order should defend the Christian religion, and the Holy Land; that they should exercise hospitality towards the Christians in general, but particularly those of their own country; and that they should with all their power endeavour to propagate and extend the Christian faith and the religion of JESUS. In the year 1190, having become rich by donations from the superstitious, they elected their first grandmaster, Henry Walpot, a German, who had distinguished himself by his zeal and valour; and their choice was confirmed by the emperor. The following year, pope Celestine III. confirmed their privileges already granted, giving them the title of the *Teutonic knights of the hospital of St Mary the Virgin*. By the conditions of this bull, they vowed perpetual continence, obedience, and poverty; obligations which it may well be imagined were not very strictly kept.

TEWKSBURY, a town in Gloucestershire, formerly noted for its monastery. It is now a large handsome corporation, containing about 500 houses, with a magnificent church. It is seated at the confluence of the rivers Severn and Avon, has a cotton manufactory, and sends two members to parliament. W. Long. 2. 15. N. Lat. 52. 0.

TEXEL, a town of the United Provinces, in N. Holland, seated at the mouth of the Zuyder-Zee, with a good harbour, and a strong fort. It is seated in an island, which is separated from the continent of Holland by a narrow channel, through which most of the ships pass that are bound to Amsterdam. E. Long. 4. 25. N. Lat. 53. 12.

TEXT, a relative term, contradistinguished to gloss or commentary, and signifying an original discourse exclusive of any note or interpretation. This word is particularly used for a certain passage of scripture, chosen by a preacher to be the subject of his sermon.

TEXTURE, properly denotes the arrangement and cohesion of several slender bodies or threads interwoven or entangled among each other, as in the webs of spiders, or in the cloths, ruffs, &c.

Texture is also used in speaking of any union or constituent particles of a concrete body, whether by weaving, hooking, knitting, tying, chaining, indenting, intruding, compressing, attracting, or any other way. In which sense we say, a close compact texture, a lax porous texture, a regular or irregular texture, &c.

THABOR, or TABOR, (anc. geog.) a mountain of Galilee, situated in a plain, and equally terminated or defined on every side; lying in the middle between the Campus Magnus or Great Plain, and Scythopolis. This mountain was the boundary of Issachar to the north, on the borders of Zabulon; and, according to Lightfoot, was distant about 10 miles to the north-west of Capernaum; which agrees with the relations of travellers. The most beautiful mountain in the world, both

Teutonic
Thabor.

in itself, and in the prospect it affords. Seen on the east and west sides, it exactly resembles a sugar-loaf; on the north and south sides, it appears of an oval round, with a deep valley running about it, so as to lie detached from, though near to, the other mountains, which it overtops. To the north-east, the east, and south-east, it has the plain of Galilee lying before it, and to the south and south-west the incomparably beautiful plain of Esdrelon; quite round, it rises equally high and steep, and appears green on every side, (Korte). A top, it has an oval plain about three miles in compass. Over the plain of Esdrelon there is a view of the mountains of Gilead; to the south, and to the south-west, that of Mount Carmel; to the west, a prospect of the mountains of Nazareth, and over them of the Mediterranean; and to the north that of the beginning of Lebanon, and then that of Bashan, (*I. bid.*) At this mountain Barak collected the army he raised against Sisera, and in the plain below fought with him. Whether this was the high mountain on which our Saviour's transfiguration happened, mentioned by the evangelists, though affirmed by the generality, is however questioned by some. Ancient tradition is for it: whereas Lightfoot will have it to be a mountain near Cæsarea Philippi; probably that very high one which, according to Josephus, hangs over the springs of the Jordan, and at the foot of which stood Cæsarea.

THALES, a celebrated Greek philosopher, and the first of the seven wise men of Greece, was born at Miletum, about 640 B. C. In order to improve himself in the knowledge of the sciences, he travelled into Egypt, where he discoursed with the priests and other learned men. Some say that he married: but others observe, that he eluded the solicitations of his mother on this head, by telling her, when he was young, that it was too soon; and afterwards, that it was too late. Thales acquired great reputation by his wisdom and learning: he was the first among the Greeks who foretold eclipses of the sun, and made extraordinary discoveries in astronomy. Thales was the author of the Ionian sect of philosophers, who were thus called from his being born at Miletum, a city of Ionia. He maintained, that water was the principle of which all the bodies in the universe are composed; that the world was the work of God; and that God sees the most secret thoughts in the heart of man. He said, That "the most difficult thing in the world is to know ourselves; the most easy, to advise others; and the most sweet, to accomplish our desires. That, in order to live well, we ought to abstain from what we find fault with in others. That bodily felicity consists in health; and that of the mind in knowledge. That the most ancient of beings is God, because he is uncreated: that nothing is more beautiful than the world, because it is the work of God; nothing more extensive than space quicker than spirit, stronger than necessity, wiser than time." It was also one of his sentences, That "we ought never to say that to any one that may be turned to our prejudice; and that we should live with our friends as with persons that may become our enemies." He thanked God for three things; that he was born of the human, not of the brute species; a man, and not a woman; a Greek, and not a barbarian. None of the ancient philosophers ever applied

themselves more earnestly to the study of astronomy than Thales. Diogenes Laertius reports, that leaving his lodging with an old woman to contemplate the stars, he fell into a ditch; on which the good woman cried, "How canst thou know what is doing in the heavens, when thou canst not perceive what is at thy feet?" He went to see Croesus, who was marching with a powerful army into Cappadocia, and enabled him to pass the river Halys without making a bridge. Thales died soon after, at above 90 years of age. He composed several treatises in verse, on meteors, the equinoxes, &c. but they are all lost.

THALETAS, an ancient Greek poet and musician, was, according to Plutarch, cotemporary with Lycurgus the Spartan legislator, and lived about 300 years after the Trojan war. Plutarch also informs us, that though Thaletas was only styled a lyric poet and musician, he was likewise a great philosopher and politician; inasmuch, that Lycurgus brought him from Crete when he returned from his travels to Sparta, in order to have assistance from him in establishing his new form of government. His odes, continues Plutarch, were so many exhortations to obedience and concord, which he enforced by the sweetness of his voice and melody. Plato likewise describes his captivating manner of singing; and Plutarch, in his Dialogue on Music, ascribes to Thaletas many musical compositions and inventions: such as *psalmi*, and new measures in verse, as well as *rhythmi* in music, which he had acquired from the flute-playing of Olympus, whom he at first had imitated. Porphyry, in his life of Pythagoras, says, that this philosopher used to amuse himself with singing the old *Pæans* of Thaletas; and Athenæus likewise tells us, that the Spartans long continued to sing his airs; and according to the Scholiast on Pindar, this poet-musician was the first who composed the hyporchemes for the armed or military dance.

There was another poet and musician of the name of *Thaletas*, who was likewise a Cretan, that flourished much later than the cotemporary and friend of Lycurgus. Sir Isaac Newton has named him among the early victors at the Pythic games; and Dr Blair places him 673 years B. C. This is the Thaletas whom Plutarch makes cotemporary with Salom, and of whom it is related that he delivered the Lacedæmonians from the pestilence by the sweetness of his lyre.

THALIA, in Pagan mythology, one of the nine muses. She presided over Comedy; and is represented crowned with a garland of ivy, holding a mask in her hand, and wearing buskins on her feet.

THAMES, a celebrated river of England, being the largest in the island. The sources of this river are four rivulets, that rise in different parts of Cotswold hill in Gloucestershire, viz. the Lech, the Churne, and the Isis; these having touched Wiltshire, and joined their waters in one channel a little below Lechlade, a town on the borders of Oxfordshire, form a deep and copious stream, which there becomes navigable for very large barges, and is constantly, after it leaves this place, whatever poetical writers may pretend, called the *Thames*. Thence it proceeds into Oxfordshire; and having visited the city of Oxford, continues to divide that county from Berkshire; rolling by Abingdon, Wallingford, Reading, Henley, Maidenhead, Windsor,

Thamyris. Windfor, and fo to Staines, becoming there the boundary of the two counties of Middlefex and Surry; and having paffed by Chertsey and Kingfton in the latter, and Brentford in the former, it comes to the capital of the Britifh monarchy, London; and having travelled that imperial city, and her filter city of Weftminfter, purfues its courfe towards the fea: in its future progress it divides Effex from Kent, vifiting in its paffage Deptford, Greenwich, Woolwich, Grays, and Gravend: at length it opens into the fea with a mouth between the Naze and the North Foreland, near fixty miles broad. In its paffage it receives no fewer than fix confiderable rivers that are not navigable, and eleven that are, which affords a vaft communication within land; its courfe has been computed about 140 miles, of which it is navigable near 100 from its mouth. In what is called the *Poff*, and which is properly the port of London, though, in the custom-house language, that is extended to the whole river below London bridge, has been known to lie upwards of 1000 fhips commodioufly; and it is univerfally allowed, that in no haven in Europe veffels lie more fafely, take in their loadings with greater eafe, or are delivered with fuperior dexterity and difpatch; fo that an immense commerce is carried on with fuch order and facility as moft aftonifhes thofe to whom it is moft thoroughly known and by whom it is beft underftood.

THAMYRIS, an ancient poet and mufician. He is called by Homer *Κίθαρις*, "one who fings to the cithara." Plutarch, in his Dialogue on Mufic, tells us that he was born in Thrace, the country of Orpheus, and had the sweeteft and moft fonorous voice of any bard of his time. Homer, in his catalogue of fhips, where he fpeaks of the cities under the dominion of Neftor, mentions Dorian as the place where Thamyris contended with the Mufes, whom he had the arrogance to challenge to a trial of fkill in poetry and mufic. The conditions and confequences of this contention are fully defcribed by the poet.

And Dorian, fam'd for Thamyris' difgrace,
Superior once of all the tuneful race,
'Till, vain of mortals empty praife, he ftrove
To match the feed of cloud-compelling Jove!
Too daring bard! whose unfeccful pride
Th' immortal Mufes in their art defy'd:
Th' avenging Mufes of the light of day
Depriv'd his eyes, and snatch'd his voice away;
No more his heav'nly voice was heard to fmg,
His hand no more awak'd the filver ftring.

Paulanias informs us, that the painter Polygnotus, in his celebrated picture of Ulyffes's defcent into hell, which was preferved in the temple of Delphos, had reprefented the wretched Thamyris with his eyes put out, his hair and beard long and difhevelled, and his lyre, broken and unftring, lying at his feet. It is certain too, according to Paulanias, that this bard was not only the fubject of painting and poetry, but of fculpture; for he tells us, that among the ftatues with which mount Helicon was decorated, he faw one of Thamyris, reprefented blind, and holding a broken lyre in his hand.

According to Diodorus Siculus, he learnt mufic at the fchool of Linus; and if we may credit Suidas, he was generally regarded as the eighth among the epic poets who preceded Homer. As to his works, which are wholly loft, antiquity has preferved the names of

feveral. Tzetzes mentions a cosmogony, or creation of the world, in 500 verfes, and Suidas a theogony in 3000: perhaps both thefe writers fpeak of one and the fame poem. He was faid chiefly to have excelled in the compofition of hymns: on which account the fanctifil philofopher Plato compares him with Orpheus; and as he makes the foul of this bard after death pafs into that of a fwan, he fixes the refidence of that of Thamyris in a nightingale. We only know his poem upon the War of the Titans by what Plutarch tells us of it from Heraclides of Pontus.

THANE, or THAIN, Thamur, a name of an ancient dignity among the Englifh and Scots, or Anglo-Saxons. Skene makes thane to be a dignity equal to the fon of an earl. Cambden will have it, that thanes were only dignified by the offices they bore. There were two kinds or orders of thanes; the king's thanes, and ordinary thanes. The firft were thofe who attended the king in his courts, and who held lands immediately of the king. The ordinary thanes, or the *thani minores*, were the lords of the manors, who had particular jurifdiction within their limits and over their own tenants; thefe changed their names for that of *barons*, and hence their courts are called *courts-baron* to this day.

THANET, an ifland of the county of Kent, furrrounded by the fea except on the north-eaft fide, where it is bounded by the branches of the river Stour, now inconfiderable to what they were formerly. It contains feveral villages, and the fea-port towns of Margate and Ramfden, and has the title of an earldom.

THAPSIA, the DEADLY CARROT; a genus of the dignity order, belonging to the pentandria clafs of plants. There are fix fpecies; the moft remarkable is the fœtida, with many pointed lobes, narrowed at their bafe. It is a native of Italy and Spain. The leaves are cut into many narrow fegments, almoft as fmall as thofe of the garden-carrot, but rough and hairy; their fegments are always oppofite, and are narrower at their bafe than at their points. The ftalks rife about two feet high, and are terminated by umbels of fmall yellow flowers, which appear in July: thefe are fucceeded by flat-bordered feeds, which ripen in the beginning of September. The roots of this fpecies were formerly ordered in medicine, but is now entirely difufed; a fmall dofe operating with extreme violence both upwards and downwards.

THAWING, the refolution of ice into its former fluid ftate by the warmth of the air. See FREEZING.

THEA, in botany. See TEA.

THEATINES, a religious order in the Romifh church, fo called from their principal founder John Peter Caraffa, then bifhop of Theate, or Chieti, in the kingdom of Naples, and afterwards pope, under the name of Paul IV. The names of the other founders were Gaetan, Boniface, and Configlieri. Thefe four pious men defiring to reform the ecclefiaftical ftate, laid the foundation of an order of regular clerks at Rome in the year 1524. Pope Clement VII. approved the inftitute, and permitted the brethren to make three religious vows, to elect a fuperior every three years, and to draw up ftatutes for the regulation of the order. They firft endeavour'd, by their example, to revive among the clergy the poverty of the apoftles and firft difciples of our Saviour, and

Thane.
Theatines.

were

Theatre
||
Thebes.

were the first who assumed the title of *regular clerks*.

THEATRE, *theatrum*, in antiquity, a public edifice for the exhibiting of scenic spectacles or shows to the people; comprehending not only the eminence on which the actors appeared and the action passed, but also the whole area of the place common to the actors and spectators.

THEBAID, a celebrated heroic poem of Statius, the subject whereof is the civil war of Thebes, between the two brothers Eteocles and Polyneices; or, Thebes taken by Thebus.

THEBES, the name of a celebrated city of ancient Greece. It is supposed to have been built by Cadmus, about the year of the world 2555. This Cadmus, according to the Greeks, was the son of Agenor king of Sidon or of Tyre; but the Sidonians allow him to have been of no higher quality than his cook, and tell us that his wife was a musician at court, with whom he ran away into Greece. The Greek writers tell us, that being commanded by his father to go in search of his daughter Europa, whom Jupiter in the shape of a bull had carried off, and forbid to return without her, he built, or rebuilt, the city of Thebes, after having long sought her in vain. He was at first opposed by the Hyantes and Aones; the former of whom he defeated in battle, and forced them to retire into Locris: the latter submitted, and were incorporated among his subjects.

Those who endeavour to extract some truth from the multitude of fables in which the early part of the Grecian history is obscured, are of opinion that Cadmus was one of the Canaanites expelled by Joshua; and that he was of the family of the Cadmonites mentioned by Moses and Joshua. He is universally allowed to have introduced the Phœnician letters into Greece, set up the first schools, and introduced brass; which, from him, had the name of *Cadmean* given to it. The government of Thebes continued for a long time monarchical; and the names of a number of its kings have been transmitted to us, with some account of their transactions; but so much obscured by fable, that little or nothing can be determined concerning them. We shall therefore pass over this fabulous part of their history, and only take notice of that when the Thebans emerged from their obscurity, and for a time held the sovereignty of Greece.

Though the Thebans had been famed in the early period of their history for their martial achievements, yet in process of time they seem to have degenerated. At the time of the invasion of Xerxes, they were the first people in Greece who were gained over to the Persian interest. On account of this misbehaviour they were become very obnoxious to the other states, especially to the Athenians, whose power and renown increased every day, and threatened at last to swallow them up altogether. The Thebans being in no condition to oppose such a formidable power, put themselves under the protection of the Spartans, who, out of jealousy of the Athenians, readily forgave them; and so grateful were the Thebans for the kindness shewn them at this time, that during the whole of the Peloponnesian war Sparta had not a more faithful ally. By this means they not only recovered the government of Boeotia, of which they had been formerly in possession till deprived of it on account of their

fiding with the Persians, but their city became one of the first in Greece. By this prosperity the Thebans became so much elated, that, when the peace of Antalcidas came to be signed, they refused to come into it, as they were thus once more deprived of the government of Boeotia; so that it was not without the utmost difficulty that they were overawed into it by the other states. Not content with forcing them to give up this point, however, the Spartans undertook to change the form of Theban government, which at this time was a democracy, and accomplished through the treachery of those who had the care of the citadel.

The Thebans continued under the power of the Spartans for four years; at the end of which term a conspiracy being formed against them by some of the principal people in the city, among whom was a young nobleman named *Pelopidas*, the Spartans were massacred and driven out, and the citadel regained. During the tumult Epaminondas, afterwards the celebrated general, with a number of the best citizens, joined the party of Pelopidas; and the latter having called a general assembly of the Thebans, proclaimed liberty to them, and exhorted them in the strongest manner to fight for their country. This speech was received with the greatest acclamations; Pelopidas was unanimously proclaimed the preserver of Thebes, and was charged with the management of the war which was then to be declared against Sparta.

These transactions so much exasperated the Spartans, that they immediately sent their king Cleombrotus against them, though it was then the depth of winter. The Athenians, in the mean time, who had hitherto assisted the Thebans, declined any farther connection, lest they should draw upon themselves the resentment of the Spartans. However, they were soon after determined to act again on the same side, by an attempt which the Spartan general, Spodnias, had rashly made on the Pyraum or harbour of Athens. Thus, by means of the Athenians, a powerful diversion was made in favour of the Thebans, who gradually recovered all the towns of Boeotia, and at length began to act offensively against their enemies, and made a powerful invasion in Phocis. They had now many sharp encounters with them; which, though they did not amount to decisive battles, yet did not fail to raise their courage, and dispirit that of the Spartans. In these encounters Pelopidas always signalized himself; and in the battle of Tanagra, where the Lacedæmonians were entirely defeated by the Athenians and their allies, Pelopidas had a principal share in the victory, and killed the Spartan general with his own hand. Soon after this, with a body of only 300 Thebans, he entirely routed and dispersed near 1000 Spartans: which was the greatest disgrace the latter had ever known; for till that time, whether in war with the Greeks or Barbarians, they had never been overcome by an equal, much less by such an inferior number of troops.

These successes of the Thebans greatly alarmed the Athenians, who continually sought to oppose their growing power. In this opposition they were joined by the Platæans, who by that means became extremely obnoxious to the Thebans, so that they at last came to a resolution to surprise their city. This they accomplished, and entirely destroyed it, together with Thepsia,

Thebes.

The form of government changed, and the citadel seized by the Spartans.

The Thebans recovered their liberty under Pelopidas.

War with Sparta.

The Spartans defeated by Pelopidas.

Platæa and Thepsia razed by the Thebans.

Thebes.

Thespia, another city extremely well affected to Athens. Soon after this, the Thebans, encouraged by their success, began to think of enlarging their territories, and making encroachments on their neighbours, as they saw other states had done before them. This spirit of conquest is said to have been raised by their general Pelopidas; in which he was seconded by Epaminondas, a person who, though like him endowed with all the necessary qualities to make a complete captain or patriot, had till then preferred a private life, and lived in a constant course of virtue and the study of philosophy. He had as yet seldom appeared in public, except to get himself excused from those state-employments which were so eagerly courted by others. This, however, had not hindered him from contracting an intimate friendship with Pelopidas, which had been daily improved by the correspondence of their tempers and principles, as well as by that zeal which both displayed for the good of their country; which last had made them, even before this time, appear together in action, and to such advantage, that Epaminondas's merit could be no longer concealed, nor indeed suffer him to continue longer in his beloved retirement: so that he saw himself, at length, deservedly placed at the head of the Theban troops; where he gave such early proofs of his future prowess and abilities, as justly gave him the next rank to Pelopidas. Both came now to be considered in the same light, as generals in the field, as governors at home, and as complete statesmen in the council. When the general treaty for restoring peace to Greece came to be proposed by the Athenians, and was upon the point of being executed by the rest of the states, the Thebans refused to agree to it, unless they were comprehended in it under the name of *Boeotians*. This demand was as strenuously opposed by the other contracting powers as insisted on by Epaminondas, who was there as ambassador on the part of the Thebans. Agefilas, in particular, told him in plain terms, that the Thebans ought to evacuate Boeotia, and leave the cities of it free and independent. To which he was answered by him, that the Lacedaemonians would do well to set them the example, by restoring Messenia to its ancient proprietors, and Laconia to its ancient freedom; for that the pretensions of the city of Thebes to Boeotia were as well founded, at least, as those of Sparta to those two countries. After this he went on, and showed how far Sparta had aggrandized herself at the expence of her neighbours: that peace might be indeed obtained, and upon a solid and lasting footing; but that this could not be otherwise done than by bringing all to an equality. This bold, though just remonstrance, in which not only Thebes, but Greece in general, was concerned, failed not, however, to exasperate the haughty Spartan monarch; and the Athenians, who had till now looked upon the Thebans as dependents either on them or on the Macedonians, were not a little offended to hear their ambassadors talk in such high terms. The result of the conference was, that Agefilas struck the name of *Thebes* out of the treaty and declared war against them, about the year 371 B. C.

13
The Spartans declare war against Thebes.

The Thebans were in no small consternation to see themselves engaged in a war with the powerful Spartans, without any ally to assist them; and the rest of the Grecian states having made peace with the latter,

began to look upon the ruin of the former as unavoidable. However, they resolved to make the best defence they could; and put their army under the command of Epaminondas, assigning him, at his own request, six others to act as counsellors or assistants. The Theban army consisted at most but of 6000 men, whereas that of the enemy was at least thrice that number; but Epaminondas trusted most in his horse, wherein he had much the advantage both in their quality and good management: the rest he endeavoured to supply by the disposition of his men, and the vigour of the attack. He even refused to suffer any to serve under him in the engagement, but such as he knew to be fully resolved to conquer or die. The two armies met at *Leuctra*, where the Spartans were defeated with great slaughter, as related under that article.

Thebes.

The victorious general, desirous to improve this great victory, sent an herald, crowned with garlands, to communicate it in form to the Athenians, in hopes that this would be an effectual means to re-unite them to the Theban interest. But it proved quite otherwise. Athens, which now looked upon them with a jealous eye, and had then in view the sovereignty of Greece, chose rather, if they could not wholly obtain it, to share it with Sparta, than to let the Thebans into the whole; and therefore declined even giving their herald audience. However, the Thebans took care to strengthen themselves by alliances; and, besides the Arcadians and Eleans, had got the Phocians, Locrians, Acarnanians, Euboeans, and other states, under their dependence: so that they were now in a condition to act offensively against the Spartans. Accordingly, under pretence of assisting the Arcadians, they entered Peloponnesus with a gallant army, with Epaminondas and Pelopidas at their head. Here they were joined by the Arcadian and other confederate forces; so that the whole amounted to 40,000, some say 50,000, men, besides great numbers of those who followed the camp, rather for plunder than fighting, and were computed about 20,000 more. The army was divided into four columns, and moved straight towards Sellasia, the place of their rendezvous, from which they pursued their march with fire and sword towards Sparta. But here they were repulsed by Agefilas, who was then returned to that metropolis.

13
Are entirely defeated at Leuctra.

14
The Athenians jealous of the Thebans.

17
The Thebans invade Peloponnesus with a formidable army, but are repulsed.

To repair, in some measure, this disgrace, and at the same time to leave some lasting monument which should redound as much to his glory as to the mortification of the Spartans, Epaminondas left not their territories till he had restored the posterity of the old Messenians to their ancient dominions, out of which they had been banished near 300 years; rebuilt their capital, and left a strong garrison for its defence. He was, however, like to have been stopped in his return by Iphicrates, whom the Athenians had sent with 12,000 men to intercept him: but this last loitered so long at Corinth, that the Thebans had passed the defiles of Cenehræ, the chief place where he could have obstructed his retreat had he taken possession of it time enough. Epaminondas continued his march till he came in full view of the city of Corinth. However, he found the roads choked up with trees, rocks, stones, and every thing that could render them impassable; and the Corinthians well fortified, and resolute on a stout

18
The Messenians restored to their ancient dominions.

dey

Thebes.

20
The Corin-
thians de-
fected.

defence. But he came so furiously upon them, notwithstanding all these difficulties, that they abandoned all their entrenchments and outworks to the Thebans, and fled into the city. Thither these pursued them sword in hand, and made an horrid slaughter of them; inasmuch that Corinth mult have unavoidably fallen into their hands, had their generals thought fit to pursue these advantages; but whether they were afraid of the Athenians falling upon them, or apprehended some dangerous ambush in a country with which they were but indifferently acquainted, or whether the army was too much weakened through so many fatigues, or lastly, whether the coldness of the season, it being then in the depth of winter, would not permit them to proceed far, they immediately marched towards Boeotia. This gave such a handle to their enemies, that they met with a very mortifying reception at their return to Thebes, where they were both arrested, and clapped up as state-prisoners, for having presumed to prolong their command four months longer than the time limited by law, which time took in almost the whole of their expedition from their first entrance into Peloponnesus. However, at last, the judges being ashamed to proceed any farther, they were both honourably acquitted.

20
Epaminon-
das and Pe-
lopidas dis-
graced at
Thebes.

This prosecution had been chiefly carried on and encouraged by Menelides, a discontented Theban, and a bold and able speaker, who, by his artful calumnies at the trial, had so far prevailed with the judges as to get Epaminondas deprived of the government of Boeotia for a whole year, though he could not gain the same advantage against Pelopidas, who was a greater favourite of the people, as being his senior in point of time.

21
Warren-
ed with
Sparta.

By this delay the Spartans, with much difficulty, had recovered themselves from their great defeat at Leuctra, and settled their affairs in as good a posture as they could; but though they had repulsed the Thebans in Peloponnesus, yet, from the exploits they had performed there, especially in the dismembering the whole kingdom of Messenia from them, they had still cause to fear what their forces might do under two such generals; and had accordingly taken due care to strengthen themselves against them, and to provide themselves with a good number of auxiliaries from other states, especially from that of Athens, with whom they had renewed their old treaty, and had agreed that each should have the command five days alternately. Soon after this treaty, the Arcadians renewed the war, and took Pallene in Laconia by storm, put the garrison to the sword, and were presently assisted by the Argives and Eleans, and especially by the Thebans, who sent to them 7000 foot and 500 horse under the command of Epaminondas. This so alarmed the Athenians likewise, that they immediately sent Gobrias with some forces to oppose his passage in good earnest; and he so behaved himself against the Thebans, that they were forced to abandon Peloponnesus a second time. This ill success gave fresh occasion to the enemies of Epaminondas to blame his conduct in the highest terms, notwithstanding the singular bravery with which he and his troops had forced the pass. Even his friends could not but suspect him of partiality for the Spartans, in not pursuing his advantage over them, and making a

21
The The-
bans re-
pulsed.

greater slaughter of them when he had it in his power; whilst his enemies made it amount to no less than treachery to his country: so that their brave general was once more deprived of the government of Boeotia, and reduced to the condition of a private man. He did not continue long under this disgrace, before an occasion offered to make his services again of such necessity to the state, as to give him an opportunity to retrieve his fame, and wipe off the stain which his enemies had thrown upon him.

The Thessalians, who had groaned some time under the tyranny of the usurper Alexander furnished the Phœrean, sent an embassy to Thebes, to implore their aid and protection: upon which Pelopidas was immediately sent as ambassador, to expostulate with him on their behalf. He was then in Macedonia, from whence he took the young prince Philip, afterwards the celebrated monarch, in order to protect and educate him; and, upon his return, marched directly to Pharsalus in Thessaly, in order to punish the treachery of some mercenaries, who had deserted the Thebans in that expedition; but when he came thither, he was surprised to be met by the tyrant at the head of a numerous army before that city, whilst his own was but as an handful of men in comparison of it. However, whether he supposed, or would be thought to do so, that Alexander came thither to justify himself, and answer to the complaints alleged against him, he went, with Ismenias his colleague, to him unarmed and unattended, not doubting but his character as ambassador from so powerful a republic, joined to his own character and authority, would protect them from insult or violence: but he found himself mistaken; for Alexander had no sooner got them in his hands, than he caused them to be seized, and sent prisoners to Phœre.

The Thebans, highly resenting the indignity offered to their ambassadors, sent immediately an army into Thessaly: but the generals were repulsed with great loss by the Phœrean usurper; and it was owing to Epaminondas, who was among them only as a private sentinel, that they were not totally cut off. For the Thebans, finding themselves in such imminent danger, which they attributed to the incapacity of their generals, had immediately recourse to him, whose valour and experience had been so often tried; and, partly by persuasions and intreaties, and partly by threats, obliged him to take the command. This soon gave a different turn to their affairs, and converted their flight into a safe and regular retreat; for he took the horse and light-armed foot, and placed himself at their head in the rear, and charged the enemy with such vigour and bravery, that he obliged them to desist from their pursuit.

However, as the army had suffered such loss before as not to be sufficient to pursue them in their turn, he was obliged to return with them to Thebes, with their pusillanimous generals; where the latter were fined 12,000 drachms each, and the former was reinstated in the command, and sent with a new reinforcement to repair the late dishonour, and prosecute their revenge. The news of his being in full march on this errand, greatly alarmed the tyrant: but Epaminondas, preferring the safety of his imprisoned colleague to all other considerations, forbore pushing hostilities to extremes,

Thebes.

23
Epaminon-
das degra-
ded.

24
Pelopidas
seized by
Alexander
of Phœre.

25
A Theban
army sent
to rescue
him, de-
feated.

26
Epaminon-
das resto-
red.

for

Thebes.

Thebes.

37
Rescues Pe-
pidas.

for fear of provoking the enemy to wreak all his fury on him: to prevent which, he contented himself for a while hovering about with his army, and now-and-then with such slight skirmishes as should intimidate the tyrant, and bring him the sooner to make some satisfactory offers. Alexander being fully convinced of the superiority of the Theban general, was glad to accept of a truce of 30 days, and to restore Pelopidas and Himenias to him; upon which he immediately withdrew his forces, and returned with them to Thebes.

By this time Thebes was raised to a sufficient height of reputation and glory to begin to aim in earnest at the sovereignty of Greece in her turn. The main obstacle to it was, that the other states grew so jealous of her present greatness, as to enter into the strongest alliances and confederacies to prevent its farther growth; so that not being able now to procure many allies at home, they made no difficulty to seek for them abroad; and the Lacedæmonians, by leading the van, gave them a plausible pretence to follow their steps, and to procure an alliance with Persia, which at that time they found was ready to accept of the offers on any terms; the only question was, which of the three states should be preferred, Sparta, Athens, or Thebes. At the same time the Thebans proposed to their few confederates to send likewise proper deputies to the Persian court, in order to support their respective interests; which they readily agreed to. These were the Arcadians, Eleans, and Argives; at the head of whose deputation Pelopidas was sent on the behalf of the Thebans; which the Athenians being apprised of, appointed two on their part. These being all arrived at the Persian court, began to pursue each their respective interests; but Pelopidas had by that time gained such credit there, both for his singular address and his extraordinary exploits, that he was distinguished in a particular manner from all the other deputies, and was received by the king with the most manifest marks of honour and esteem, who freely owned himself convinced that the Thebans were the people on whom he could most safely depend; and after having greatly applauded the equity of his demands, ratified and confirmed them with great readiness, to the no small mortification of the other states. The substance of them was, that the liberties formerly granted to the other towns of Greece should be confirmed; that Messenia, in particular, should continue free and independent on the jurisdiction of Sparta; that the Athenians should lay up their fleet; and that the Thebans should be looked upon as the ancient and hereditary friends of Persia.

29
The The-
bans pro-
pose to
build a
fleet.

The Thebans took advantage of the dissensions which prevailed among the Greeks as a pretence for increasing their forces; and Epaminondas thought it a proper opportunity for his countrymen to make a bold effort to obtain the dominion at sea, as they had obtained it in a great measure at land. He proposed it to them in a public assembly, and encouraged their hopes from the experience of the Lacedæmonians, who in Xerxes's time had, with ten ships only at sea, gained the superiority over the Athenians, who had no fewer than 200; and added, that it would be a disgrace now to Thebes to suffer two such republics to engross the empire of so extensive an element, without putting in at least for their share of it. The people

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2

readily came into his proposal, not without extraordinary applause, and immediately ordered 100 galleys to be equipped; and in the mean while sent him to Rhodes, Chios, and Byzantium, to secure those states in their interest, and get what assistance he could from them. His negotiations had all the success that could be wished for, notwithstanding the strenuous opposition of the Athenians, and of their admiral Laches, who was sent with a powerful squadron against him. But what more effectually thwarted all his measures, was the work that they found for him at land, and the obliging the Thebans to take part in the quarrels that then reigned among their neighbours: so that whatever projects they had concerted, proved abortive for the present; and the death of Epaminondas, which happened not long after, put an effectual stop to them.

During the absence of that general, and of his colleague Pelopidas, the Orchomenians, being spirited up by some Theban fugitives, had formed a design to change the Theban government into an aristocracy; and 300 horsemen of the former had been actually sent to put it in execution. Their project, however, was timely discovered by the vigilance of the magistrates, who caused them to be seized, and put immediately to death. They next sent a sufficient force against the city of Orchomenos, with orders to put all the men to death, and to sell the women and children for slaves, which was punctually done; after which they raised that noble city to the ground. Pelopidas was then on his way to Thebally, at the head of a powerful army, whither he had been sent to assist the Thebans, who still groaned under the tyranny of Alexander the Phæzean, and had made several brave efforts to recover their liberty, but had been still overpowered by that usurper. Being joined by the Thebans, he encamped in the face of the enemy, though far superior in number, and consisting of above 20,000 men. A fierce engagement soon ensued, in which both sides fought with uncommon bravery. The place where the battle was fought was called *Cyncephalea*, from several little hills on it, between which there ran a large plain. Both sides endeavoured at first to post themselves on these eminences with their foot, whilst Pelopidas ordered his cavalry to charge that of the enemy below; which they did with such success, that they soon put them to the rout, and pursued them over the plain. This obliged the tyrant to gain the tops of the hills, where he greatly annoyed the Thebans that endeavoured to force those ascents; so that Pelopidas was obliged to give over his pursuit to come to their relief. This immediately inspired the Thebans with fresh courage, who began again to charge the enemy at several onsets; and soon threw them into such disorder, that they were forced to give way. Pelopidas no sooner perceived the advantage, than he began to look about for Alexander, with a design of engaging him. Having found him out as he was commanding his right wing and endeavouring to rally his men, he moved directly to him; and being got near enough to be heard by him, challenged him to decide the battle by single combat with him. Alexander, instead of accepting the offer, turned about, and with all the speed he could ran to screen himself amongst his guards. Upon this Pelopidas charged him with such furious speed, that he obliged him to retire farther, and shelter himself within the thickest

30
The city of
Orchome-
nos razed.37
Pelopidas
marches a-
gainst the
Theban
tyrant.

43 B ranks;

Thebes.

rank; the fight of which made him attack with fresh vigour, and fight more desperately against him. He tried in vain several times to break through their ranks to reach him, cutting down great numbers of those that came forward to oppose him: his eagerness at length exposed him so far to the darts that were shot at him at a distance, that some of them went quite through his armour, and gave him a desperate wound or two, while the rest advanced and stabbed him in the breast with their spears.

32
Is killed.

It is scarce possible for words to express the grief and despair which not only his brave Thebans, but likewise the Thessalians and other allies, showed at the sight of their slain general: some of the latter, who had perceived the danger he was exposed to, came down the hill with all possible speed to his relief; but when they perceived that they were come too late to save him, both they and the rest of the little army thought on nothing but how to revenge his death. They rallied accordingly, both horse and foot, as quick as possible, and began to charge the enemy afresh, and with such desperate fury, that they at length gained a complete victory over them, and killed above 3000 of them in their pursuit, besides a much greater number which they had slain on the field of battle, though they still looked upon all these advantages as vastly too small to compensate the loss of their brave general.

The news of his death had no sooner reached Thebes than the whole city was seen in as deep a mourning as his army. However, they sent a reinforcement to it of 7000 foot and 700 horse, as well to revenge the death of that general, as to improve the victory he had gained over the enemy; by the help of which they fell so furiously on them, that they quickly broke and totally defeated the shattered remains of Alexander's army. Hereupon he was forced to sue for peace, and to accept it on such conditions as the conquerors thought fit to impose. He was at length dispatched in his bed by his wife Thebe, assisted by her brothers, about seven years after his defeat. His body was afterwards dragged along the streets, trodden under foot, and left a prey to the dogs.

34
And at last murdered.

35
Ambition of the Thebans.

All this while the Thebans were watching to improve every commotion that happened, every success they met with, to the forwarding of their then reigning and favourite project of increasing their power above all the rest, and in their turn to give laws to Greece. Their late success in Theffaly, and the rupture between the Arcadians and Mantineans at the same time about some consecrated money which the former had taken out of the temple of Olympias to pay their troops employed against the Eleans, and which the latter called a downright sacrilege, besides other disorders that reigned in the other states of Greece, gave fresh encouragement to Thebes to set up for arbiters in those disputes; and so much the more, as those who had embezzled the sacred money, and wanted rather to embroil matters than to have them brought to light, sent that republican word that the Arcadians were just upon the point of revolting to the Spartans, and advised them to come and put an immediate stop to it. At the same time they dispatched some private directions to a Theban officer in Tegea to apprehend several of their own people as disturbers of the peace: which was accordingly done, and several eminent persons were confined as prisoners of state; but were soon after dischar-

ged, and loud complaints were made against such arbitrary and unjust proceedings. The officer was accused before the Theban senate for having intermeddled in their affairs, and endeavoured to interrupt the good correspondence between the two states. It was even insisted on by some of the Teggans, that he should be indicted and proceeded against by his principals; whilst the more moderate sort, who foresaw the consequences that were like to attend such appeals, and that it would infallibly bring the Thebans upon them, loudly protested against their marching into their territories, and did all they could to prevent it. The Thebans, however, were become too powerful and ambitious to miss so fair an opportunity of getting once more footing in Peloponnesus, as they had long ago premeditated; and Epaminondas was so far from making a secret of their design, that he told the Arcadian deputies in justification of it, that as it was on their account that the Thebans engaged in the war, they had acted treacherously with them in making peace with Athens without their consent: however, that when he was got with his army on his march into Peloponnesus to assist his friends, he would soon see what proofs they, the Arcadians, would then give of their fidelity. This speech did not fail to alarm them greatly; especially as it was spoken in such a magisterial style and threatening tone. Even those who were best affected to the Thebans could not forbear expressing their dislike of it; and all that had the welfare of Peloponnesus at heart, readily agreed with the Mantineans, that there was no time to be lost to use all proper means to prevent the impending storm.

36
Epaminondas displays the states of Greece.

Athens and Sparta were accordingly applied to, and were easily prevailed upon to assist the Mantineans, and to come into a strict confederacy against the Thebans; and to prevent all disputes about the command of the army, it was agreed that each state should have it in its own territories; which plainly shows how terrified they all were at the apprehension of a fresh invasion of the Thebans: for this was a point which neither the Spartans nor Athenians would have so readily given up to the Arcadians, though these had formerly as strenuously insisted upon it, even when they were almost reduced to the last extremity, and had never been able to obtain it till now. But Epaminondas was then in full march at the head of his Boeotian troops, with some Euboean auxiliaries and a body of stout Theffalian horse; and was moreover to be joined by the Messenians, Argives, and several other nations, as soon as he had entered Peloponnesus. The confederate army against him had ordered their rendezvous at Mantinea, the place which they naturally concluded would be first attacked, as being the chief seat of those who had revolted from the Thebans. But whilst they were securing themselves on that side, Epaminondas, who wisely considered how far this confederacy and expedition must have drained the city of Sparta of its chief strength, broke up privately from Nemea, where he had lain for some time encamped, and marched all that night with a design to have surprised that important capital: but his project being timely discovered, the vigilant king took care to disconcert it; so that, though the Theban general made several vigorous assaults on that city, he was so stoutly repulsed, and the Spartans behaved with such intrepid valour, that he was forced to retire and turn his thoughts against Mantinea, which

Thebes.

37
A combination against Thebes.

39
Epaminondas makes an unsuccessful attempt on Sparta.

Thebes.

which he judged by this time to have been quite defenceless. He judged rightly indeed; for the place was not only drained of its troops, but likewise of its inhabitants, who took that opportunity whilst the scene of war was in Lacedæmon, to gather in their harvest, and were scattered all over the country; so that he would not have met with any difficulty in gaining the town, had not the Athenian auxiliaries come unexpectedly to its relief and given him a fresh repulse.

These two last defeats greatly exasperated the Theban general, who had never till now been used to them, and could not but foresee that they would not only lessen his reputation with his allies, but, if not timely retrieved, would fully the glory of all his former exploits. What added to his present difficulties was, that the time allotted him for his expedition was almost expired; so that he had but a short space left to undertake some brave achievement, which might recover his and his country's honour, and keep up the spirits of his auxiliaries and those under his protection. He was moreover got very far into the enemy's country, and saw plainly enough how narrowly they watched all his motions, and how well prepared they were to oppose him whatever attempt he resolved upon, whether to attack them or to retreat. Under all these difficulties, he rightly considered, that he must immediately resolve upon a decisive battle; in which, if his pristine fortune followed him, he might at once retrieve his affairs, and make himself master of Peloponnesus; or, if that failed him, as it lately had done, fall honourably in the attempt. In this engagement Epaminondas made the wisest disposition of his troops, attacked and fought with the most intrepid courage and conduct, and had opened himself a way through the Spartan phalanxes, thrown them into the utmost confusion, and made a terrible slaughter of them, inasmuch that the field of battle was covered with their wounded and slain, when, in the heat of the fight, having ventured himself too far in order to give them a total overthrow, the enemy rallied again, pouring their whole fury and three whole volleys of darts at him, some of which he drew out and returned to them, till at length, being covered with wounds, and weakened with the loss of so much blood, he received a mortal wound from a javelin, and was with great difficulty rescued from the enemy by his brave Thebans, and brought alive, though speechless, into his tent. As soon as he had recovered himself, he asked his friends that were about him what was become of his field; and being told that it was safe, he beckoned to have it brought to him, and killed it. He next inquired which side had gained the victory; and being answered, The Thebans; he replied, Then all is well: and upon observing some of his friends bewailing his untimely death, and leaving no children behind him, he is said to have answered, Yes; I have left two fair daughters, the victory of Leuctra, and this of Mantinea, to perpetuate my memory. Soon after this, upon the drawing of the point of the javelin out of his body, he expired.

The consequence of this great general's fall, and of this bloody fight, in which neither side could boast any great advantage over the other, but a great loss of men on both sides, inasmuch that Xenophon makes it a drawn battle, was, that both parties agreed on a cessation of arms, and parted as it were by consent, to

take care of their wounded and slain. The Thebans indeed thus far gained the greater share of glory, that they renewed the fight; and after a most desperate contest, gained the victory over those Spartans that opposed them, and rescued the body of their dying general out of their hands. However, an effectual end was put to this bloody war, and a general peace agreed on by all but Sparta; who refused it only because the Messenians were included in it. But as to the Thebans, they had no great reason to boast of this dear-bought victory, since their power and glory began to decline from that very time; so that it may be truly said, that it rose and set with their great general.

On the death of Epaminondas, the Thebans relapsed into their former state of inactivity and indolence; and at last having ventured to oppose Alexander the Great, their city was taken, and the inhabitants slaughtered for several hours, after which the buildings were destroyed. It was rebuilt by Cassander, but never afterwards made any considerable figure among the states of Greece. About the year 146 B. C. it fell under the power of the Romans, under which it continued till the extinction of their empire by the Turks. It is now called *Thive*, and is nothing to what it was formerly; yet it is four miles in circumference, but so full of ruins, that there are not above 4000 Turks and Christians in it. It is now famous for a fine sort of white clay, of which they make bowls for pipes after the Turkish fashion. They are never burnt, but dry naturally, and become as hard as a stone. There are two mosques in Thebes, and a great many Greek churches. It is seated between two small rivers, in E. Long. 24. 5. N. Lat. 38. 22.

THEBES is also the ancient name of the capital of Upper Egypt, named likewise *Hecatompolis* and *Disopolis*. It was celebrated for its grandeur, and among other things, for its having 100 gates. It is now inconsiderable; but there are vast columns of marble and porphyry lying half buried in the ground, with statues and obelisks of a prodigious size, inscribed with hieroglyphics. Not far from this place are to be seen the sepulchres of the kings of Thebes, lying in grottoes, cut out of the rock in a most beautiful manner, with long rooms or galleries under the mountains. The modern name of the place is *Sayd*.

THEFT, or *Simple LARCENY*, is "the felonious taking and carrying away, of the personal goods of another." This offence certainly commenced then, whenever it was, that the bounds of property, or laws of *meum* and *tuum*, were established. How far such an offence can exist in a state of nature, where all things are held to be common, is a question that may be solved with very little difficulty. The disturbance of any individual, in the occupation of what he has seized to his present use, seems to be the only offence of this kind incident to such a state. But, unquestionably, in social communities, when property is established, any violation of that property is subject to be punished by the laws of society; though how far that punishment should extend, is matter of considerable doubt.

By the Jewish law, it was only punished with a pecuniary fine, and satisfaction to the party injured. And in the civil law, till some very late constitutions, we never find the punishment capital. The

Thebes
Theft.42
Peace concluded.43
State of
Thebes to
the present
time.39
And on
Mantinea.40
Battle of
Mantinea.41
Epaminon-
das killed.

Theft.

laws of Draco at Athens punished it with death : but his laws were said to be written in blood ; and Solon afterwards changed the penalty to a pecuniary mulct. And so the Attic laws in general continued ; except that once, in a time of dearth, it was made capital to break into a garden and steal figs : but this law, and the informers against the offence, grew so odious, that from them all malicious informers were styled *syco-phants* ; a name which we have much perverted from its original meaning. From these examples, as well as the reason of the thing, many learned and scrupulous men have questioned the propriety, if not lawfulness, of inflicting capital punishment for simple theft. And certainly the natural punishment for injuries to property seems to be the loss of the offender's own property : which ought to be universally the case, were all mens fortunes equal. But as those who have no property themselves are generally the most ready to attack the property of others, it has been found necessary, instead of a pecuniary to substitute a corporal punishment ; yet how far this corporal punishment ought to extend, is what has occasioned the doubt. Sir Thomas More and the marquis Beccaria, at the distance of more than two centuries, have very sensibly propounded that kind of corporal punishment which approaches the nearest to a pecuniary satisfaction, viz. a temporary imprisonment, with an obligation to labour, first for the party robbed, and afterwards for the public, in works of the most slavish kind ; in order to oblige the offender to repair, by his industry and diligence, the depredations he has committed upon private property and public order. But, notwithstanding all the remonstrances of speculative politicians and moralists, the punishment of theft still continues throughout the greatest part of Europe to be capital : and Puffendorf, together with Sir Matthew Hale, are of opinion that this must always be referred to the prudence of the legislature ; who are to judge, say they, when crimes are become so enormous as to require such sanguinary restrictions. Yet both these writers agree, that such punishment should be cautiously inflicted, and never without the utmost necessity.

The Anglo-Saxon laws nominally punished theft with death, if above the value of twelvepence : but the criminal was permitted to redeem his life by a pecuniary ransom ; as, among their ancestors the Germans, by a stated number of cattle. But in the ninth year of Hen. I. this power of redemption was taken away, and all persons guilty of larceny above the value of twelvepence were directed to be hanged ; which law continues in force to this day. For though the inferior species of theft, or petit larceny, is only punished by whipping at common law, or, by statute 4 Geo. I. c. 11. may be extended to transportation for seven years, as is also expressly directed in the case of the Plate-glass Company, yet the punishment of grand larceny, or the stealing above the value of twelvepence, (which sum was the standard in the time of king Athelstan, 800 years ago) is at common law regularly death : which, considering the great intermediate alteration in the price or denomination of money, is undoubtedly a very rigorous constitution ; and made Sir Henry Spelman (above a century since, when money was at twice its present rate) complain, that while every thing else

was risen in its nominal value, and become dearer, the life of man had continually grown cheaper. It is true, that the mercy of juries will often make them shun a point, and bring in larceny to be under the value of value or twelvepence, when it is really of much greater value : but this, though evidently justifiable and proper when it only reduces the present nominal value of money to the ancient standard, is otherwise a kind of pious perjury, and does not at all excuse our common law in this respect from the imputation of severity, but rather strongly confesses the charge. It is likewise true, that by the merciful extensions of the benefit of clergy by our modern statute-law, a person who commits a simple larceny to the value of thirteen pence or thirteen hundred pounds, though guilty of a capital offence, shall be excused the pains of death : but this is only for the first offence. And in many cases of simple larceny the benefit of clergy is taken away by statute : as from horse-stealing in the principals and accessories both *before* and *after* the fact ; theft by great and notorious thieves in Northumberland and Cumberland ; taking woollen cloth from off the tenters, or linens, fustians, calicoes, or cotton, goods, from the place of manufacture ; (which extends, in the last case, to aiders, assisters, procurers, buyers, and receivers) ; feloniously driving away, or otherwise stealing one or more sheep or other cattle specified in the acts, or killing them with intent to steal the whole or any part of the carcase, or aiding or assisting therein ; thefts on navigable rivers above the value of forty shillings, or being present, aiding, and assisting thereat ; plundering vessels in distress, or that have suffered shipwreck ; stealing letters sent by the post ; and also stealing deer, hares, and conies, under the peculiar circumstances mentioned in the Waltham black act. Which additional severity is owing to the great malice and mischief of the theft in some of these instances ; and, in others, to the difficulties men would otherwise lie under to preserve those goods, which are so easily carried off. Upon which last principle the Roman law punished more severely than other thieves the *Abigei*, or stealers of cattle ; and the *Balnearii*, or such as stole the cloaths of persons who were washing in the public baths ; both which constitutions seem to be borrowed from the laws of Athens. And, so too, the ancient Goths punished with unrelenting severity thefts of cattle, or of corn that was reaped and left in the field : such kind of property (which no human industry can sufficiently guard) being esteemed under the peculiar custody of heaven.

THEFT-Bole, (from the Saxon *theof*, i. e. *sur*, and *bote*, *compensatio*) is the receiving of a man's goods again from a thief, after stolen, or other amends not to prosecute the felon, and to the intent the thief may escape ; which is an offence punishable with fine and imprisonment, &c.

THEME, denotes the subject of an exercise for young students to write or compose on.

THEMISON, a physician of Laodicea, a disciple of Asclepiades. He founded the methodic sect, with a view to the more easily teaching and practising the art of medicine. See **MEDICINE**, n° 78.—80. Themison gave the first account of diacodium, which was prepared of the juice and decoction of poppy-heads and honey.

Theft
Themison

Theſtiſtus honey. He invented a purging medicine called *heira*.
See MEDICINE.

Theodore.

Theodore.

THEMISTIUS, an ancient Greek orator and philoſopher, a native of Paphlagonia, who flouriſhed in the fourth century. He had great intereſt and favour with the emperors in his time, and though a heathen, was of a very tolerating ſpirit. He taught for many years at Conſtantinople, of which city he was made præfect by Julian and Theodoſius; and lived to be exceeding old. More than 30 of his orations are ſtill extant, beſide commentaries on ſeveral parts of Ariſtotle's works.

THEMISTOCLES, the renowned Athenian admiral, general, and patriot, who gained the battle of Salamine againſt the Perſians. Being baniſhed his country by his ungrateful fellow-citizens, he fled to Artaxerxes king of Perſia; but, in order to avoid taking up arms againſt his country, he ſlew himſelf, 464 B. C. See ATTICA, n° 76, *et ſeq.*

THEOBALD (Lewis), the ſon of an attorney at Sittingbourn in Kent, was a well-known writer and critic in the early part of the preſent century. He engaged in a paper called the *Cenſor*, publiſhed in Miſt's Journal, wherein, by delivering his opinions with too little reſerve concerning ſome eminent wits, he expoſed himſelf to their reſentment. Upon the publication of Pope's Homer, he praiſed it in terms of extravagant admiration, yet afterwards thought proper to abuſe it as earneſtly; for which Pope at firſt made him the hero of his Dunciad, though he afterward laid him aſide for another. Mr Theobald not only expoſed himſelf to the laſhes of Pope, but waged war with Mr Dennis, who treated him more roughly, though with leſs ſatire. He nevertheleſs publiſhed an edition of Shakeſpeare, in which he corrected with great pains and ingenuity many faults that had crept into that poet's writings. This edition is ſtill in great eſteem; being in general preferred to thoſe publiſhed by Pope, Warburton, and Hanmer. He alſo wrote ſome plays, and tranſlated others from the ancients.

THEOCRACY, in matters of government, a ſtate governed by the immediate direction of God alone: ſuch was the ancient government of the Jews before the time of Saul.

THEOCRITUS, a celebrated Greek poet, was born at Syracuſe, but lived at the court of Egypt in the reign of Ptolemy Philadelphus, about the 285th year before the Chriſtian æra. It is ſaid that at his return to Syracuſe, venturing to ſpeak ill of Hiero king of that city, he was put to death by his order. There are ſtill extant Theocritus's Idylliums in the Doric dialect, which are maſterpieces in their kind, written with admirable ſimplicity, and filled with inexpressible beauties. The beſt edition of them is that of Oxford, in 1699, 8vo.

THEODICY. See METAPHYSICS, n° 6. 222—230.

THEODOLITE, a mathematical inſtrument much uſed in ſurveying. See GEOMETRY.

THEODORE, king of Corſica, baron Nieuhoff in the county of La Marc in Weſtphalia. He had his education in the French ſervice, and afterwards went to Spain, where he received ſome marks of regard from the duke of Riparda and cardinal Alberoni; but being of an unſettled diſpoſition, he quitted Spain, and

travelled into Italy, England, and Holland, in ſearch of ſome new adventure. He at laſt fixed his attention on Corſica, and formed the ſcheme of rendering himſelf ſovereign of that iſland. He was a man of abilities and addreſs; and having fully informed himſelf of every thing relating to Corſica, went to Tunis, where he ſell upon means to procure ſome money and arms; and then went to Leghorn, from whence he wrote a letter to the Corſican chiefs, Giafferi and Paoli, offering conſiderable aſſiſtance to the nation if they would elect him as their ſovereign. This letter was conſigned to count Domenico Rivarola, who acted as Corſican plenipotentiary in Tufcany; and he gave for anſwer, that if Theodore brought the aſſiſtance he promiſed to the Corſicans, they would very willingly make him king.

Upon this he without loſs of time ſet fail, and landed at Tavagna in the ſpring of the year 1736. He was a man of a very ſtately appearance, and the Turkiſh dreſs he wore added to the dignity of his mien. He had a few attendants with him; and his manners were ſo engaging, and his offers ſo plauſible, that he was proclaimed king of Corſica before count Rivarola's diſpatches arrived to inform the chiefs of the terms upon which he had agreed. He brought with him about 1000 zechins of Tunis, beſides ſome arms and ammunition, and made magnificent promiſes of foreign aſſiſtance; whence the Corſicans, who were glad of any ſupport, willingly gave into his ſchemes. Theodore inſtantly aſſumed every mark of royal dignity. He had his guards and his officers of ſtate. He conferred titles of honour, and druck money both of ſilver and copper. The ſilver pieces were few in number, and can now hardly be met with; the copper coins have on one ſide T. R. that is, "Theodorus Rex," with a double branch croſſed, and round it this inſcription, PRO BONO PUBLICO RE. Co. that is, "For the public good of the kingdom of Corſica;" on the other ſide is the value of the piece; *Cinque Soldi*, or five ſous.

The Genoefe were not a little confounded with this unexpected adventurer. They publiſhed a violent manifeſto againſt Theodore, treating him with great contempt; but at the ſame time ſhowing they were alarmed at his appearance. Theodore replied, in a manifeſto, with all the calmneſs and dignity of a monarch; but after being about eight months in Corſica, perceiving that the people began to cool in their affections towards him, he aſſembled his chiefs, and declared he would keep them no longer in a ſtate of uncertainty, being determined to ſeek in perſon the ſupport he ſo long expected. He ſettled an adminiſtration during his abſence, recommended unity in the ſtrongeſt terms, and left the iſland with reciprocal aſſurances of fidelity and affection. He went to Holland, where he was ſo ſucceſſful as to obtain credit from ſeveral rich merchants, particularly Jews, who truſted him with cannon and other warlike ſtores to a great value, under the charge of a ſupercargo. With theſe he returned to Corſica in 1739; but by this time the French, as auxiliaries to the Genoefe, had become ſo powerful in the iſland, that though Theodore threw in his ſupply of warlike ſtores, he did not incline to venture his perſon, the Genoefe having ſet a high price on his head. He therefore again departed; and after many unavailing attempts

Theodore, attempts to recover his crown, at length chose for retirement a country where he might enjoy the participation of that liberty which he had so vainly endeavoured to give his Corsicans; but his situation in England by degrees grew wretched, and he was reduced to low as to be several years before his death a prisoner for debt in the King's bench. At length, to the honour of some gentlemen of rank, a charitable contribution was set on foot for him in the year 1753. Mr Boswell observes, that Mr Horace Walpole generously exerted himself for the unhappy Theodore, and wrote a paper in the World with great elegance and humour, soliciting a contribution for the unhappy monarch in distress, to be paid to Mr Robert Doddsley bookseller, as lord high treasurer. This brought him a very handsome sum, and he was allowed to get out of prison. That gentleman adds, that Mr Walpole has the original deed, by which Theodore made over the kingdom of Corsica in security to his creditors, and that he has also the great seal of the kingdom. Theodore died in 1756, and was buried in St Anne's church-yard, Westminster; where, in 1757, a simple unadorned monument of marble was erected to his memory by a gentleman, with an inscription, which, after mentioning some of the above particulars, concludes with the following lines:

The grave, great teacher, to a level brings
 Heroes and beggars, galley-slaves and kings:
 But Theodore this moral learn'd ere dead,
 Fate pour'd its lesson on his living head,
 Bestow'd a kingdom and deny'd him bread.

Theodore left a son, who is an accomplished young gentleman.

THEODORET, bishop of St Cyrius in Syria, in the 5th century, and one of the most learned fathers of the church, was born in the year 386, and was the disciple of Theodorus Mopsesta and St John Chrysostom. Having received holy orders, he was with difficulty persuaded to accept of the bishopric of St Cyrius, about the year 420. He discovered great fru-

gality in the expences of his table, dress, and furniture, but spent considerable sums in improving and adorning the city of Cyrius. He erected two large bridges, public baths, fountains, and aqueducts, and laboured with great zeal and success in his diocese. Yet his zeal was not confined to his own church: he went to preach at Antioch, and the neighbouring towns; where he became admired for his eloquence and learning, and had the happiness to convert multitudes of people. He wrote in favour of John of Antioch and Nestorius, against Cyril's Twelve Anathemas: he afterwards attacked the opinions of Nestorius, and was deposed in the synod held by the Eutychians at Ephesus; but was afterwards restored by the general council of Chalcedon, in which he was present, in 451. It is thought that he died soon after; though others say that he lived till the year 470. There are still extant Theodore's excellent Commentary on St Paul's Epistles, and on several other books of the holy Scriptures. 2. His Ecclesiastical History from the time of Arius to Theodosius the Younger. 3. The history of the famous Anchorites of his time. 4. Epistles. 5. Discourses on Providence. And, 6. An excellent treatise against the Pagans, intitled, *De curandis Græcorum affectibus*; and other works. The best edition of all which is that of Father Sirmond in Greek and Latin, in 4 vols folio.

THEODOSIUS I. called the Great, was a native of Spain. The valour he had shown, and the great services he had done to the empire, made Gratian, attacked by the Goths and Germans, to admit him as a partner in the government. He received the purple in 379, aged 43. See CONSTANTINOPLE, n° 81—92.

THEOGNIS, an ancient Greek poet of Megara in Achaia; flourished about the 59th Olympiad, 144 B. C. We have a moral work of his extant, containing a usual summary of precepts and reflections, to be found in the collections of the Greek minor poets.

T H E O L O G Y;

Or, The Study of RELIGION.

TO ascend by a chain of reasoning from things visible to things invisible, from palpable to impalpable, from terrestrial to celestial, from the creature even up to the Creator, is the business of theology: it is not surprising, therefore, that the union of many doctrines is necessary completely to form such a science. To understand, and properly to interpret, the scriptures or revelation, demands not less sagacity than assiduity. The gift of persuasion is also essential to the ministers of the gospel. And lastly, the civil government has committed to their care certain functions of society, which relate, or seem to relate, either to the doctrines or morality of the gospel. They assemble, for example, in bodies to form consistories; they judge in matrimonial cases; they carry consolation and hope to the souls of the sick; they prepare for death those criminals which justice sacrifices to public safety; they take upon themselves the charge of Ephori, with the inspection of some pious foundations: they distribute

alms; they administer the sacraments, &c.

To discharge fully so many duties, the theologian has need, 1. Of several preparatory studies; 2. Of some theoretic sciences; and, 3. Of many doctrines which have for their object his ministerial office. The first are,

1. The languages; and among these,
 - (a) His native language, in which he is to preach and exercise his ministry, and with which he ought to be perfectly acquainted.
 - (b) The Latin language, which is the language of the learned world in general.
 - (c) The Greek language, in order to understand the new Testament.
 - (d) The Hebrew language, of which the Talmudian and Rabbinical idioms are a part.
 - (e) The Arabic language.
 - (f) The Syriac language.
 - (g) The French language. And,

(h) The

(b) The English language. The two latter of which now appear necessary to every man of letters, and particularly to a theologian, on account of the excellent works which are wrote in those languages.

2. The principal parts of philosophy ; as,
 - (a) Logic.
 - (b) Metaphysics.
 - (c) Moral philosophy.
3. Rhetoric and eloquence, or the art of speaking correctly, of writing with elegance, and of persuasion.

To which may be added,

4. The elements of chronology, and universal history.
5. The study of the Jewish antiquities.

He who would devote himself to the important employment of a theologian, and has the noble ambition to excel in it, should early impress on his mind these truths: that the years which are passed at an university are few; that they run rapidly away; that they are entirely engrossed by the theoretic sciences; and that he who does not carry with him to the university a fund of knowledge in the preparatory parts of learning, commonly brings very little away, when his age or his parents oblige him to quit it.

The theoretic sciences of a theologian are,

1. The dogmatic, or the theory of theology; which some Latin authors name *alio thetica*, or *systematica*.
2. The exegesis, or the science of attaining the true sense of the holy scriptures.
3. The hermeneutic, or the art of interpreting and explaining the scriptures to others. This differs in general but little from the exegesis, and in some respects is quite the same.
4. Polemic theology, or controversy.
5. Natural theology.
6. Moral theology.
7. The history of the church under the Old and New Testaments.

The practical sciences are,

1. Homiletic theology.
2. Cathetic theology.
3. Casuistic theology.

We do not here particularly name the *patristic theology*, (*theologia patrum seu patristica*), because all Christian communions are not agreed in their opinions concerning the degree of authenticity and infallibility that is to be attributed to these ancient fathers of the church. The Protestants believe, that these primitive theologians were liable to error in their sentiments as well as those of our days; and, in all probability, that they were less skillful, less learned, less clear, and less accustomed to close reasoning, than the latter, as philosophy was then more imperfect. But as we find in the writings of these fathers, many elucidations of the doctrine of the primitive apostles, and many irrefragable testimonies of the authenticity of divers remarkable events, which serve to establish the truth of Christianity; and as we there see, moreover, the origin of errors, of arbitrary ceremonies, and of many doctrines that have been introduced into the Christian church; the reading and the study of these fathers cannot but be of great utility to the theologian. To a virtuous citizen, who unites such various sciences, and employs them in pointing out to his fellow-citizens

the path that leads to temporal and eternal felicity; in a word, to a wise theologian, what veneration is not due?

SECT. I. Of the DOGMATIC.

UNDER the general term of dogmatic, we comprehend that part which the different writers on theology have called sometimes *theoretic*, sometimes *systematic*, and sometimes *thetic theology*, &c. The term *dogmatic* appears to us the most general, and the most just, to express the subject that we intend, as it comprehends an entire system of all the dogmas or tenets that each religion professes: whether it teach these dogmas by the way of theses, as articles of faith; by public lecture; by catechising; or any other manner whatever.

Every positive religion must naturally have a system of certain points of doctrine to propose to its followers; otherwise each one would form a particular system according to his own fancy: there would be as many different religions as there are individuals on the earth, and each society would consist of a confused mass of fantastic opinions; as the different modes of thinking, and the different degrees of discernment, are varied and compounded by mankind to infinity; but truth, on the contrary, is uniform and invariable.

The Christian religion is as compound in its dogmas as it is simple in its moral principle. It includes, 1. The dogmas founded on the lights of reason. 2. Those drawn from the Old Testament and the law of Moses. 3. Those taken from the New Testament and the doctrine of JESUS CHRIST. 4. Those that the fathers of the church have drawn from the Holy Scriptures. 5. Those that the church under the New Testament has prescribed to Christians by oecumenical and other councils assembled in different ages. 6. The dogmas that the popes, in quality of heads of the church, have established by their bulls: and to these must be added, on the part of the Protestants, 7. The dogmas that the reformers, especially Luther and Calvin, have taught. 8. The decisions of synods; and lastly, the tenets that are maintained by the different sects, as Socinians, Anabaptists, Quakers, &c. Each of these particular religions or sects pretend to support their dogmas both by reason and revelation: we do not here offer a work of controversy, and are very far from attempting to determine on which side truth and reason are to be found.

Our zeal, however, for the Christian religion in general, which we regard as perfectly divine, and as the only religion adapted to promote the happiness of mankind in this world, and to secure it in the next, and the desire we have that it may endure to the end of time, compels us to make in this place one important reflection; which is, that simplicity is ever an essential attribute of perfection, as complexity is of imperfection. Now, it cannot be denied, without doing violence to truth, that among the different dogmas of which we have been speaking, there are several that seem to be founded on speculations very abstruse, on subtleties very intricate, and on interpretations very ambiguous. God certainly never intended that all mankind should be theologians; he has not given them his divine word to be the cause of discord among men, nor that they should pass their whole lives in a painful search after objects of belief and articles of faith;

faith; and that they should forego, in that pursuit, the necessary offices of life, and their duties as citizens. The dogmas, then, essentially necessary to the welfare of mankind, ought to consist of a small number, and to bear the marks of simplicity and perspicuity; without which they must be imperfect, and consequently the work of man. Our intention, in making this remark, is, to extend our voice, if it be possible, even to posterity, whom we would conjure not to injure our religion, so holy and so admirable, by a multiplicity of dogmas. It is necessary, however, that the divine, who makes it his study and his profession, should be thoroughly acquainted with the theory of this science, in order that he may be able to instruct the sincere Christian, and to explain the nature of each particular dogma, as well as the solidity of its proofs; and to this it is that the study of the dogmatic leads; of which we shall now continue the analysis.

The dogmatic is then nothing but a *fuccinct exposition of all the dogmas of the Christian religion, in a natural and philosophical order*. By the word philosophical, we do not here precisely mean the method of mathematicians, in the manner the late M. Wolff has applied it to philosophy; every subject is not capable of a demonstration so exact and rigid; but a regular order is required in the arrangement of the general system, and a connection is to be preserved in the several matters that form it: the definitions should be just; the divisions exact; the arguments solid; the proofs clear; the citations conclusive; the examples striking; and, in a word, every thing should be adduced that appertains to so important a discipline.

It is very essential, moreover, in the dogmatic, at the beginning of each thesis, to explain the several terms that are peculiar to it, and that use has established in treating of theology; to draw from each definition certain axioms, and from thence to form propositions, and to illustrate them by solid reasoning. Lastly, we should not neglect, in such a system, to make use of the expressions used in the symbolic books that have been received by the whole Christian church, and which cannot be rejected or altered, without causing a confusion in our ideas, and in the general system of the Christian religion. But before we make the least advance in the study of Christian theology, it is indispensably necessary to examine the proofs by which the truth, the authenticity, and the divinity of the sacred and canonical books are established; for this is the foundation of all the dogmas, and the axis on which its whole doctrine turns.

The systematic part of the Christian religion, among the great number of its dogmas or theses, has *three principal*, from which all the rest are derived, and which form the basis of its whole doctrine:

1. The existence of one God in three persons.
2. The necessity of a Mediator or Redeemer.
3. The real appearance of the Mediator or Messiah on the earth.

Whoever writes, professes, or teaches the dogmatic, should be, above all things, careful well to establish these important truths; to evince them by the strongest and most evident proofs, drawn partly from the lights of reason, and partly from revelation; and he will then see with what facility all other theses flow from, and how easy it will be to prove them by, these.

The infinite variety that is found among mankind in their manner of thinking, and in their method of treating subjects; the frequent changes that have happened in the exterior form of philosophy, and in the method of treating it; the oppositions that have been raised at all times against divers doctrines of the Christian religion; all these have produced among theologians, different systems of the dogmatic. Sometimes they have combined positive theology with morality, and have formed a system that they call *theologia theoretico-practica*, or *theologia thetico-moralis*, &c.: sometimes they have refuted the arguments that others oppose to certain theses; and from thence has arose a system that they call *theologia thetico*, or *dogmatico*, or *positivo-polemica*: sometimes they have joined to natural theology that of revelation; and have formed a dogmatic, called *philosophico-theologica*: and so of the rest. But, besides that these distinctions and denominations are in themselves pedantic, it is at all times more eligible, in every science, to avoid confounding with each other the several branches of which it consists. The different dogmas, morality, philosophy, and controversy, are separate articles; and when each of these parts of theology are separately treated, they are disposed with more order in the mind, and a greater light is diffused over their several subjects.

It appears, moreover, from the simple enumeration that we have made above, of the different principles on which the dogmas of the Christian religion are founded, that, to be thoroughly acquainted with its whole theory, the theologian should also apply himself to the study of the symbolic books of its communion, and especially should be well versed in the Creed of the Apostles; that of Nice and St. Athanasius; the book called *Formula Concordiæ*; the Theses of the council of Trent; the Catechisms of Luther; the Confession of Augsburg; the Articles of Smalcalden; the Catechism of Heidelberg, &c. That he should be well acquainted with that part of theology that is called *patristica*: that is to say, that he should be well read in the fathers of the church; that he should not be ignorant even of scholastic theology; that he should at least know the frivolous subtleties and the complicated method of the ancient scholastic divines, which was derived from the philosophy of Aristotle and the schools; that he should make a serious study of the sacred history of all ages, the councils and synods; that he should, above all, never lose sight of natural theology; and lastly, that it is indispensably necessary that he should procure a good bibliothèque, or treatise of ecclesiastical writers (A), which he may consult occasionally, and learn from thence to know the best guides. The more a theologian applies himself to all these subjects, the more ability he will acquire in this science, and the more perfect he will be in the theory of that religion which it is his duty to teach to others.

Revealed religion being founded (at least in great part) on natural religion, and philosophy being the source from whence the principles and the knowledge of the latter are derived, it is evident that philosophy is intimately connected with theology: nevertheless, the aid of the former is to be employed with precaution, and is not to be regarded as the foundation of the theological dogmas, but only as a mean by which they may be explained and enforced. The Holy Scrip-

ture

(A) Those of Du Pin and William Cave are most celebrated.

SECT. II.

T H E O L O G Y.

Hermeneu-
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Theology.

tures constitute perpetually the true basis of revealed theology : philosophy effectually concurs, however, to prove the existence and the attributes of the Supreme Being ; the necessity of the creation of the universe by Almighty God, in opposition to every other possible manner of its being produced : it furnishes, moreover, plausible conjectures concerning the intention of the Almighty in creating this world ; it proves the necessity of a perpetual power to preserve it ; it supposes, that as God could not produce any thing that was not perfect in its kind, he could not have created man as he now is ; it vindicates the conduct of the Supreme Being, in appointing chastisements for transgressions, by showing that moral evil was not introduced into the world by absolute necessity, but by the abuse of liberty, the most noble prerogative of the human soul ; it determines the necessity of a Mediator ; it furnishes arguments for the belief of the immortality of the soul, and of a future state that has a relation to the moral actions of this life ; and lastly, it inspires a love of God as a Being of sovereign perfection, a gratitude towards him as our Creator and Preserver, and a submission to his will as our Supreme Ruler and Director ; motives of all others the most powerfully conducive to a virtuous conduct.

It is this use which theology makes of philosophy, that has given occasion to divide the theses of the dogmatic into pure and mixed ; that is, into theses that are founded entirely upon revelation ; and such as arise from an union of reason with revelation. Of the first sort are, 1. The article of the Holy Scripture itself ; which treats of its divine origin, its authority, and its efficacy. 2. The dogma of the Trinity. 3. That of the origin of evil, or of original sin. 4. The whole article of Jesus Christ. 5. The dogma of the efficacy and operations of the Holy Ghost. 6. That of the sacraments. 7. That of repentance. 8. That of the belief in Jesus Christ. 9. That of good and bad angels. 10. That of the end of the world, and the last judgment. 11. That of the church, &c. The mixed dogmas or theses are, 1. The doctrine of a Supreme Being in general ; his beings, his attributes, and his works. 2. That of the creation. 3. That of providence, or the conservation of the world. 4. Of sin, as a transgression of the laws of God. 5. Of rewards and punishments after death, &c. He that attentively studies, thoroughly comprehends, and well digests, all these theses, will have reason to rest content with his knowledge of the dogmatic.

SECT. II. *Of the EXEGETIS and the HERMENEUTIC.*

The term *Exegetis* is derived from the Greek verb *EXEΓNASTAI*, which signifies to relate or explain ; and that of *Hermeneutic* from *ERMEŒUEIN*, which means to search into ; and, in a figurative sense, thoroughly to examine and interpret. The learned, but especially the theologians, make use of these words, sometimes as synonyma, to express the same thing, and sometimes (as there are scarce any terms that are perfectly synonymous) to denote a small difference between two parts of learning of the same nature. By the word *Exegetis* they mean, that science which teaches clearly to investigate the true sense of the original text of the Holy Scriptures ; and by the *Hermeneutic*, the art of interpreting and explaining the Holy Scriptures to others (a).

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(A) The *Exegetis* is a kind of rational grammar. The *Hermeneutic* is the art of interpreting entire passages.

This distinction is so subtle, that it becomes almost frivolous. They are, in fact, the same science ; the one is only an explication of the other, and for that reason we think we are authorized to treat of them together in this place.

In order to the true understanding of the sacred text of all the books contained in the Holy Bible, whether of the Old or New Testament, it is absolutely necessary that the theologian be thoroughly acquainted, not only with the languages in which these books were originally wrote, but likewise with the history and antiquities of those remote times in which their authors lived. With regard to researches into the history of the Jewish nation, their antiquities, their morals, and their customs, it will be found advantageous to pursue it as far as the nature of the subject will admit, without, however, engaging in critical subtleties that lead to a labyrinth to which there is no end, and have spread more clouds over theology than even the scholastic controversies have formerly done.

He who would successfully interpret any work whatever, should first consider the spirit in which it is wrote : he should attentively reflect on the general design of that work, and the particular motives that induced the author to undertake it ; his genius, his passions, his taste ; the time, the place, and the people for whom it was written. These considerations are, above all, necessary, when we would undertake the explication of the Holy Scriptures. Independent of those reflections which the theologian will of himself naturally make on the subject, the excellent commentaries which we have on the Bible, in which the greatest men of every age have exercised their genius, may serve him as a guide in this course. The critical histories will likewise afford great aid, and throw admirable lights on this matter. Clear ideas, an acute discernment, and a solid judgment, will complete the work.

Furnished with ideas from such sources, the theologian may venture to investigate the true sense of those passages of Holy Scripture that may appear to him obscure, contradictory, or difficult, and to interpret them to others : but he will be more wise and less vain than to attempt to impose his decisions on mankind, at all times, as authentic and infallible. The human discernment is ever confined and imperfect ; and God has not granted to any man, to any theologian, or assembly of divines, an exclusive power of interpreting his divine word : he has moreover denounced his anathema against all those who shall add or take away a single word thereof. But to explore the true sense of any passage, and to explain it to others, cannot certainly be deemed either adding or retrenching.

SECT. III. *Of MORAL THEOLOGY.*

If it were allowable to compare the Saviour of the world to a weak mortal, we would say, that the conduct of Jesus Christ resembled that of Socrates, who has left us no part of his doctrine in writing, but whose whole instructions (as well as the particulars of his life) have been collected, digested, and published, by his disciples. The evangelists are the only historians of the Messiah : it is to their labours that we owe the knowledge of his actions upon earth, and his divine doctrine. The four Evangelists, and the Acts of the Apostles wrote by St Luke, contain therefore

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alone

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Theology.

alone the history of the life of Jesus Christ, and the doctrine that he taught. His apostles and disciples began by paraphrasing his doctrine, as well by their evangelic sermons as in the epistles they addressed to the faithful of several Christian churches: they have given explanations, and have added pastoral instructions, which are in effect admirable; but which, nevertheless, form not the original text of the discourses of our Saviour. The bishops of the apostolic century, the fathers of the church in all succeeding centuries, the other bishops and ecclesiastics, the councils, the synods, the doctors of theology, the popes, the confessor, the reformers likewise, and an infinity of theologians, have drawn from the Gospel, and sometimes also from the letters of the apostles, and from other commentaries on the gospel, various tenets; which, united, form at this day the general system of the Christian religion. The theologians who devote themselves to the service of the altar, study this system in the dogmatic; the laity learn it by means of catechisms; and after they have made confession of their faith, solemnly adopt it when they are received into the bosom of the church.

It is not the same with regard to the morality of Jesus Christ, which every one may read in the Gospel; and to know which, it is not necessary to become learned, nor to study a complicated system. If the dogmatic were not armed with a thousand arguments to establish the divinity of Jesus Christ, yet would the morality of his gospel sufficiently prove it; seeing that it is perfectly holy, entirely simple, strictly just, and most completely adapted to promote the felicity of the human race in this world, and in that which is to come. The Saviour of the world has not enjoined any part of mankind to engage in disputes or abstract refinements: the sole command that he has given them is, *to believe in his gospel*; and that is comprised in one word only, *Love*: the grand and only principle on which the whole of his sacred doctrine is founded.

To produce the greatest effects possible by the least efforts, is the highest perfection in nature, and at the same time the true characteristic of divinity. God has given to all the beings that compose the universe, one simple principle alone, by which the whole, and every part, is connected and perpetually supported; and that is *Love*. The attraction of the celestial bodies, as well as of those of which our globe is formed, is a species of *love*; a mutual tendency toward each other. The uniform generation, by which all beings are perpetuated, is founded in *love*. This is the true *minimum*, the true system of *the least action*, which includes something so divine. It appears to be the will of God to establish by the mouth of the Messiah, the same simple principle in morality, that is, in the rule of human actions, by saying *Love*: in a word, it was his will, that in the conduct of mankind, as in every other part of nature, there should be no other principle than that of *Love*.

That in the different systems of ethics of the ancient heathen philosophers many maxims and precepts of admirable morality are to be found, cannot be denied; but, beside that these philosophers are almost continually contradicting each other in their maxims, no one of their systems is founded on the true principle.

Moral
Theology.

In searching after it, they have discovered some excellent truths; but it has been by chance, and they are at best imperfect. Jesus Christ has alone taught mankind perfect morals, by deducing them from this true principle. Every principle should be simple: the idea of a compound principle implies at once an imperfection. Every principle should be comprehensive, even universal, in its effects. Every principle, whose effects are limited, is imperfect. God himself is uniform in his principle, and infinite in his effects. His doctrine, or his law, should be the same. Jesus Christ has made known to mankind this principle, simple and universal. He has therefore been, in this sense also, the true Saviour of the world. He has preached to mankind; and his only doctrine has been that of *love*.

By the word *Love*, with regard to bodies in general, is meant a tendency, a mutual inclination, that urges them to join and to coalesce; and with regard to men in particular, a lively affecting pleasure that possesses the mind on contemplating the perfections of any object. This pleasure is always accompanied with a desire either to possess that object, or to render it propitious. By adopting therefore this principle, and this last definition of *Love*, it follows, that all the duties of man consist, 1. In the love of God in preference to all other objects. 2. In the love of himself. 3. In the love of his own species. 4. In the love of every other creature to a certain degree.

The doctrines of Jesus Christ are, in these respects, the most explicit.

From this principle flows our duty towards God, towards ourselves, our neighbour, and to those beings that are subject to our power. The first rule is, to communicate to all those, whom it is our duty to love, all the good, and to preserve them from all the evil in our power. The second, to do to no one what we would not have done to ourselves in similar circumstances. The third, which is the simple effect of love, is to endeavour to please the object that we ought to love. The fourth, to endeavour to render the pleasures that we communicate to others, as lively as possible, and those inevitable evils, which we are sometimes constrained to do to them, as supportable as we can; and so of the rest. The whole evangelic doctrine of our Saviour is replete, from beginning to end, with admirable precepts for these purposes; and these precepts, with their applications, general and particular, we learn from that science which we call *moral theology*.

This doctrine we distinguish from moral philosophy, or the simple doctrine of Ethics; because Jesus Christ has made known, in his divine morality, a far greater degree of perfection than is discoverable by the mere light of human reason. For the renouncing of self-interest, and private pleasure; the forgiveness of offences; the love of his enemies; the triumph over destructive passions; and many other like virtues, the Christian is alone indebted to the doctrine of Jesus Christ.

A second difference between Christianity and philosophy consists in this, That the first adds to the second still new motives to the practice of virtue. That of redemption and pardon, obtained by Jesus Christ, is not one of the least. Its argument is this: If God has so loved mankind, as to afford them the means

means by which the evil, caused by their own fault, may be abolished, it would be the greatest of all ingratitude and malice towards himself, if man should not endeavour to acknowledge this love, to merit it, and to embrace the means of pleasing God. A third motive, taken also from the merit of Jesus Christ, here offers itself as an auxiliary to the two former. According to the Christian doctrine, man has not by nature the power to practise all those virtues which are agreeable to God: but the same doctrine teaches, on the other hand, the conditions by which it is possible to please that most holy and perfect Being; and gives the Christian hope also that he shall never labour in vain.

Lastly, the Christian morality is of far greater efficacy in adversity than philosophy: it carries with it a wonderful consolation in misfortune, and even in the hour of death; for the Christian may say, with the Apostle, *that godliness (or the practice of evangetic morals) is in all things profitable, having the promise of the present life, and that which is to come.*

SECT. IV. Of POLEMIC THEOLOGY, or CONTROVERSY.

We cannot sufficiently lament, that the church of the God of peace should be a church-militant; and that a doctrine so simple and clear as that of the Gospel should be the cause of discord even among Christians themselves. Nevertheless, as the truth is so difficult to discover in all things, and especially in matters of religion; as it is so frequently covered with the clouds of interest and ambition; as the same object appears so different to different men; and as error in the face of the world constantly assumes the mask of truth; it is but just that the true religion be furnished with arms to combat error, and to pluck off that deceitful mask by which so many poor mortals are seduced.

The theologian, who has made the proper preparatory studies, who is thoroughly instructed in natural religion, in the dogmatic and the hermeneutic, and who joins to these sound logic, is already well prepared for this spiritual combat: he is armed, but he is still to learn how to use these arms: he must also be made acquainted with the enemies he is to encounter, to know their force, and the arts they will use against him. It is plain enough, we suppose, that we here speak of spiritual arms; of those with which we are furnished by reason and the Holy Scripture: evil be to him that employs any other: force is ever an infallible proof of the want of argument. The propagation of a religion by the sword, after the manner of Mahomet; persecutions, either secret or open; constraint, violence, every sort of religious war, is so atrocious, so contrary to the spirit of the Gospel, in a word, so detestable, that every true Christian must avert his sight from such infamous horrors.

Controversy is conducted either from the pulpit or chair, by way of harangue, by conversation, or by writing. The first quality that is necessary to a disputant is reason, and the next moderation; in what manner soever the contest is conducted, these two qualities should constantly be manifest, during the whole course of altercation.

There are some errors that attack the system of re-

ligion, and there are others that attack even its morality. In order properly to oppose an error, we must begin by finding out its real meaning: we must therefore study the different systems of other religions, and the principal heresies, if we would successfully refute them. We do not mean by this, that the theologian should know all the errors that spring up in the brain of each individual; we speak only of those that are professed by whole sects.

They who attack our religion, found their opinions either on the interpretation of the sacred text, or on philosophy or history; and we should always oppose them with the same arms with which they pretend to defeat us. It is necessary to begin by divesting ourselves of all prejudice, in order the better to show others those prejudices by which they are deluded. We should never make use, but especially when we oppose weak minds, of opprobrious terms in the course of the debate, nor contend about words or expressions, nor attack incidental circumstances that may attend erroneous principles; but bend our whole force against the root of the tree, the principal error; to uncover it, to dig it up, to destroy it.

Polemical theology is taught in universities by two methods, according to the views of the student. If he learn it merely in order hereafter to defend his parishioners against the most prevalent errors, he is only to examine the principal controversies according to the systematic order of theology; and may content himself with knowing their true meaning, together with the arguments of those that oppose them. But if it be his intention to teach this science to others, or to engage in controversy, either by conversation or writing; in short, if he aspire to renown in it, he should study the origin and history of each controversy, he should make himself a complete master of the arguments for and against it, the exceptions that it makes, its interests, its different revolutions and actual state, &c. These follow, in this study, either the order established in the dogmatic, or that which is used in symbolic books, that is, such as treat on articles of faith.

In order the better to elucidate the method to be observed in this sort of study, we shall say, that to acquire a complete knowledge of theological disputes, the student should, 1. Make the examen of each religion, and even of each controversy. 2. He should thoroughly examine his system in the symbolic books, and likewise the sources of his religion. 3. He should precisely determine the principal and capital error of each religion, sect, or individual; that which is the source from whence all the other errors flow. 4. Search into the political causes of each error, and each controversy, from history. 5. Examine the natural order according to which all the errors have taken their rise, the one from the other: and lastly, 6. Confront the respective arguments, the answers, and exceptions, that each party has made to defend its cause. To all this is to be added, 7. What they call *collegium disputatorium*; an exercise by which all that is learned in the closet and in the schools is called forth and animated, under the inspection of a professor; and the mind is accustomed to think, and the tongue to speak, with facility and efficacy.

The principal contests in which the theologian may be engaged, are, 1. Against those who admit of no revealed religion; as the atheists and deists. 2. Against those who admit of a revealed religion, but adopt not the true Revelation; as the Heathens, the Mahometans, &c. 3. Against those who believe only a part of the true Revelation; as the Jews. 4. Against those who add to the true Revelation matter foreign to it; as traditions, &c. 5. Against those who make a false interpretation of the sacred text, and draw from it erroneous systems; as the heretics and the schismatics, &c. And lastly, 6. Against those who make a wrong use of certain expressions of Revelation, and build on whimsical notions, ridiculous systems; the Fanatics, &c.

According to this division, the theologian will have to combat principally with,

1. The Atheists, with Spinosa at their head. 2. The Deists. 3. The Heathens and Idolaters. 4. The Mahometans. 5. The modern Jews. 6. The Arians and the Manicheans, or rather those who in these days follow their ancient errors. 7. The Socinians. 8. The Catholics, opposed to the Protestants. 9. The Protestants, opposed to the Catholics. 10. The Molinists, opposed to the Jansenists. 11. The Jansenists, opposed to the Molinists. 12. The Reformed, opposed to the Lutherans. 13. The Lutherans, opposed to the Reformed. 14. The Arminians. 15. The Anabaptists. 16. The Quakers. 17. The Fanatics, at the head of whom is Jacob Bohm. 18. The Pietists. 19. The Moravian Brethren, or the Herenuthers, &c.

Now, as each of the religions, communions, or heresies above-mentioned, have not scrupled to publish to the world their dogmas and creeds, the theologian ought carefully to instruct himself in those symbolic books, in which each of them have comprised its system; to study and to make a good analysis of them; and to prepare such arguments as are the most just, the most weighty, and proper to confute them.

Before we quit this subject, there is one remark to be made, or rather one caution that is very essential, which we would offer to the young theologian; which is, that the polemic is useful, and even necessary, in the study of theology in general; but that it is a discipline which ought to be treated with great prudence and moderation. Disputation in general is a dangerous art; and religious disputation is a deceitful art, and of infinite peril. The student will do right well to remember, that there is no sect, no communion on earth, that is perfectly true in all its dogmas without exception; that there are some small errors in all religions; that infallibility never was, nor ever will be, the portion of humanity. He should likewise remember, that the masters who teach him, or the books that he reads, are constantly partial to the religion they profess; and that when he has supported a thesis, and confuted his adversaries in a collegial dispute, (where his adversaries, as well as his preceptors, are of the same side of the question, and will not fail to adjudge him the victory), he should be persuaded, that the victory would not have been so easily obtained had he contended with able adversaries of the opposite religion: he should remember, that we triumph without glory when we combat without danger; and let him not be vain of his laurels, nor imagine himself some wonderful scholar; seeing that it

is very possible that he may go off victorious from such a dispute, that he may receive vast applause from his professors and his colleagues, and at the same time have reasoned like a dolt.

On the other hand, the most able theologians, and the most consummate professors in this science, ought to be constantly on their guard against the abuse of polemic theology; which frequently serves less to clear and confirm the truth of the dogmas of a communion, than to establish perpetual discord and hatred among Christians. Every theologian should also remember, that, by the nature of the subject, it is not possible to produce demonstration in support of his theses and opinions; but that his arguments will be only valid, and preponderate in proportion to their degree of evidence; and lastly, that it is a ridiculous and insufferable vanity to imagine, that every man, who does not think precisely as we do, is guilty of palpable error.

SECT. V. PASTORAL THEOLOGY.

HAVING described the theoretic sciences of theology, we now come to those which regard the practice. It would be to bury the talents that God has given him, and the studies that he has made, if the theologian did not employ them to the edification of his neighbour and the prosperity of the church. His office in society is attended with constant and anxious labours. He is charged with the cure of souls, with the instruction of youth, with preaching of the Gospel, the conduct of his flock, and the administration of the sacraments, with visitations to the sick and the dying, with calming the terrors of weak minds, with administering comforts to afflicted souls, and many other functions equally difficult and important.

As the homily makes a part of eloquence, it is unnecessary to say any thing of it in this place, but treat the others in their order.

It is in vain that a son of the church possesses all the sciences that belong to his profession, that he is an agreeable and even a renowned preacher, if he does not give a life, an efficacious spirit, to his ministry, by a good example; for that is the first precept in pastoral theology. He is at the head of a flock, and ought to be their guide: but how absurd, if his words and his actions be at continual variance with each other! How scandalous, if he be not the first to practise these lessons of wisdom that he preaches! How indecent, if while he edifies by his discourses, he disgraces by his morals! What baseness, if he should even glory in his irregularities! It is less shameful for a soldier to relate that he has tamely suffered an affront, than for an ecclesiastic to boast of his debaucheries! Both the one and the other is a disgrace to his profession.

But this exemplary conduct should be free from all affectation in the external behaviour. A singularity of dress, and an air of austerity; the head declined, the eyes turned up to heaven, the hands constantly clasped, a plaintive tone of voice, and a solemn gait; a scrupulosity in things indifferent, and a dogmatic and clerical manner of deciding in the common affairs of life; a ridiculous inclination to discover iniquity in innocent actions; to confound pleasure with vice, and to be an enemy to joy, the greatest boon that God has bestowed on man; and a hundred other like fopperies there are, with which the religious make a parade,

that

that is shocking both to good sense and the evangelical morality, and which render their ministry, in the eyes of sensible people, more contemptible than respectable. These are rocks on which the young theologian is much too liable to run, and of which he cannot be sufficiently cautioned.

After this candid caution and brief introduction, we pass to the examen of the different parts, the union of which composes the system of the pastoral, the most important article perhaps in all theology. The design of Revelation was, without doubt, to conduct man by faith to a virtuous life. It is not the opinions or the learning of weak mortals that can determine their intrinsic merit; it is their wisdom, their regularity of conduct, that must stamp their value. Experience shows, that a man of great genius and learning may be also a great villain; one who is unable to please God or his neighbour: the virtuous Christian, on the contrary, must be agreeable to both: it follows therefore, that the practical part of theology, which leads mankind to a virtuous conduct, is of all its parts the most important.

SECT. VI. CATECHETIC THEOLOGY.

By Catechetical Theology is meant, *The art of teaching youth, and ignorant persons, the principal points of the Evangelical Doctrine, as well with regard to belief as practice.* This application of the theoretic sciences of the theology ought to be conducted in the most simple manner possible. It is not every one who is possessed of the talent of properly composing and delivering catechetical instructions: and it is an art that is very necessary in the Christian church.

The greatest difficulty consists in separating the articles of faith that are absolutely essential and indispensable to the salvation of mankind, from those that are subtle and speculative, more liable to contradiction, and less necessary to such as do not make theology their profession. However, as children do not always remain children, and as the church is composed of persons of both sexes and of all ages, it is necessary that, in the explanations of the catechism, there should be employed different degrees of simplicity, proportioned to the age and capacity of those that are to be instructed. It is expedient for young people to retain in their minds the first principles of religion, such as are contained in good catechisms; and that they be explained to them in particular lectures; which is the most usual and most natural method of enabling youth to give an account of their faith. The sermons that are given in the Catholic churches on controversy, and in Protestant churches on the catechism, serve to instruct those who are of riper years and have their judgment more formed. These sermons compose, at the same time, a sort of course of the dogmatic and the polemic theology.

Both in private catechising, and in sermons that are purposely intended to explain the catechism, the theologian should avoid, as much as possible, the use of technical terms; or (which is still better) he ought to begin by explaining those terms, of which he should give such clear and determinate definitions, that no person of a moderate capacity can possibly mistake them. In a word, he should endeavour more to prove than to persuade; and as eloquence sometimes persuades at the

expense of truth, he should cautiously avoid that sort of delusive persuasion, and in its room substitute clear and solid argument.

SECT. VII. OF CASUISTIC THEOLOGY.

By casuistic theology is meant, the science that decides in doubtful cases of moral theology, and that calms the scruples of conscience which arise in the Christian's soul during his sojourn in this world.

The studies relative to these objects, which the theologian is supposed to have made, and the confidence that the common rank of Christians place in their pastors, afford them the means and the opportunities of rendering signal service to those of their fellow-citizens who have need of their counsel and consolation: for where there is one man of a philosophic spirit, one Christian of a well-grounded knowledge in theology, there are in a society a thousand that are not, and who are yet desirous of being instructed, guided, comforted, established. It is therefore both just and important that he who devotes himself to the service of the altar, should early study all those sciences that will enable him worthily to perform this important part of his ministry.

God forbid, however, that we should countenance the abuse that is made, in some Christian countries, of the duties that we have here explained. To reduce these matters into a political system; to make the direction of consciences a profession, a regular trade; to provide each house with a spiritual director, as with a butcher or baker, a steward or porter, who by that means may insinuate himself into the confidence of families, and become the depository of all their secrets; may sometimes sow discord between husband and wife, or the nearest relations; who may avail himself of the confidence of his devotees, to direct them constantly in matters of a worldly, and sometimes even of a criminal nature; to efface the legitimate and sacred authority of the father of a family, and in its place to substitute a foreign power; to undermine the confidence, the union and concord of families, in order to confirm and render necessary this secondary authority; to captivate the spirit, and oft-times the heart, of a wife or daughter, and in general of weak minds; to enjoin them ridiculous mummeries that lead to fanaticism, and a thousand dangerous superstitions, or to religious exercises that divert them from their domestic duties; in a word, to assume an absolute authority over the consciences of mankind, is a pernicious invention, contrary to the evangelic moral, to the welfare of society, to the interest of the state, and to the sovereign authority; and well deserves an exemplary punishment.

But the cure of souls, faithfully intended, and properly limited, differs totally from this despotic power. He who is charged with it by a lawful vocation, should remember that there are four classes of men with whom he will be engaged: 1. With those of weak minds; of little knowledge and little ability. 2. With those whose spirits are afflicted by some great reverse of fortune. 3. With those of nice and timorous consciences, who suffer by their scruples, whether they be vain or rational. 4. And lastly, the wicked, the hardened and incorrigible sinner. The grand art here consists in representing to each of these classes of men, the truth, in a manner so clear, so strong and full, that they

they can no longer retain any doubts that conviction must take place, and consolation or conversion be the consequence.

Truth is in its nature highly problematic: each one, however, is persuaded that he knows it, that he possesses it, and is guided by it; every man thinks himself in the right. We should therefore begin by discovering the truth in the subject before us, and in placing it upon a solid foundation. This business of demonstrating the truth to others, is attended in the mean time with infinite difficulty. Every mind is not capable of discovering it at the first glance; nor can all discern it from the same point of view. Sometimes men require conviction by abstract or philosophical arguments, and sometimes by the express decisions of the Holy Scripture. Sometimes by authority, sometimes by gentle remonstrance, and sometimes by dreadful menaces. Sometimes they are to be reclaimed by properly exposing the necessary and fatal consequences that result from their conduct; and at others, by the alluring promises of the gospel. Now vice is to be boldly confronted; and now the transgressor is to be conducted into the right path by artful turnings: now the sinner's crimes are to be painted in the strongest colours; and now a veil is to be lightly cast over them; and sometimes we should even indulge a favourite inclination, in order to induce them to abandon a more pernicious passion: and so of the rest.

As it is impossible that the books which have been wrote on this subject, though of an immense quantity, can contain every case that daily occurs in the ministry of the gospel; and as these cases are not always justly decided by these authors; and, if they were, the consulting of such enormous works would take up too much of a theologian's time, and divert him from his other studies; and as these casuistic writers contain, moreover, a number of puerile subtleties and wretched chi-

meras; it is highly proper that the minister of the altar, whom we suppose to have a masterly knowledge of the principles, the dogmas, and moral of the Christian religion, should endeavour to draw from the true source the means that he is to employ on each occurrence, and not have recourse to books for their decisions. For which purpose it is necessary, 1. That he accustom himself to reason according to the rules of sound logic. 2. That he learn to know the human heart, under its different disguises; the characters of men, their arts, and ruling passions. 3. That he do not attempt to gain or convince by little pious frauds, or by lucky sophisms artfully represented. 4. That he do not inflict what are called *penances*, which are the height of absurdity. 5. That he do not enjoin mummeries, pilgrimages, austerities, and a thousand like matters, which can never carry with them a real conviction, and only serve to divert men from their labours and the duties of society. But, 6. That he constantly present, as we have before said, and cannot too often repeat, the truth, in all its native force and purity.

This truth, however, is no enemy to sacred eloquence; on the contrary, the latter serves to introduce the former into the mind of the auditor, and there to give it such strong impressions, as neither time, the dissipation of the world, nor the distractions of fortune, are able easily to efface. The whole ministerial function consists in teaching, preaching, administering the sacraments of the church, visiting the sick and the dying, comforting the afflicted, and affording the spiritual aids to all those who have need of them. Eloquence is of the greatest efficacy in all these functions; and, without affecting it, the minister of the gospel should never neglect it. There are some professors in universities who give their auditors a complete systematic course on pastoral theology, which may be attended with many advantages.

T H E

Theophilus
Theophrastus.

THEOPHILUS, the sixth bishop of Antioch; was raised to that see in 169, and instructed his church till about the year 182. There are still extant his three books, written in Greek, against the calumniators of the Christian religion, addressed to Autolyces. They were printed at Oxford in 1684, in duodecimo, under the inspection of Dr Fell. There are also other works attributed to him; but these are written by later authors.

THEOPHRASTUS, a celebrated Greek philosopher, was the son of Melanctus, and was born at Erebus in Bœotia. He was at first the disciple of Lucippus, then of Plato, and at last of Aristotle. He succeeded the latter in the 322 year before the Christian æra, and taught philosophy at Athens with extraordinary applause. He said of an orator without judgment, "that he was a horse without a bridle." He was accustomed to say, "There is nothing so valuable as time, and those who lose it are the most inexcusable of all prodigals." He died at above 100 years of age. Theophrastus wrote many works; of which the following are the principal of those that are still extant, 1. An excellent moral treatise intitled *Characters*, which he says in his preface he composed at 99 years of age. Isaac Casaubon has written learned Commentaries on this small treatise: it has been translated from the Greek into French, by M. de la Bruyere; it has also

T H E

been translated into English. 2. A curious treatise on Plants. 3. A history of Stones; of which Dr Hill has given a good edition, with an English translation, and learned notes, in 8vo.

THEOPHYLACT, archbishop of Achrida, the metropolis of Bulgaria, and one of the most learned men of the 11th century, was born at Constantinople, where he was instructed in ecclesiastical learning. He laboured with great zeal to establish the Christian religion in Achrida, where there were still many pagans, and died after the year 1071. He wrote Commentaries upon the Gospels, the Acts of the Apostles, St Paul's Epistles, and upon Habakkuk, Jonah, Nahum, and Hosea, and also several Epistles, and other works in Greek.

THEOFOMPUS, a celebrated Greek orator and historian, was born in the island of Chios, and flourished in the reign of Alexander the Great. He was one of the most famous of all the disciples of Isocrates, and won the prize from all the panegyristes whom Artemisa invited to praise Mausolus. He wrote several works, which are lost.

THEOREM, a speculative proposition, demonstrating the properties of any subject.

THEORETIC, something relating to theory, or that terminates in speculation. See **THEORY**.

THEORY,

Theophylact
Theoretic.

THEORY, in general, denotes any doctrine which terminates in speculation alone, without considering the practical uses or application thereof.

THERAPEUTÆ, a term applied to those that are wholly in the service of religion. This general term has been applied to particular sects of men, concerning whom there have been great disputes among the learned.

THERAPEUTICS, that part of medicine which acquaints us with the rules that are to be observed, and the medicines to be employed in the cure of diseases.

THERAPHIM, certain images or superstitious figures mentioned in Scripture. Some Jewish writers tell us, that the theraphim were effigies of human heads, placed in niches, and consulted as oracles. Others say, they were talismans, or figures of metal cast and engraved under certain aspects of the planets; to which they ascribe extraordinary effects.

THERIACA ANDROMACHI, a compound medicine made in the form of an electuary. See **PHARMACY**, n° 903, b.

THERMÆ, hot baths or bagnios. Luxury and extravagance were in nothing carried to such heights as in the thermæ of the Roman emperors. Ammian complains, that they were built to such an extent as to equal whole provinces; from which Valesius would abate, by reading *piscinæ* instead of *provinciae*. And yet after all, the remains of some still standing are sufficient testimonials for Ammian's censure; and the accounts transmitted of their ornaments and furniture, such as being laid with precious stones, (Seneca); set round with seats of solid silver, (Pliny); with pipes and cisterns of the same metal, (Statius); add to, rather than take from, the censure. The most remarkable bagnios were those of Dioclesian and Caracalla at Rome, great part of which remains at this day; the lofty arches, stately pillars, variety of foreign inarble, curious vaulting of the roofs, great number of spacious apartments, all attract the curiosity of the traveller. They had also their summer and winter baths.

THERMOMETER, an instrument for measuring the increase and decrease of the heat and cold of the air, by means of the elastic and expansive power of fluids.

The thermometer is an instrument of modern invention, but authors are not agreed on the person who was the first inventor. Sanctiorius affirms, that he himself had this honour; and his assertion is corroborated by the testimonials of Borelli and Malpighi. Boerhaave, however, ascribes it to Cornelius Drebbel; Muschenbroek to the Venetian Paul Sarpi; and Viviani to Galileo. It is not well known what was the form of the first instruments of this kind, only it is certain that they were far from being as perfect as they are at present. They were very clumsy; and air being the fluid employed, they acted also as a kind of *barometers*, and thus were entirely unfit for comparing the degrees of heat at the distance of any considerable time. The first improvement in their construction was made by Ferdinand II. great duke of Tuscany, or the members of the academy del Cimento under his protection. Spirit of wine inclosed in glass tubes hermetically sealed, was now employed; by which means evaporation was prevented, and likewise the pressure of the external air kept off. Instruments of this kind

were introduced into England by Mr Boyle, and very soon came to be universally used among the virtuosi in different parts of the world. However, they still laboured under great disadvantages; for as they were not adjusted to any common scale, tho' they would each of them show the comparative degrees of heat and cold in the bodies to which they were applied; yet they could never be compared with one another, nor could the observations made in different parts of the world be collected in such a manner as to answer any good purpose.

Mr Boyle was the first who proposed one certain and determinate degree of cold as a standard to be universally chosen from whence to begin the scale of thermometers, and which being at all times invariable, would keep the observations made by different thermometers sufficiently exact. The point he proposed was that in which the oil of aniseeds congeals; and he also mentioned that in which distilled water begins to freeze, as another which might be employed. At last, however, Mr Boyle laid aside both these standards; as thinking that the oil of aniseeds, water, and other liquors, might freeze in different degrees of heat. In this opinion he was followed by Dr Halley, who proposed for a standard the temperature of deep caves below ground. These indeed do always preserve the same temperature, but the use of them would be found not a little inconvenient for the purpose of adjusting thermometers; nor, after all, could there be any certainty even in this method; for we are by no means sure that the temperature of the ground is the same in all places at the same depth from the surface. Dr Halley therefore proposed another point, namely, that in which spirit of wine boils; and he also mentioned the heat of boiling water as a point very fixed and determined, and in which he has been followed by all that came after him.

From this one point of the heat of boiling water, it has been proposed to construct thermometers in such a manner that they shall all correspond with each other. This method is by marking the degree of expansion or contraction of the fluid in thermometers, as the heat applied is either greater or less than that of boiling water. Supposing, for example, the whole volume of this fluid to consist of 10,000 parts, we must mark on the tube, where that volume is expanded by heat or contracted by cold, 1, 2, 3, 4, &c. of these parts; all which may be done by different persons and in different places, so that they shall answer precisely to one another.—Yet this method, so plausible in appearance, is found not to be very practicable; it being difficult to determine exactly all the divisions from the alteration of the bulk of the fluid. The best method, therefore, is to have two fixed points of heat at a considerable distance the one from the other; such as that of boiling and freezing water; after which we are to divide the scale or tube between them into any convenient number of equal parts or degrees.

The method just now proposed is that which has for a long time been universally followed; and the only difficulties which remained in the construction of thermometers were the choice of a proper fluid, the adjusting of the two fixed points, and the division of the space between them in such a manner as to make proper allowance for any inequalities that might happen

to be in the diameter of the tube through which the fluid moves.

* See Cold, Congelation, and Quick-silver.

With regard to the fluid, quicksilver has universally obtained the preference, as being sooner heated and cooled than any other with which we are acquainted, and requiring so great a degree of cold to congeal it, that till very lately it was thought impossible to do so; though the contrary is now shown by undeniable experiments*. The heat also which quicksilver requires to make it boil, is very considerable, so that the scale on a quicksilver thermometer may be enlarged greatly beyond that made with any other fluid. In extreme degrees of cold, indeed, where quicksilver freezes, the thermometer should be filled with highly rectified spirit of wine, or the fluid petroleum, called *naphtha*; both of which are found unalterable in the greatest degrees of cold, either natural or artificial, hitherto observed in any part of the world.

The adjustment of the two fixed points of heat, viz. that of boiling and that of freezing water, has been found a matter of considerable difficulty, as they vary considerably according to the height of the mercury in the barometer at the time. Hence the greatest philosophers have not thought it below them to bestow their labour in attempting to bring this matter to its utmost exactness; and for this purpose a committee of the Royal Society was lately appointed.

This inaccuracy in the heat of boiling water at different times, was observed by Mr Fahrenheit, a celebrated artist at Amsterdam, from whom the kind of thermometers now mostly used took their name. He supposed the variation to be much greater than it really is; but Mr de Luc, by a great number of experiments made at different heights above the level of the sea, found a rule by which the difference in the boiling point, answering to different heights in the barometer, is determined with great exactness. According to this rule, the alteration of the boiling point by the variation of the barometer from $29\frac{1}{2}$ to $30\frac{1}{2}$ inches is $1^{\circ}.59$ of Fahrenheit. The committee of the Society (of whom M. de Luc was one), after a number of experiments which our limits will not allow us to insert, lay down the following practical rules for adjusting the boiling and freezing points.

“*Rules to be observed in adjusting the boiling point.*—The most accurate way of adjusting the boiling point is, not to dip the thermometer into the water, but to expose it only to the steam, in a vessel closed up in the manner represented in fig. 4. where *ABba* is the vessel containing the boiling water, *Dd* the cover, *E* a chimney made in the cover intended to carry off the steam, and *Mm* the thermometer passed thro’ a hole in the cover. Those who would make use of this method, must take care to attend to the following particulars.

“1st, The boiling point must be adjusted when the barometer is at 29.8 inches; unless the operator is willing to correct the observed point in the manner directed below.

“2^{dly}, The ball of the thermometer must be placed at such a depth within the pot, that the boiling point

shall rise very little above the cover; for otherwise part of the quicksilver in the tube will not be heated, and therefore the thermometer will not rise to its proper height. The surface of the water in the pot also should be at least one or two inches below the bottom of the ball; as otherwise the water, when boiling fast, might be apt to touch the ball: but it does not signify how much lower than that the surface of the water may be.

“3^{dly}, Care must be taken to stop up the hole in the cover through which the tube is inserted, and to make the cover fit pretty close, so that no air shall enter into the pot that way, and that not much steam may escape. A piece of thin flat tin plate must also be laid on the mouth of the chimney, so as to leave no more passage than what is sufficient to carry off the steam. The size of this plate should be not much more than sufficient to cover the chimney, that its weight may not be too great; and the mouth of the chimney should be made flat, that the plate may cover it more completely. It must be observed, that when the tin-plate is laid on the mouth of the chimney, it will commonly be lifted up by the force of the steam, and will rattle till it has slipped aside sufficiently to let the steam escape without lifting it up. In this case it is not necessary to put the plate back again, unless by accident it has slipped aside more than usual. If the artist pleases, he may tie each corner of this plate by a string to prongs fixed to the chimney, and standing on a level with the plate, as thereby it will necessarily be kept always in its place (*A*); but we would by no means recommend having it made with a hinge, as that might be apt to make it stick, in which case the included vapour might be so much compressed as to cause an error. We would also by no means advise lining the tin-plate with leather, or any other soft substance for the sake of making it shut closer, as that also might be apt to make it stick. The chimney also ought not to be made less than half a square inch in area: for though a smaller chimney would be sufficient to carry off the steam, unless the vessel is much larger than what we used; yet the adhesion which is apt to take place between it and the tin-plate when wet, might perhaps bear too great a proportion to the power which the included steam has to lift it off, if it was made much less. It is convenient that the chimney be not less than two or three inches long, as thereby the observer will be less incommoded by the steam; but it would be improper to make it much longer, for the longer the chimney is, the greater disposition has the air to enter into the pot between it and the cover.

“It is most convenient not to make the cover fit on tight, but to take on and off easily; and to wrap some spun cotton round that part of the cover which enters into the pot, in order to make it shut closer; or, what seems to answer rather better, a ring of woollen cloth may be placed under the cover, so as to lie between the top of the pot and it. These methods of making the cover shut close can be used more conveniently when the cover is made to enter within the pot, as in the figure, than when it goes on to the outside.

Plate

XLXVIII.

(A) Fig. 2. n^o 3. is a perspective view of the chimney and tin plate; *ABCD* is the plate; *E* the chimney; *Ff*, *Gg*, *Mm*, and *Nn*, the prongs fastened to the chimney, to which the four corners of the plate are to be tied by the strings *Af*, *BG*, *CM*, and *DN*; the ends *F*, *G*, *M*, and *N*, of the prongs must be on a level with the plate, and the strings should not be stretched tight.



Fig. 1.
The Order of the Thistle.



Fig. 4.

Interval between finding a freezing in babies.

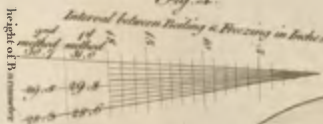


Fig. 5.

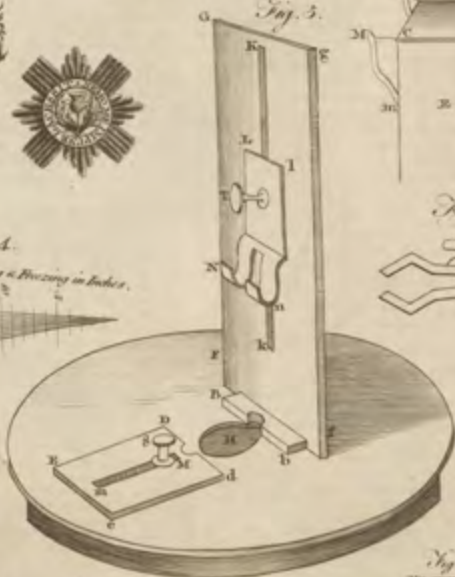


Fig. 2.

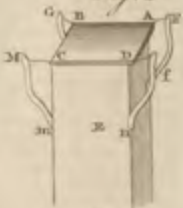


Fig. 6.



Fig. 3.

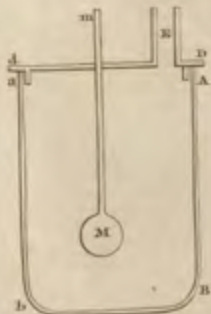


Fig. 9
VULTURE.



Fig. 7
VESTERTILLO.
or Shear-Bat.



Fig. 8
VIVERRA ZIBETHA.
or Civet Cat.



A Bell, Sculp. c

thermo-
meter.Thermo-
meter.

"There are various easy ways by which the hole in the cover, through which the tube of the thermometer is passed, may be stopped up, and by which the thermometer may be suspended at the proper height. The hole in the cover may be stopped up by a cork, which must first have a hole bored through it big enough to receive the tube, and be then cut into two, parallel to the length of the hole. Another method more convenient in use, but not so easily made, is represented in fig. 6, which exhibits a perspective view of the apparatus; *Aa*, is the cover; *H*, the hole through which the thermometer is passed; *Bb*, a flat piece of brass fixed upon the cover; and *DdEe*, a sliding piece of brass, made so as either to cover the hole *H*, or to leave it uncovered, as in the figure, and to be tightened in either position by the screw *S* sliding in the slit *Mm*; a semi-circular notch being made in the edge *Bb*, and also in the edge *Dd*, to inclose the tube of the thermometer: pieces of woollen cloth should also be fastened to the edges *Bb* and *Dd*, and also to the bottom of the sliding-piece *DdEe*, unless that piece and the cover are made sufficiently flat, to prevent the escape of the steam. In order to keep the thermometer suspended at the proper height, a clip may be used like that represented in fig. 6, which, by the screw *S*, must be made to embrace the tube tightly, and may rest on the cover. That part of the clip which is intended to bear against the tube had best be lined with woollen cloth, which will make it stick tighter to the tube, and with less danger of breaking it. Another method, which is rather more convenient, when the top of the tube of the thermometer is bent into a right angle, in the manner frequently practised at present for the sake of more conveniently fixing it to the scale, is represented in the same figure; *GgFf*, is a plate of brass, standing perpendicularly on the cover; and *L/Nn*, a piece of brass, bent at bottom into the form of a loop, with a notch in it, so as to receive the tube of the thermometer, and to suffer the bent part to rest on the bottom of the loop; this piece must slide in a slit *Kk*, cut in the plate *L/Nn*, and be tightened at any height by the screw *T*.

"4thly, It is best making the water boil pretty briskly, as otherwise the thermometer is apt to be a great while before it acquires its full heat, especially if the vessel is very deep. The observer, too, should wait at least one or two minutes after the thermometer appears to be stationary, before he concludes that it has acquired its full height.

"5thly, Though, as was said before, this appears to be the most accurate way of adjusting the boiling-point; yet, if the operator was to suffer the air to have any access to the inside of the vessel, he would be liable to a very great error: for this reason, we strongly recommend it to all those who use this method, not to deviate at all from the rules laid down, without assuring themselves, by repeated trials with a pretty sensible thermometer, that such alteration may be used with safety. But the covering the chimney with the tin-plate ought by no means to be omitted; for though, if the cover of the pot fits close, it seldom signifies whether the plate is laid on or not, yet, if by accident the cover was not to fit close, the omitting the tin-plate would make a very great error. Making the

chimney very narrow would not answer the end properly; for if it was made so small as to make the vessel sufficiently close when the water boiled gently, it would not leave sufficient passage for the escape of the steam when the water boiled fast.

"Another way of adjusting the boiling point is, to try it in a vessel of the same kind as the former, only with the water rising a little way, namely from one to three or four inches above the ball, taking care that the boiling point shall rise very little above the cover, as in the former method. In this method there is no need to cover the chimney with the tin-plate; and there is less need to make the cover fit close, only it must be observed, that the closer the cover fits, the less the operator will be incommoded by the steam. The height of the barometer at which the boiling point should be adjusted, when this method is used, is 29½ inches, or three-tenths of an inch less than when the former method is used.

"It will be convenient to have two or three pots of different depths; for if a short thermometer is to be adjusted in the same pot which is used for a long one, it will require a great depth of water, which, besides taking up more time before it boils, makes the observation rather less accurate, as the heat seems to be less regular when the depth of water in the pot is very great, than when it is less.

"Perhaps some persons, for the sake of heating the water more expeditiously, may be inclined to use an apparatus of such kind that the fire shall be applied to a considerable part of the sides of the pot as well as to the bottom; we would, however, caution them against any thing of that kind, as the observations are considerably less regular than when little more than the bottom of the pot is heated. If the pot is heated over a chafing-dish or common fire, we apprehend that there can seldom be any danger of too much of the sides being heated; but if the operator should be apprehensive that there is, it is easily prevented by fastening an iron ring an inch or two broad round the pot near the bottom. This precaution is equally necessary when the thermometer is adjusted in steam, especially when there is not much water in the pot.

"The greatest inconvenience of this method of adjusting the boiling point is the trouble of keeping a proper depth of water in the pot; as to do this it is necessary first to find the height of the boiling point coarsely by trying it in an open vessel, and then to put such a quantity of water into the pot that it shall rise from one to three or four inches above the ball, when the thermometer is placed at such a depth within the pot that the boiling point shall rise very little above the cover. The operator must be very careful that the quantity of water in the pot be not so small as not entirely to cover the ball.

"A third way of adjusting the boiling point is to wrap several folds of linen rags or flannel round the tube of the thermometer, and to try it in an open vessel, taking care to pour boiling water on the rags, in order to keep the quicksilver in the tube as nearly of the heat of boiling water as possible. The best way is to pour boiling water on the rags three or four times, waiting a few seconds between each time, and to wait some seconds after the last time of pouring on water before the boiling point is marked, in order that

Plate
XXXIII.

B. In the
ceding
fig. calc. 1.
3. from
tom, for
4. read
29.3;
3. and in
foot-note,
Plate 210.
2. at 3.
4. Ibid.
2.]

Thermo-
meter.

the water may recover its full strength of boiling, which is in good measure checked by pouring on the boiling water.

"In this method the boiling point should be adjusted when the barometer is at 29.8 inches, that is, the same as when the first method is used; the water should boil fast, and the thermometer should be held upright, with its ball two or three inches under water, and in that part of the vessel where the current of water ascends (b).

"Whichever of these methods of adjusting the boiling point is used, it is not necessary to wait till the barometer is at the proper height, provided the operator will take care to correct the observed height according to the following table.

Height of the barometer when the boiling point is adjusted ac- cording to the first method.		Correc- tion in thousandths of the in- terval be- tween 32° and 212°.	Height of the barometer when the boiling point is adjusted ac- cording to the second method.		Correc- tion in thousandths of the in- terval be- tween 32° and 212°.
after 32° method.	after 29° method.		after 32° method.	after 29° method.	
30.64	10		29.69	29.59	1
58	9		58	28	2
30.71	41	8	47	17	3
59	29	7	36	06	4
48	18	6	25	28-95	5
37	07	5	14	84	6
25	29-95	4	03	73	7
14	84	3	18-93	62	8
03	73	2	81	51	9
29-91	62	1	70	—	10
80	50	0	59	—	11

"To make use of this table, seek the height which the barometer is found to stand at in the left-hand column, if the boiling point is adjusted either in the first or third method, and in the second column if it is adjusted in the second method; the corresponding number in the third column shows how much the point of 212° must be placed above or below the observed point, expressed in thousandths parts of the interval between the boiling and freezing point: for example, suppose the boiling point is adjusted in steam when the barometer is at 29 inches, and that the interval between the boiling and freezing points is 11 inches; the nearest number to 29 in the left-hand column is 29.03, and the corresponding number in the table is 7 higher, and therefore the mark of 212° must be placed higher than the observed point by $\frac{7}{1000}$ of the interval between boiling and freezing, that is, by $\frac{7 \times 11}{1000}$, or .077 of an inch.

"This method of correcting the boiling point is not strictly just, unless the tube is of an equal bore in all its parts; but the tube is very seldom so much unequal as to cause any sensible error, where the whole correction is so small. The trouble of making the correction will be abridged by making a diagonal scale, such as is represented in fig. 4.

"It is not very material what kind of water is used for adjusting the boiling point, so that it is not at all salt; only, if any kind of hard water is used, it is better that it should be kept boiling for at least ten

minutes before it is used. But we would advise all those desirous of adjusting thermometers in the most accurate manner for nice experiments, to employ rain or distilled water, and to perform the operation in the first-mentioned manner, that is, in steam.

"On the freezing point.—In adjusting the freezing as well as the boiling point, the quicksilver in the tube ought to be kept of the same heat as that in the ball. In the generality of thermometers, indeed, the distance of the freezing point from the ball is so small, that the greatest error which can arise from neglecting this precaution is not very considerable, unless the weather is warmer than usual; but as the freezing point is frequently placed at a considerable distance from the ball, the operator should always be careful either to pile the pounded ice to such a height above the ball, that the error which can arise from the quicksilver in the remaining part of the tube not being heated equally with that in the ball, shall be very small; or he must correct the observed point, upon that account, according to the following table;

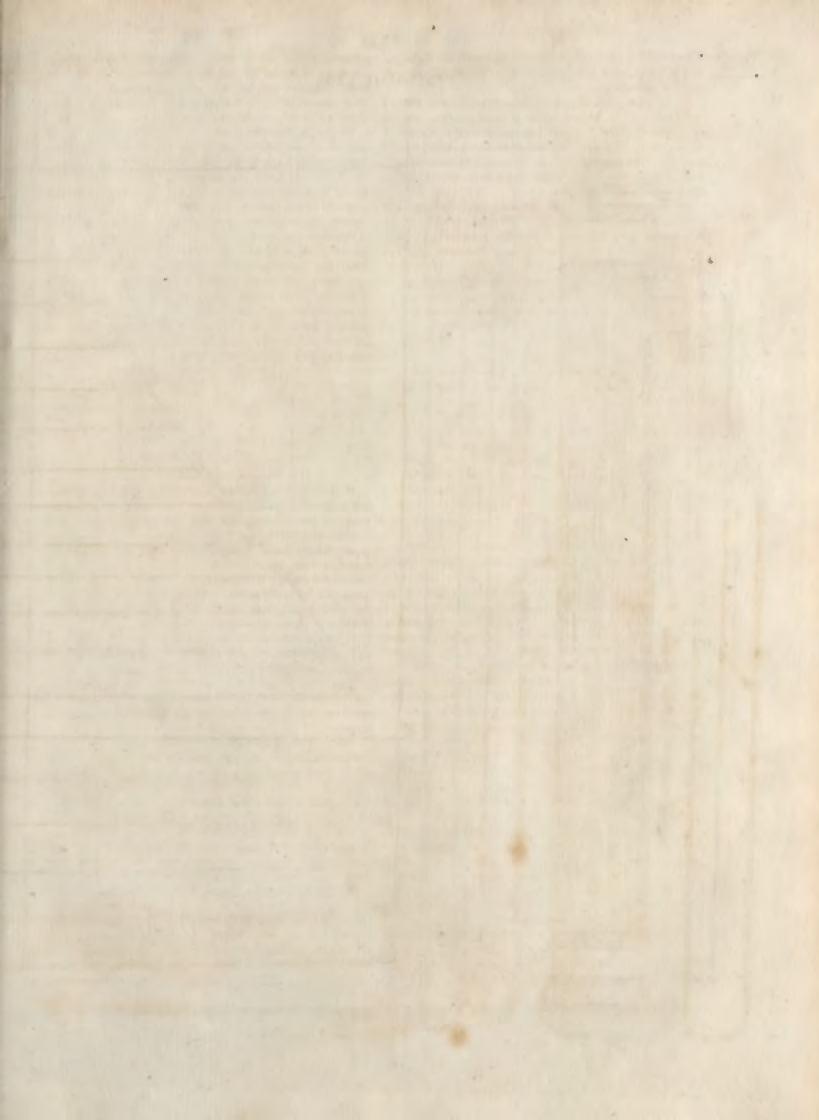
Heat of the air.	Correction.
42°	.00087
52	.00174
62	.00261
72	.00348
82	.00435

"The first column of this table is the heat of the air, and the second is the correction expressed in 1000th parts of the distance between the freezing point and the surface of the ice: for example, if the freezing point stands seven inches above the surface of the ice, and the heat of the room is 62, the point of 32° should be placed $7 \times .00261$, or .018 of an inch lower than the observed point. This correction also would be made more easy by the help of a diagonal scale, similar to that proposed for the boiling point.

"On the precautions necessary to be observed in making observations with thermometers.—In trying the heat of liquors care should be taken that the quicksilver in the tube of the thermometer be heated to the same degree as that in the ball; or, if this cannot be done conveniently, the observed heat should be corrected on that account."

After having adjusted the fixed points of thermometers in this manner, the division of the scale is easy; for by making a certain quantity of mercury, suppose as much as fills the tube the length of half an inch, pass through the whole length of it when open at both ends, we can perceive what length of space it occupies in different parts of the tube, and divide accordingly. However, even after thermometers are constructed in this manner with the utmost accuracy, a very considerable inconvenience attends the using them, namely, that the observer's eye must be on the instrument the very instant that the mercury stands at the highest or lowest degree; for since the time when that may happen is utterly uncertain, if it be not immediately noticed, it can never afterwards be known. The sultry heat of the summer's day, and the freezing cold of the winter's night, render it very

"(n) In a vessel of boiling water one may almost always perceive the current of water to ascend on one side of the vessel, and to descend on the other.



THERMOMETER.

Fig. 3.



Fig. 1.

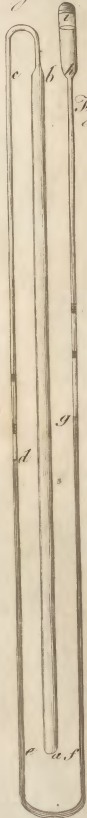


Fig. 2.



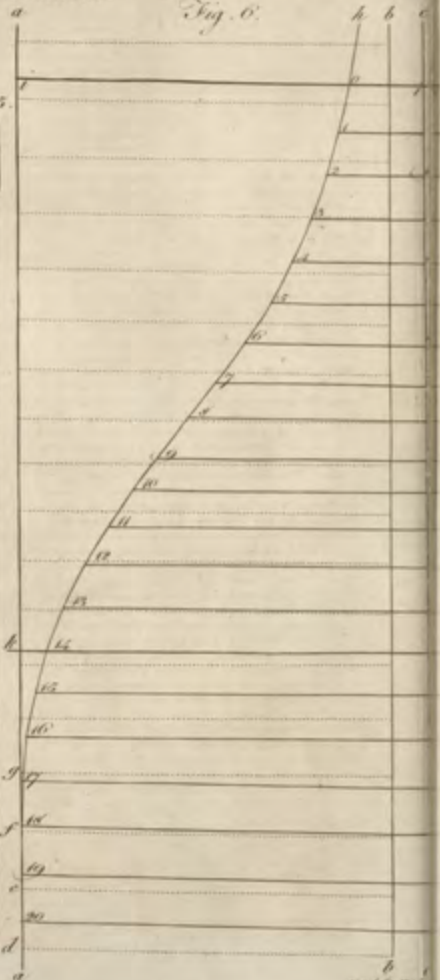
Fig. 3.



Fig. 4.



Fig. 6.



W. & A. 1794

Thermo-
meter.

unpleasant to be abroad at such times in the open air, although it is absolutely necessary that the thermometer should be so. It would therefore be a very great improvement could a thermometer be constructed in such a manner as to show the greatest height to which it had ascended, or the lowest point to which it descended, in the observer's absence. One of this kind has been constructed by Mr James Six, of which the following account is given by him in the 72d vol. of the Phil. Transf.

Plate
CC.LXXXV.

"Fig. 1. *ab* is a tube of thin glass, about 16 inches long, and five sixteenths of an inch in diameter; *cde fgh*, a smaller tube with the inner diameter, about one fortieth, joined to the larger at the upper end *b*, and bent down, first on the left side, and then, after descending two inches below *ab*, upwards again on the right, in the several directions *cde, fgh*, parallel to and one inch distant from it. On the end of the same tube at *b*, the inner diameter is enlarged to half an inch from *b* to *i*, which is two inches in length. This glass is filled with highly rectified spirits of wine to within half an inch of the end *i*, excepting that part of the small tube from *d* to *g*, which is filled with mercury. From a view of the instrument in this state, it will readily be conceived, that when the spirit in the large tube, which is the bulb of the thermometer, is expanded by heat, the mercury in the small tube on the left side will be pressed down, and consequently cause that on the right side to rise; on the contrary, when the spirit is condensed by cold, the reverse will happen, the mercury on the left side will rise as that on the right side descends. The scale, therefore, which is Fahrenheit's, beginning with *o* at the top of the left side, has the degrees numbered downwards, while that at the right side, beginning with *o* at the bottom, ascends. The divisions are ascertained by placing this thermometer with a good standard mercurial one in water gradually heating or cooling, and marking the divisions of the new scale at every 5° (c). Thus far our thermometer resembles in some respects those of Mr Bernoulli and Lord Charles Cavendish: but the method of showing how high the mercury had risen in the observer's absence, the essential property of an instrument of this kind, is wholly different from theirs, and effected in the following manner. Within the small tube of the thermometer, above the surface of the mercury on either side, immersed in the spirit of wine, is placed a small index, so fitted as to pass up and down as occasion may require: that surface of the mercury which rises carries up the index with it, which index does not return with the mercury when it descends; but by remaining fixed, shows distinctly, and very accurately, how high the mercury had risen, and consequently what degree of heat or cold had happened. Fig. 2. represents one of these indexes drawn larger than the real ones, to render it more distinct. *a* is a small glass tube, three quarters of an inch long, hermetically sealed at each end, inclosing a piece of steel wire nearly of the

Thermo-
meter.

same length; at each end *cd* is fixed a short piece of a tube of black glass, of such a diameter as to pass freely up and down within the small tube of the thermometer. The lower end floating on the surface of the mercury, is carried up with it when it rises, while the piece at the upper end being of the same diameter, keeps the body of the index parallel to the sides of the thermometer tube. From the upper end of the body of the index at *e* is drawn a spring of glass of the fineness of a hair, about five-sevenths of an inch in length, which being set a little oblique, presses lightly against the inner surface of the tube, and prevents the index from following the mercury when it descends, or being moved by the spirit passing up or down, or by any sudden motion given to the instrument by the hand or otherwise; but at the same time the pressure is so adjusted as to permit this index to be readily carried up by the surface of the rising mercury, and downwards whenever the instrument is to be rectified for observation. To prevent the spirit from evaporating, the tube at the end *i* is closely sealed (*n*). Fig. 3. represents the thermometer on its frame; the plates on which the scale is graven on either side are made to slide out, and the frame is open to the back behind the large tube, which does not touch it, except at each end. The cap *a*, and the base *b*, are made to fix on with screws, and only cover the turning of the small tube. By a screw at the bottom of the frame, it may be made fast to the wall against which it is to hang without doors, to prevent its being shaken by violent winds. Towards evening I usually visit my thermometer, and see at one view, by the index on the left side, the cold of the preceding night; and by that on the right, the heat of the day. These I minute down, and then apply a small magnet to that part of the tube against which the indexes rest, and move each of them down to the surface of the mercury: thus, without heating, cooling, separating, or at all disturbing the mercury, or moving the instrument, may this thermometer, without a touch, be immediately rectified for another observation. When I wish to put the thermometer out of my hand without hanging it up, I have a stand to place it on; for if the mercury presses against the index while the instrument lies in an horizontal position, it is in danger of passing by it, which is avoided by keeping the thermometer in a position nearly vertical. To prevent the mercury shifting its place in the spirits within the tube (which I apprehend it might do on account of the superiority of its specific gravity, especially when kept for a considerable time, very high on one side, and low on the other), I made that part of the small tube from *e* to *f* with the inner diameter exceeding small; and found upon trial, that after the summer's heat had kept the mercury for a long time high on one side, the winter's cold brought it again as accurately to the freezing point on the other as at first (*x*). This thermometer may be made a mercurial

"(c) The divisions below the freezing point are taken by means of a mixture of sea-salt and ice, as described by Nollet, De Luc, and others.

"(d) When this tube is closed (not hermetically, but only so as to prevent the spirits evaporating) the thermometer must be brought to the greatest heat it is likely at any time after to sustain: and though no more air is enclosed than what remains at that time above the spirits, yet that will, by its elasticity pressing on the fluid, answer every purpose as well as if the external air was freely admitted.

"(e) With a thermometer of this sort I observed the greatest heat and cold that happened every day and night throughout the year 1781.

rial one by inverting the glass, and filling with mercury that part which in the first is filled with spirits, and with spirits that part of the small tube from *d* to *g* which in the former is filled with mercury; the indexes in either case may be the same, and will be carried up in the same manner upon the surface of the mercury; but the end of the tube at *i*, instead of being sealed, must then be left open, and stand inverted in a bulb, or small cistern of mercury, into which the external air has free access. The diameter of the tube *ab* should be considerably increased if the degrees on the scale are required to be as wide as those in the spirit-thermometers. It is indeed better in this case to have a double rather than a larger single tube; but finding the weight of so great a quantity of mercury in a thin glass tube attended with many disadvantages, and the motion of the fluids in the spirit-ones perfectly agreeing with, and being as readily excited by change of heat and cold as in the mercurial thermometers, I preferred the former as much more commodious. A person cannot approach near to the thermometer first described when the air is very cold (especially with a light, which by night is necessary) without causing the spirits presently to expand, and consequently the mercury on the left side immediately to descend. This sensibility is here attended with every advantage, without the inconvenience to which common thermometers in this case are liable (*r*); for the index will accurately show the greatest height to which the mercury had risen, although, before the exact degree can well be distinguished, it will appear separated from the index, and descending space. As the scale is 16 inches long, and divided into 100° only, which are more than sufficient for the temperature of the air, they are large enough to be subdivided at pleasure. The indexes, though of a tender and delicate nature, when once placed in the tube, are not liable to suffer any alteration by time or accident; and the thermometer may be exposed to rain at all times, without suffering the least injury in any respect.

" In constructing the thermometer before-mentioned, I at first hit on a plan by which the same end was obtained by a different method; and though in some respects, and for some purposes, it may not be so proper as that already described, yet for some others it may be found useful; and therefore I shall briefly describe it. The glass of this instrument is in all respects the same as in the former, excepting that the diameters of the tubes are something larger. It is likewise filled with spirits of wine and mercury, in the same manner; but the indexes are different, being only a small tube of black glass, about five-sevenths of an inch in length, hermetically sealed at each end, containing a piece of steel wire. An index of this sort is placed in the thermometer on either side, which ha-

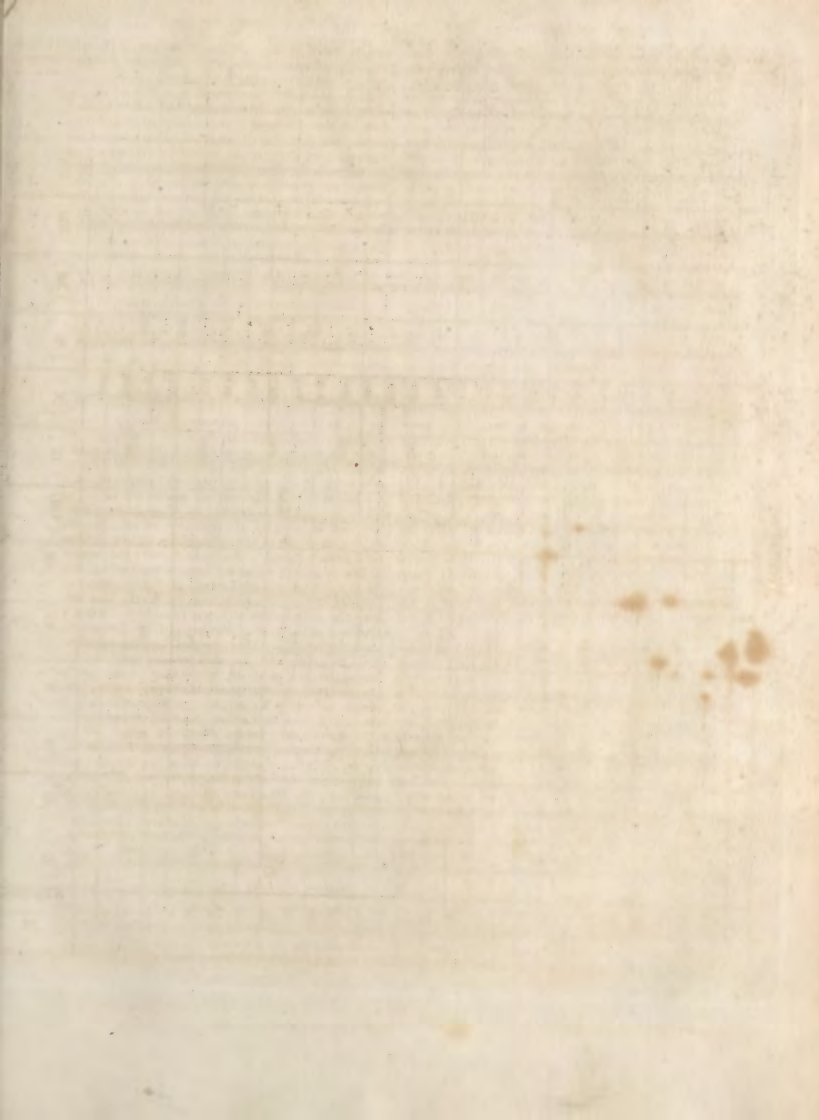
ving no spring to support them, sink down in the spirits, and rest upon the mercury. Whenever the mercury descends, the index will follow it; but when it rises, the index will not rise with it, and by remaining at the place to which the mercury had descended, will show the greatest degree of heat or cold which had happened. In this manner do these indexes answer the same purpose, though they move directly contrary to the others in the other thermometer; but this instrument is not so easily rectified as the former, for the most powerful magnet will not bring the index up again while the mercury above presses against them; and although it is possible to remove the mercury, and by that means set the index at liberty, yet inconveniences will be incurred from which the other is entirely free.

" In some cases it may be found expedient, instead of the double thermometer first described, to make two single ones; one to show the greatest degree of heat only, and the other the cold, each having its proper index (see fig. 4. and 5.). The first has the small tube as this thermometer was principally to be used immersed in a bulb or small cistern of mercury, to which the external air has free access; the other has the small tube turned up on the right side, with some mercury let down to the bottom, and the upper end closely sealed, as in the double instrument. Making a standard mercurial thermometer, by which the scale of the spirit-one was to be divided, I endeavoured to obtain as wide degrees as possible, that the motion of the mercury might thereby be rendered more conspicuous, and the height of it ascertained with greater precision. It is true, the larger the degrees, the larger in some measure must be the bulb, and therefore the fluid contained in it not likely to be so soon affected by any change bent down on the left side, and the lower end immersed in heat or cold in the atmosphere as in a smaller. But sed in a large quantity of water, gradually heating or cooling, little or no disadvantage could arise from making the bulb somewhat larger than those commonly made use of in the air. Not being able, however, to procure glass tubes so long as I had occasion for, whose inner diameters were perfectly equal, I took the following method to adjust the divisions on the scale to the inequality of the tubes. Choosing a tube of a length suitable to my purpose, with a proper bulb at the end, I put into it a small quantity of mercury (*c*) sufficient to form a column about one inch in length. Drawing then on a board the three lines *aa*, *bb*, *cc*, fig. 6. I placed the glass tube on the line *aa*, and while the mercury remained at rest at the end of the tube, near the bulb, I made two pencil-marks on the line *aa*, one at *d*, and the other at *e*, perfectly coinciding with the two ends of the column of mercury: then causing the mercury to move slowly on farther from the bulb, till that end of the column which was first at *d* coincided

" (*r*) The most sensible mercurial thermometers commonly have the column of mercury, as well as the degrees, very small; and a person assisted with a light can hardly view them near enough, when the weather is very cold, without causing the mercury to rise before the degrees where it stood can be well ascertained.

" Freezing fogs also, which with us usually attend the greatest degrees of cold, by covering the glass with frost, render the mercury invisible, and cannot well be removed without causing the mercury to rise, or at least render the observation doubtful, which at such a time is very disagreeable; for in proportion to the extraordinary degree of cold, so is our curiosity likely to be excited.

" (*g*) To put in a small quantity of mercury, and measure its length at different parts of the tube, as described by Abbe Nollet, vol. iv. p. 370. *Leçons Physiques*, is a very excellent method to discover the error; but in what manner readily to adjust the scale so as to avoid any inaccuracy from such inequality (which in tubes of the length I had occasion for seemed to me unavoidable), was a matter concerning which I could meet with no information.



[illegible]

Thermo-
meter,
Thermo-
pylae.

Thesla
||
Thelpis.

ded with the mark at *e*, and letting it rest again, I made another mark at *f*; after which, causing the mercury to move on as before, and continuing to mark its length at every part of the tube till it reached the end farthest from the bulb; by these means I obtained the several intermediate points on the line *aa*. Through these several points I drew dotted lines parallel to each other, and at right angles with the line *aa* to the line *bb*. Taking now, with a pair of compasses, the widest intervals between any of the dotted parallels, which in this case is from *d* to *e*, I inserted that distance successively between the several parallels, beginning at the lowest pair, as from *d* to *e*, from *e* to *f*, from *f* to *g*, and so on to *h*, as exhibited in the figure; and the aggregate of these lines may be considered as one continued line, without any error of consequence in this matter. Having now the thermometer completely filled with mercury, the air expelled, the point of the scale at 102°, and the freezing point properly taken (H) and marked upon the tube, which was now hermetically sealed, I again applied the tube to the line *aa*, and marked on that line the point of 102° and the freezing point. Through those points I drew the lines *ii*, *kk*, and divided that part of the compound line *db* included between *ii* and *kk* into 14 equal parts, beginning at *a*, the point where *ii* cuts the line *db*, continuing afterward six divisions now on that line below *kk*, making in all 20 equal divisions. If now lines be drawn through each of the dividing points, from *a* to *20* to the line *cc*, at right angles with the same, they will give on the line *cc* the true thermometrical scale to every 5° from 2 to 102, properly adjusted to the inequality of the tube (1), which in this case is nearly of the same diameter at each end, but smaller towards the middle. Tubes may indeed be found of some considerable length with less inequality than what this scale exhibits; but the error is here enlarged to render the method of correcting it more conspicuous."

Though Fahrenheit's thermometer is that most commonly used, yet as others have been invented by different persons, we have thought proper, in Plate CCLXXXV. to give a comparative view of their different scales; by which if the reader happens to meet with any of those instruments, or to peruse the accounts of observations made by them, they may be easily reduced to one standard.

THERMOPYLÆ, (anc. geog.); a narrow pass or defile, between the wash of the Sinus Maliacus; on the east and steep mountains, reaching to Oeta, made dreadful by unpassable woods; on the west, leading from Thessaly to Locris and Bœotia. These mountains divide Greece in the middle, in the same manner as the Apennine does Italy; forming one continued ridge from Leucate on the west to the sea on the east, with thickets and rocks interspersed; that persons even prepared for travelling, much

less an army encumbered with baggage, cannot easily find a commodious passage. In the valley verging towards the Sinus Maliacus, the road is only sixty paces broad; the only military way for an army to pass, if not obstructed by an enemy; and therefore the place is called *Payla*, and by others, on account of its hot water, *Thermopylae*. Ennobled by the brave stand made by Leonidas and three hundred Spartans, against the whole army of Persia; and by the bold resolution of blind Euthycus, choosing rather to fall there in fight, than return to Sparta, and escape the common danger. Famous also for the Amphyctiones, the common council, or states general of Greece, assembling there twice a year, spring and autumn.

THESEA, in antiquity, feasts celebrated by the Athenians in honour of Thefeus, consisting of sports and games, with mirth and banquets; such as were poor and unable to contribute to them were entertained at the public expence.

THESEUS, a famous hero of antiquity ranked among the demi-gods, whose history is fabulous. He was the reputed son of *Aegeus* king of Athens. He threw Sciron, a cruel robber, down a precipice; fastened Procrustes tyrant of Attica to a bending pine, which being let loose, tore him asunder; killed the Minotaur kept in the labyrinth by king Minos, in Crete; and by the assistance of that prince's daughter, Ariadne, who gave him a clue, escaped out of that labyrinth, and failed with his deliverer to the isle of Naxos, where he had the ingratitude to leave her.

Thefeus afterwards overcame the Centaurs, subdued the Thebans, and defeated the Amazons. He assisted his friend Pirithous in his expedition to the infernal regions to carry off Proserpine; but was imprisoned by Pluto, till he was released by Hercules. He is also said to have established the Isthmian games, in honour of Neptune; to have united the twelve cities of Attica; and to have founded a republic there, 1236 B. C. Some time after, taking a voyage into Epirus, he was seized by Aidonius king of the Molossians; meanwhile Menestheus rendered himself master of Athens. But at length Thefeus being released from prison, retired to Scyros, where king Lycomedes caused him to be thrown from the top of a rock. Thefeus had several wives; the first of whom was Helena the daughter of Tyndarus; the second, Hypolita queen of the Amazons; and the last, Phædra sister to Ariadne, who punished him for his infidelity to her sister, by her incestuous passion for his son Hippolitus.

THESIS, a general position which a person advances, and offers to maintain. In colleges it is frequent to have placards containing a number of them in theology, in medicine, in philosophy, in law, &c.

THESPIS, a famous Greek tragic poet, and the first representer of tragedy at Athens. He carried his

"(H) The freezing point marked on the tube of this thermometer is immediately taken by means of grated ice but the point of 100° by a standard mercurial thermometer, the upper point of the scale of which was properly taken by boiling water, and the lower one by grated ice; but it is more commodious in the first to have the tube no longer than the air-scale, especially as the degrees are pretty wide. The method of adjusting the scale to the inequality of the tube remains the same, let the given points be at any distance, or the divisions increased to any number.

"(I) Experimentally to prove this method, I have made mercurial thermometers, whose scales from the freezing point to that of boiling heat were nearly three feet; and though the inequalities of the tubes were very considerable, varying in contrary directions to each other, yet when they were on the same frame, they perfectly agreed in a motion of the mercury in every part of their scales."

Theffaly. his troop from village to village in a waggon, from which they performed their pieces. Alceſtis was the firſt tragedy they performed at Athens, 536 B. C.

THESSALY, a country of ancient Greece, ſuppoſed to have received its name from Theſſalus the father, or, according to others, the ſon of Græcus, an ancient king of an obſcure village, from whom the Greeks are ſaid to have been defended. It was alſo called *Emonia*, the origin of which name is uncertain; *Pelaſgia*, from Pelafgus one of the firſt Grecian princes; and *Pyrrhæa*, from Pyrrha the wife of Deucalion.

It was anciently divided into four diſtricts, or perhaps kingdoms. Theſſaliotes, Illeotis, Pelafgiotis, and Phthiotis. Deucalion was king of this laſt when the deluge that goes by his name happened, which deſtroyed all the inhabitants of this and the neighbouring countries, except only ſuch as happily eſcaped into the high mountains of Theſſaliotes, and Deucalion and his wife, who were carried in an ark upon the waters nine days and nights, and reſted at length upon Parnaſſus, from which they were ſeigned to have re-peopled the country by throwing of ſtones behind them. However, the name of Theſſaly and Theſſalians in time prevailed, and came to ſignify all the four parts. Sometimes it included Magnæſia and Phthiotis, and ſometimes not; ſometimes it was joined with Macedonia, and ſometimes ſevered from it, and again re-joined to it.

Theſſaly, properly ſo called, had on the eaſt the provinces of Magnæſia and Phthia above-mentioned, and theſe two were bounded by the Ægean ſea. On the weſt it had Illyricum and Epirus, now Albania; on the north Macedonia and Mygdonia, and on the ſouth Grecia Propria. It extended from 24 deg. 10 min. to 25 and a half eaſt longitude, and from north to ſouth, from 39 deg. 50 min. to about 41 deg. north latitude.

Theſſaly was famous, among other things, for ſuch an extraordinary breed of oxen, that Neleus king of Pylus reſuſed to give his daughter in marriage to Melampus king of Tyrius, except he procured him ſome of them; which he ſoon after did by the help of his brother Bias. What fine horſes they bred, and how expert they were in the uſe and management of that noble creature, is evident, ſince the fiction of the Centaurs is allowed to have taken its origin from them. This fable, however, reflects no leſs diſgrace upon them for their brutiſh incontinency, than it commends them for their skill in horſemanſhip. The attempt which they made upon the women at the nuptials of their neighbour Pirithous king of the Lapithæ, if not forged on purpoſe to caſt an ignominious brand upon them, is a pregnant proof of the one; and the hiſtory of their wars with other nations afford us a conſtant proof of the latter: ſo that in ſpite of their debauchery, they have ſhewed themſelves a warlike nation; and as ſuch, their alliance as well as aſſiſtance, eſpecially that of their cavalry, was ever highly courted by contending powers. And indeed, if we conſider how liable the pleaſantneſs and fertility of their country made them to foreign invaſions, it will be no wonder they ſhould be ſo well inured to the trade of war. Nor can it be ſuppoſed that any thing but their extraordinary valour could have ſaved them from being ſwallowed up by

ſome of their neighbours, conſidering that their ſcanty territories conſiſted only of four ſmall kingdoms or diſtricts, as often diſjoined from each other under different princes, as united together under one.

At the head of the Theſſalian hiſtory muſt be placed the celebrated Argonautic expedition, which happened in the reign of Pelias king of Theſſaly, about the year of the world 2720, or 100 years before the taking of Troy. The occaſion of this expedition was as follows:

Æſon the third in deſcent from Æolus, being either worn out with age or weary of government, whilst his ſon Jaſon was yet very young, appointed Pelias, his brother by the mother's ſide, guardian of the kingdom till his ſon came of age. Pelias on the other hand, who had reſolved to ſecure the government to himſelf, ſent to conſult the oracle about it, and was bid to beware of the man that had but one ſhoe. It happened ſome time after, that as he was ſacrificing to Neptune, he called his nephew to him, who was on the other ſide of a rivulet, and Jaſon having dropped one of his ſhoes in croſſing the brook, gave him occaſion to think that he was the perſon pointed out by the oracle. He then aſked him what courſe he would take with the perſon of whom the oracle had bid him beware; and Jaſon readily answered, That he would ſend him to Colchis in ſearch of the golden fleece. His uncle took him at his word, and ſent him immediately upon that enterpriſe. Jaſon made no difficulty to obey; and having engaged a conſiderable number of young noblemen, the flower of all Greece, to this expedition, he procured a ſhip to be built for this purpoſe at Pegæſa, by one Argus, from whom he called it *Argos*; and hence he and his gallant company were called *Argonautæ*.

Theſe adventurers, after many ſtrange difficulties and exploits, arrived at length at the land of Colchis, where the golden fleece was kept. They went immediately to the metropolis, where Jaſon acquainted Æetes king of the country with Pelias's command, and demanded the fleece of him. Æetes promiſed to deliver it to him, provided he could yoke together by his own ſingle ſtrength two fierce and terrible bulls (which had brazen hoofs, and breathed out fire and flame, and had been preſented to him by Vulcan), and plough the ground with them, ſowing it with the dragon's teeth which Minerva had given him, and were the remainder of thoſe which Cadmus had ſown at Thebes.

Jaſon, perplexed how to perform theſe conditions, was happily relieved by Medea the king's daughter, who was fallen in love with him. She promiſed him that if he would marry her, ſhe would aſſiſt him in it; and he had no ſooner agreed to it, than ſhe gave him a medicine, with which having anointed his body and armour, he became proof againſt the violence of the bulls; or, according to others, the taught him how to tame theſe fierce creatures, ſo as to be able to yoke and make uſe of them. She told him, moreover, that the teeth which he was to ſow would preſently ſpring up into armed men, which would infaſſibly deſtroy him unleſs he raiſed an immediate diſſention among them, by throwing ſtones at them, during which he might eaſily cut them off. Jaſon having ſucceſsfully performed the taſk, went and demanded the fleece according to Æetes's promiſe, whilst

Theſſaly. whilst he, instead of delivering it, was contriving how to destroy him and his company, and burn their ship. To prevent this, Medea went, and by her enchantments cast the dragon into a deep sleep, stole the fleece, and brought it to her lover, who took her, and, at her desire, also her brother Absyrtus, into his ship, and sailed away immediately with his companions. Æetes, who was soon informed of his daughter's treachery, pursued immediately after them; which when she perceived, she cut her brother in pieces, and scattered his mangled limbs about in hopes to stop his farther pursuit, as it actually did: for the disconsolate king, surprised at her unnatural barbarity, staid to gather up the fragments of his son's body, and buried them in a place called from thence *Toni*; and in the mean time she and the Argonauts escaped into *Theſſaly*, not without having first felt the effects of Jupiter's anger for the murder of Absyrtus, and after having spent four whole months in this expedition.

During the absence of Jason, Pelias, who never expected his return from Colchis, had taken some means to cut off his father, in order to fix the kingdom upon himself and his son Acastus; and the old king being apprised of his plots, had poisoned himself by drinking a draught of bull's blood. His queen likewise, oppressed with grief for his death, and the supposed loss of her son and kingdom, had hanged herself; so that Pelias now thought himself secure on his throne, when, contrary to his expectation, Jason returned successful and victorious, and brought the fleece to him. However, he had so well strengthened himself in it, that Jason did not dare to undertake any thing against him openly. Medea was forced to have recourse to her magic to be revenged on the tyrant, and, as some say, restored Jason's father to life. After this she persuaded Pelias's daughters to boil their old father, on pretence she would restore him to life and youthful vigour; but upon her non-performance Acastus mounted the throne, and having performed his father's funeral obsequies, banished Jason and his wife from *Theſſaly*, who went and dwelt at Corinth.

Acastus is famed for having been a great hunter, and for the incontinency of his wife Hippolyta, or, as she is called by others, *Cretheis*; which proved fatal to him. She was in love with Peleus the son of Cæus, and had solicited him in vain for some time, till, enraged at length at his constant refusal, she accused him to her husband for making some attempts upon her honour. Acastus believing her, and endeavouring to kill Peleus, was himself and his unchaste wife slain by him.

The next *Theſſalian* prince, both in time and fame, was the celebrated Achilles, the son of Peleus and Thetis, the goddess of the sea. This hero was king of Phthia, one of the four provinces of *Theſſaly*, and is feigned to have been dipped by his mother in the river Styx when he was a child, and to have been made invulnerable by it in every part except the heel, by which she held him. After this she sent him to be brought up by the Centaur Chiron, where he learned music, arms, and the riding of the great horse. Being afterwards warned by the oracle, that if he went to the Trojan war he should meet with his death there, she dispatched him privately in woman's apparel to Lyco-

medes king of Scyrus, an island in the *Ægean* sea, and one of the Cyclades.

In the mean time the Grecian chiefs, being likewise forewarned by an old prophecy, that their enterprise against Troy would prove unsuccessful unless they had Achilles with them, Ulysses undertook to find him out, and to bring him to that war; which he accordingly did. Thetis finding that her son was determined to prefer a glorious death before the walls of Troy to an inglorious immortality, prevailed upon Vulcan to make him an impenetrable armour, with which he went at the head of his bold myrmidons to the fatal siege. Here he forbore acting for some time, upon a pique he had taken against Agamemnon on account of a beautiful female captive; but his resentment giving way to his grief for the death of his dear friend Patroclus, who had been killed by Hector, Achilles thenceforth fought nothing but to revenge it; which he soon after did. Hector was not only slain, but most barbarously used by him after his death, he having caused his body to be tied to his chariot and dragged thrice round the walls of Troy. This inhumanity did not go long unpunished; and Priam having redeemed his son's shattered remains at an excessive price, Paris, another of his sons, soon after shot Achilles in the heel, the only place in which he was not invulnerable.

The two most memorable things which the *Theſſalians* are since recorded for, are their driving the *Beotians* from the country of Arne, a small territory in *Theſſaly*; so called from its metropolis built by *Beotus* the son of Neptune, by Arne the daughter of *Æolus*, the second of that name, who was the son of *Hypotes*, and grandson of *Mimas* king of *Æolis*; and their constant wars against the *Phocians*. The former of these happened, according to *Thucydides*, 60 years after the taking of Troy, and about 100 after their first settlement in that territory; when the *Beotians* being driven thence, went and possessed themselves of a country then named *Cadmeis*, and called it by their name *Boeotia*. We have elsewhere spoken of that country, and given another etymology of it, to which we refer the reader.

As for their wars with the *Phocians*, it is not easy to guess at the true ground of them; only we find, that there was an irreconcilable hatred entailed between those two nations, which proved a constant source of fresh and bloody encounters, in which the *Theſſalians*, though superior in strength, especially on account of their cavalry, were very often worsted by the policy of their enemies; witness those statues of *Apollo*, *Minerva*, *Diana*, and other trophies, which *Pausanias* tells us they set up both on their borders and at the temple of *Delphos*, in memory of their signal victories over them. The truth is, the kingdom of *Phocis* was very mountainous, and the avenues to it very rugged; so that the *Theſſalians*, who seem still to have been the aggressors, could receive but little benefit from their horse.—*Theſſaly* is now called *Fanna*, a province of European Turkey, bounded by Macedonia on the north, by the Archipelago on the east, by *Achaia* or *Livadia* on the south, and by *Epirus* on the west.

THETIS, in Pagan mythology, the wife of *Oceanus*, and the mother of *Nereus* and *Doris*, who were married

Theſſaly,
Thetis.

Thevenot,
Thibet.

married to each other; and from this marriage sprung the nymphs of the earth and sea. Among the sea-nymphs there was one named *Thetis* the *Younger*, who excelled all the rest in beauty, and for whom Jupiter conceived such a passion, that he resolved to espouse her: but being informed by the Destinies that she would bring forth a son who would rise above his father, he married her to Peleus. To their nuptials all the gods and goddesses were invited, except Discord, who, to be revenged for this contempt, threw a golden apple into the assembly, on which was engraven, *This for the fairest*. Juno, Pallas, and Venus, disputed for this apple; but Paris being chosen to decide the difference, adjudged it to Venus. From the marriage of Thetis and Peleus sprung Achilles.

THEVENOT (Melchisedeck), a celebrated writer of travels, and keeper of the French king's library, was born at Paris. At a very early period he discovered an extreme desire to see foreign countries; and notwithstanding the intreaties of his mother, who strove to detain him, he set out from Paris on his travels. However, he visited only a part of Europe; but the study of the languages of different countries, and the great pains he took to obtain a knowledge of their manners and customs, rendered him, perhaps, as well skilled in them as if he had himself travelled in those countries. He collected a great number of curious manuscripts in English, French, Spanish, Italian, Latin, Greek, Hebrew, Syriac, Arabic, Turkish, and Persian. He applied himself to study during his whole lifetime; and his Travels into the Levant are esteemed. They were published in folio, in French, in 1663, and in English in 1687.

THIBET, a country of Asia, very little known to the Europeans, till of late that it has been in some measure explored by Mr Bogle, one of the servants of the English East India Company. In Bengal this country is known by the name of *Boutan*, and lies to the northward of Hindostan, separated from it by a range of high and steep mountains, properly a continuation of the celebrated mount Caucasus. This chain of mountains stretches from the ancient Media and the shores of the Caspian Sea, round the north-east frontiers of Persia to Candahar and Cassamire; from thence directing its course more easterly, it forms the great northern barrier to the various provinces of the Mogul empire, and probably ends in Affam or China. In the valleys lying between the lower mountains are many tribes of Indian people; and a dispute happening between the heirs of one of the rajahs or petty princes, one party called to their assistance the Boutaners, and the other the British. The latter prevailed; and the fame of British valour being carried to the court of Thibet, the *Tayshoo-Lama*, who ruled the state under the Delai-Lama, at that time in his minority, sent a deputation to Bengal, desiring peace for the prince who had been engaged in war with the British. This was readily granted by the governor; and Mr Bogle was sent ambassador to the court of Thibet, where he resided several months; and after an absence of a year and a quarter, returned to Calcutta. The account of this gentleman's expedition hath not been published by himself; but from Mr Stewart's letter to Sir John Pringle, published in the Philosophical Transactions, vol. 67. we learn the fol-

lowing particulars, collected from his papers.

"Mr Bogle divides the territories of the Delai Lama into two different parts. That which lies immediately contiguous to Bengal, and which is called by the inhabitants *Doocho*, he distinguishes by the name of *Boutan*; and the other, which extends to the northward as far as the frontiers of Tartary, called by the natives *Pu*, he styles *Thibet*. Boutan is ruled by the Dah Terriah, or Deb Rajah, as I have already remarked. It is a country of steep and inaccessible mountains, whose summits are crowned with eternal snow; they are intersected with deep valleys, through which pour numberless torrents that increase in their course, and at last, gaining the plains, lose themselves in the great rivers of Bengal. These mountains are covered down their sides with forests of stately trees of various sorts; some (such as pines, &c.) which are known in Europe; others, such as are peculiar to the country and climate. The valleys and sides of the hills which admit of cultivation are not unfruitful, but produce crops of wheat, barley, and rice. The inhabitants are a stout and warlike people, of a copper complexion, in size rather above the middle European stature, hasty and quarrelsome in their temper, and addicted to the use of spirituous liquors; but honest in their dealings, robbery by violence being almost unknown among them. The chief city is Tassly Seddein situated on the Patchoo. Thibet begins properly from the top of the great ridge of the Caucasus, and extends from thence in breadth to the confines of Great Tartary, and perhaps to some of the dominions of the Russian empire. Mr Bogle says, that having once attained the summit of the Boutan mountains, you do not descend in an equal proportion on the side of Thibet; but continuing still on a very elevated base, you traverse valleys which are wider and not so deep as the former, and mountains that are neither so steep, nor apparently so high. On the other hand, he represents it as the most bare and desolate country he ever saw. The woods, which every where cover the mountains in Boutan, are here totally unknown; and, except a few straggling trees near the villages, nothing of the sort to be seen. The climate is extremely severe and rude. At Chamnanning, where he wintered, although it be in latitude $31^{\circ} 39'$, only 8° to the northward of Calcutta, he often found the thermometer in his room at 29° under the freezing point by Fahrenheit's scale; and in the middle of April the standing waters were all frozen, and heavy showers of snow perpetually fell. This, no doubt, must be owing to the great elevation of the country, and to the vast frozen space over which the north wind blows uninterruptedly from the pole, through the vast deserts of Siberia and Tartary, till it is stopped by this formidable wall.

"The Thibetians are of a smaller size than their southern neighbours, and of a less robust make. Their complexions are also fairer, and many of them have even a ruddiness in their countenances unknown in the other climates of the east. Those whom I saw at Calcutta appeared to have quite the Tartar face. They are of a mild and cheerful temper; and Mr Bogle says, that the higher ranks are polite and entertaining in conversation, in which they never mix either strained compliments or flattery. The common people, both

Thibet.

in Boutan and Thibet, are clothed in coarse woollen stufts of their own manufacture, lined with such skins as they can procure; but the better orders of men are dressed in European cloth, or China silk, lined with the finest Siberian furs. The ambassador from the Deb Rajah, in his summer-dress at Calcutta, appeared exactly like the figures we see in the Chinese paintings, with the conical hat, the tunic of brocade silk, and light boots. The Thibetian who brought the first letter from the Lama was wrapped up from head to foot in furs. The use of linen is totally unknown among them. The chief food of the inhabitants is the milk of their cattle, prepared into cheese, butter, or mixed with the flour of a coarse barley or of pease, the only grain which their soil produces; and even these articles are in a scanty proportion: but they are furnished with rice and wheat from Bengal and other countries in their neighbourhood. They also are supplied with fish from the rivers in their own and the neighbouring provinces, salted and sent into the interior parts. They have no want of animal-food from the cattle, sheep, and hogs, which are raised on their hills; and are not destitute of game, though I believe it is not abundant. They have a singular method of preparing their mutton, by exposing the carcass entire, after the bowels are taken out, to the sun and bleak northern winds which blow in the months of August and September, without frost, and so dry up the juices and parch the skin, that the meat will keep uncorrupted for the year round. This they generally eat raw, without any other preparation. Mr Bogle was often regaled with this dish, which, however unpalatable at first, he says, he afterwards preferred to their dressed mutton just killed, which was generally lean, tough, and rank. It was also very common for the head men in the villages through which he passed, to make him presents of sheep so prepared, set before him on their legs as if they had been alive, which at first had a very odd appearance.

"The religion and political constitution of this country, which are intimately blended together, would make a considerable chapter in its history. It suffices for me to say, that at present, and ever since the expulsion of the Eluth Tartars, the kingdom of Thibet is regarded as depending on the empire of China, which they call *Cathay*; and there actually reside two mandarines, with a garrison of a thousand Chinese, at Lahassa the capital, to support the government; but their power does not extend far: and in fact the lama, whose empire is founded on the surest grounds, personal affection and religious reverence, governs every thing internally with unbounded authority. Every body knows that the Delai Lama is the great object of adoration for the various tribes of heathen Tartars, who roam through the vast tract of continent which stretches from the banks of the Volga to Corea on the sea of Japan, the most extensive religious dominion, perhaps, on the face of the globe. He is not only the sovereign pontiff, the viceregent of the Deity on earth; but, as superstition is ever the strongest where it is most removed from its object, the more remote Tartars absolutely regard him as the Deity himself. They believe him immortal, and endowed with all knowledge and virtue. Every year they come up from different parts, to worship and make rich offerings at his shrines:

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even the emperor of China, who is a Mantchou Tartar, does not fail in acknowledgments to him in his religious capacity; and actually entertains at a great expence, in the palace of Pekin, an inferior lama, deputed as his nuncio from Thibet. It is even reported that many of the Tartar chiefs receive certain presents, consisting of small portions of that, from him, which is ever regarded in all other persons as the most humiliating proof of human nature and of being subject to its laws, and treasure it up with great reverence in gold boxes, to be mixed occasionally in their ragouts. It is, however, but justice to declare, that Mr Bogle strenuously insists, that the lama never makes such presents; but that he often distributes little balls of consecrated flour, like the *pain benit* of the Roman-Catholics, which the superstition and blind credulity of his Tartar votaries may afterwards convert into what they please. The orthodox opinion is, that when the grand lama seems to die, either of old age or of infirmity, his soul in fact only quits an actual crazy habitation to look for another younger or better, and it is discovered again in the body of some child, by certain tokens known only to the lamas or priests, in which order he always appears. The present Delai Lama is an infant; and was discovered only a few years ago by the Tayhooh Lama, who in authority and sanctity of character is next to him, and consequently, during the other's minority, acts as chief. The lamas, who form the most numerous as well as the most powerful body in the state, have the priesthood entirely in their hands; and, besides, fill up many monastic orders, which are held in great veneration among them. Celibacy, I believe, is not positively enjoined to the lamas; but it is held indispensable for both men and women who embrace a religious life: and indeed their celibacy, their living in communities, their cloisters, their service in the choirs, their strings of beads, their fasts, and their penances, give them so much the air of Christian monks, that it is not surprising an illiterate capuchin should be ready to hail them brothers, and think he can trace the features of St Francis in every thing about them. It is an old notion, that the religion of Thibet is a corrupted Christianity; and even Father Disederii, a Jesuit (but not of the Chinese mission) who visited the country about the beginning of this century, thinks he can resolve all their mysteries into ours; and asserts, with a truly mystical penetration, that they have certainly a good notion of the Trinity, since, in their address to the Deity, they say as often *konciok-sik* in the plural as *konciok* in the singular, and with their rosaries pronounce these words, *om, ha, hum*. The truth is, that the religion of Thibet, from whence-ever it sprang, is pure and simple in its source, conveying very exalted notions of the Deity, with no contemptible system of morality: but in its progress it has been greatly altered and corrupted by the inventions of worldly men; a fate we can hardly regret in a system of error, since we know that that of truth has been subject to the same. Polygamy, at least in the sense we commonly receive the word, is not in practice among them: but it exists in a manner still more repugnant to European ideas; I mean in the plurality of husbands, which is firmly established and highly respected there. In a country where the means of subsisting a family are not easily

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Thistle.

found, it seems not impolitic to allow a set of brothers to agree in raising one, which is to be maintained by their joint efforts. In short, it is usual in Thibet for the brothers in the family to have a wife in common, and they generally live in great harmony and comfort with her; not but sometimes little dissensions will arise (as may happen in families constituted upon different principles) an instance of which Mr Bogle mentions in the case of a modest and virtuous lady, the wife of half a dozen of the Tayhoos Lama's nephews, who complained to the uncle that the two youngest of her husbands did not furnish that share of love and benevolence to the common stock which duty and religion required of them. In short, however strange this custom may appear to us, it is an undoubted fact that it prevails in Thibet in the manner I have described.

"The manner of bestowing their dead is also singular: they neither put them in the ground like the Europeans, nor burn them like the Hindoos; but expose them on the bleak pinnacle of some neighbouring mountain, to be devoured by wild beasts and birds of prey, or wafted away by time and the vicissitudes of weather in which they lie. The mangled carcases and bleached bones lie scattered about; and, amidst this scene of horror, some miserable old wretch, man or woman, left to all feelings but those of superstition, generally sets up an abode, to perform the dismal office of receiving the bodies, assigning each a place, and gathering up the remains when too widely dispersed."

THIGH, in anatomy. See ANATOMY, n° 57.

THINKING, a general name for any act or operation of the mind. See METAPHYSICS, n° 70.

THIRLAGE. See LAW, N° clxx. 12—18.

THIRST, an uneasy sensation arising from a deficiency of the saliva to moisten the inward parts of the mouth. Hence arises a strong desire for drink; and thirst is a symptom generally attending fevers of all kinds.—Thirst is best allayed by acids; water kept a while in the mouth, then spit out, and repeated as required; a bit of bread chewed with a little water, which latter may be gradually swallowed; if the person is very hot, brandy is the best for holding in the mouth, but should be spit out again: except in fevers, large draughts of cold water are hurtful.

Preservation against Hunger and Thirst. See HUNGER.

THISTLE, in botany. See CARDUS.—The dried flowers of the cardus lanceolatus or spear-thistle, and cardus nutans or milk-thistle, are used in some countries as a rannet for curdling their milk. Many kinds of phalene are fond of the flowers, and hover over them at night; the tender stalks of the palustris or marsh-thistle, and indeed of most thistles, are esculent, being first peeled and boiled. In this manner the inhabitants of Smaland in Sweden, as Linnaeus informs us, often eat them.

Order of the THISTLE, or of St Andrew, a military order of knighthood in Scotland, the rise and institution whereof is variously related by different authors. Lesley bishop of Ross reports, that the night before the battle between Athelstan king of Northumberland, and Hungus king of the Picts, a bright cross, in form of that whereon St Andrew (the tutelary saint of Scotland) suffered martyrdom, appeared to Hungus; who having gained the victory, ever after bore the figure

of that cross on his banners. Others assert, that Achaius king of Scotland first instituted this order, after having made the famous league offensive and defensive with Charlemagne king of France. But although the thistle had been acknowledged as the symbol of the kingdom of Scotland from the reign of Achaius, yet some refer the beginning of this order to Charles VII. of France. Others place the foundation of it as low as the year 1500.

The chief and principal ensign is a gold collar composed of thistles and sprigs of rue interlinked with amulets of gold, having pendent thereunto the image of St Andrew with his cross, and the motto, NEMO ME IMPUNE LACESSET.

The ordinary or common ensign worn by the knights, is a star of four silver points, and over them a green circle, bordered and lettered with gold, containing the said motto, and in the centre is a thistle proper; all which is embroidered on their left breast, and worn with the collar, with a green ribbon over the left shoulder, and brought under the right arm; pendent thereto is the image of St Andrew, with his cross, in a purple robe, within an oval of gold enamelled vert, with the former motto: but sometimes they wear, encircled in the same manner, a thistle crowned.

About the time of the Reformation, this order was dropped, till James II. of England resumed it, by creating eight knights: however, the Revolution unsettled it again; and it lay neglected, till queen Anne, in 1703, restored it to the primitive design, of twelve knights of St Andrew.

THLASPI, MITHRIDATE, or *Treacle mustard*; a genus of the filiculosa order, belonging to the tetradynamia class of plants. There are 10 species; of which the most remarkable are, 1. The arvensis, or penny-cress, is a native of several places of England and Scotland, growing in corn-fields, but not very common. The stalk is a foot high, angular and branched; the leaves sessile, embracing the stalk at their base; the flowers very small and white. The plant smells of garlic; and in countries where it abounds, is found often to communicate its disagreeable odour to the milk of cows that feed on it. The seeds abound with an oil formerly used for the rheumatism and sciatica, but now taken no notice of. 2. The burra pastoris, or shepherd's purse, is common in corn-fields, gardens, waste places, and by waysides. This plant affords us a strong instance of the influence of soil and situation; for in some places it is not more than two inches high when it flowers and perfects its seeds, in others it rises to the height of two or three feet. It is infertile; but was nevertheless formerly much recommended in hæmorrhages of all kinds, though deservedly rejected in the present practice.

THOMASANS, THOMISTS, or *Christians of St Thomas*, a people of the East Indies, who, according to the tradition, received the Gospel from St Thomas. Upon the arrival of the Portuguese at Calicut, in their first voyage to the Indies, they met with ancient Christians, who pretended to be defended from those converted by St Thomas. The Thomæans being informed of a new people arrived among them, who bore a particular veneration for the cross, sent ambassadors to them to make an alliance with them, and to solicit their assistance against the Gentile princes, by whom

Thistle
Thomæans.

See Plate
CCLXXXIII.
fig. 1.

they

Thomaseans they were greatly oppressed. A mixture of opinions, with a total interruption of pastors, sometimes for several years together, occasioned that horrible chaos their religion was in at the arrival of the Portuguese; for a specimen whereof we shall add their manner of celebrating the eucharist: Over their altar was a kind of gallery; and while the priest was saying the beginning of the office below, a cake of flour of rice was frying in oil, or butter, above; when enough, the cake was let down in a basket upon the altar, where the priest consecrated it: as to the other species, for wine they used a kind of brandy or arrack, variously prepared in that country. Nor was their ordination much more regular; the archdeacon, who was sometimes more respected than the bishop himself, frequently ordained priests: their other abuses were infinite. The Portuguese, for these two last centuries, have laboured both the ecclesiastical and secular power therein: for this end they have called the Thomæan bishops to the council at Goa, have instructed, charged them, &c. and even sent them for instruction to Portugal and Rome; but finding that they were still apt to relapse at their return, and that no good was like to be done with them, they resolved to exclude them once for all, and to appoint an European bishop in their room. These proceedings have rendered the Portuguese infinitely odious to the Thomæans.

St THOMAS the Apostle, furnished *Didymus*. He was not with the disciples when Christ appeared to them after his resurrection, and therefore would not believe that he was really risen from the dead; but eight days after, Christ making him feel the place where the wounds had been made in his side and in his hands, he was thoroughly convinced of that important truth. His infidelity, indeed, furnished such an incontestible proof of our Saviour's resurrection, that it made some of the fathers say, that "St Thomas's incredulity was of greater service than the faith of the other apostles." St Thomas preached the gospel to the Ethiopians, Parthians, Medes, &c. It is even said that he preached to the Indians; and was run through with a lance, near the town of Meliapore, called the *town of St Thomas*: but this is now generally allowed to be a mistake, and the conversion of the people called the *Christians of St Thomas*, is, with great certainty, attributed to another Thomas, who lived five centuries after the apostle of that name.

St THOMAS, a city of the Hither India, on the coast of Coromandel, three miles south of Fort St George; subject to the Portuguese.

St THOMAS, is also an island in the Atlantic ocean, situated under the equator, in 8° E. Long.

St THOMAS is also a town of Guiana, in South America, situated on the river Oroonoko; subject to Spain.

St THOMAS's Day, a festival of the Christian church, observed on Dec. 21. in commemoration of St Thomas the apostle.

St THOMAS of Canterbury's Day, a festival of the Romish church, observed on Dec. 29. in memory of Thomas Becket archbishop of Canterbury, who was murdered, or, as the Romanists say, martyred, in the reign of king Henry II.

THOMISM, the doctrine of St Thomas Aquinas,

and his followers the Thomists, chiefly with regard to predestination and grace. There is some doubt what the true genuine Thomism is; but there are authors who distinguish the Thomism of St Thomas from that of the Dominicans. Others again make Thomism no other than a kind of Janfenism disguised: but Janfenism, it is known, has been condemned by the popes, which pure Thomism never was: in effect, the writings of Alvarez and Lemos, who were appointed by their order to lay down and defend, before the holy see, the dogmata of their school, have since been reputed the rule of pure Thomism.

THOMSON (James), an excellent British poet, the son of a Scots divine, was born in the shire of Roxburgh in 1700, and was educated in the university of Edinburgh with a view to the ministry. But his genius inclining him to the study of poetry, which he soon found would be incompatible with that of theology, or at least might prevent his being provided for in that way in his own country, he relinquished his views of engaging in the sacred function; and repaired to London in consequence of some encouragement he had received from a lady of quality there, a friend of his mother's.

The reception he met with wherever he was introduced, emboldened him to risk the publication of his excellent poem on Winter.—This piece was published in 1726; and from the universal applause it met with, Mr Thomson's acquaintance was courted by people of the first taste and fashion. But the chief advantage which it procured him, was the acquaintance of Dr Rundle, afterward bishop of Derry, who introduced him to the late lord chancellor Talbot; and some years after, when the eldest son of that nobleman was to make his tour of travelling, Mr Thomson was chosen as a proper companion for him. The expectations which his *Winter* had raised, were fully satisfied by the successive publications of the other seasons: of Summer, in the year 1727; of Spring, in the following year; and of Autumn, in a quarto edition of his works, in 1730. Beside the Seasons, and his tragedy of Sophonisba, written and acted with applause in the year 1729, he had, in 1727, published his poem to the memory of Sir Isaac Newton, with an account of his chief discoveries; in which he was assisted by his friend Mr Gray, a gentleman well versed in the Newtonian philosophy. That same year the resentment of our merchants, for the interruption of their trade by the Spaniards in America, running very high, Mr Thomson zealously took part in it, and wrote his spirited and public-spirited *Britannia*, to rouse the nation to revenge.

With the Hon. Mr Charles Talbot, our author visited most of the courts in Europe, and returned with his views greatly enlarged; not of exterior nature only, and the works of art; but of human life and manners, and of the constitution and policy of the several states, their connections, and their religious institutions.—How particular and judicious his observations were, we see in his poem on Liberty, begun soon after his return to England. We see at the same time, to what a high pitch his care of his country was raised, by the comparisons he had all along been making of our happy government with those of other nations. To inspire his fellow-subjects with the like sentiments, and

Thomson. show them by what means the precious freedom we enjoy may be preserved, and how it may be abused or lost, he employed two years in composing that noble work; upon which he valued himself more than upon all his other writings. On his return to England with Mr Talbot (who soon after died), the chancellor made him his secretary of briefs; a place of little attendance, suiting his retired indolent way of life, and equal to all his wants. This place fell when death, not long after, deprived him of his noble patron, and he then found himself reduced to a state of precarious dependence, in which he passed the remainder of his life; excepting only the two last years of it, during which he enjoyed the place of surveyor-general of the Leeward-islands, procured for him by Lord Lyttelton. His genius, however, could not be suppressed by any reverse of fortune. He resumed his usual cheerfulness, and never abated one article in his way of living; which, though simple, was genial and elegant. The profits arising from his works were not inconsiderable; his tragedy of Agamemnon, acted in 1738, yielded a good sum. But his chief dependence was upon the late prince of Wales, who settled on him a handsome allowance, and honoured him with many marks of particular favour. Notwithstanding this, however, he was refused a licence for his tragedy of Edward and Eleanor, which he had prepared for the stage in the year 1739.

Mr Thomson's next performance was the Masque of Alfred, written jointly with Mr Mallet, by the command of the prince of Wales, for the entertainment of his royal highness's court, at Clifden, his summer-residence, in the year 1740. Mr Thomson's poem, entitled the *Casile of Indolence*, was his last work published by himself; his tragedy of Coriolanus being only prepared for the theatre, when a fatal accident robbed the world of one of the best of men and best of poets. He would commonly walk the distance between London and Richmond (where he lived), with any acquaintance that offered, with whom he might chat and rest himself, or perhaps dine by the way. One summer evening being alone in his walk from town to Hammer-smith, he had over-heated himself, and in that condition imprudently took a boat to carry him to Kew; apprehending no bad consequence from the chill air on the river, which his walk to his house, towards the upper end of Kew-lane, had always hitherto prevented. But now the cold had so seized him, that the next day he found himself in a high fever. This, however, by the use of proper medicines, was removed, so that he was thought to be out of danger; till the fine weather having tempted him to expose himself once more to the evening dews, his fever returned with violence, and with such symptoms as left no hopes of a cure. His lamented death happened on the 27th of August 1748.

Mr Thomson had improved his taste upon the finest originals, ancient and modern. The autumn was his favourite season for poetical composition, and the deep silence of the night he commonly chose for his studies. The amusement of his leisure-hours were civil and natural history, voyages, and the best relations of travellers. Though he performed on no instrument, he was passionately fond of music, and would sometimes listen a full hour at his window to the nightingales in

Richmond gardens; nor was his taste less exquisite in the arts of painting, sculpture, and architecture. As for the more distinguishing qualities of his mind and heart, they best appear in his writings. There his devotion to the Supreme Being, his love of mankind, his country, and friends, shine out in every page; his tenderness of heart was so unbounded, that it took in even the brute creation. It is not known, that through his whole life he ever gave any person a moment's pain, either by his writings or otherwise. He took no part in the political squabbles of his time, and was therefore respected and left undisturbed by both sides. These amiable virtues did not fail of their due reward; the applause of the public attended all his productions, and his friends loved him with an enthusiastic ardour.

His testamentary executors were the Lord Lyttelton, whose care of our poet's fortune and fame ceased not with his life; and Mr Mitchell, a gentleman equally noted for the truth and constancy of his private friendship, and for his address and spirit as a public minister. By their united interests, the orphan play of Coriolanus was brought on the stage to the best advantage; from the profits of which, and the sale of manuscripts and other effects, a handsome sum was remitted to his sisters. His remains were deposited in the church of Richmond, under a plain stone, without any inscription. A handsome monument was erected to him in Westminster abbey, in the year 1762, the charge of which was defrayed by the profits arising from a splendid edition of all his works in quarto; Mr Millar the bookseller, who had purchased all Mr Thomson's copies, giving up his property on this grateful occasion.

THORN, a town of Poland, in Regal Prussia, and in the palatinate of Culm. It was formerly an Hanseatic town, and still enjoys great privileges; is large and well fortified; but part of the fortifications, and a great number of houses, were ruined by the Swedes in 1703. It is seated on the Vistula, in E. Long. 19. 22. N. Lat. 52. 56.

THORNBACK, in ichthyology. See RAIA.

THORNHILL (Sir James), an eminent English painter, was born in Dorsetshire in 1676, of an ancient family; but was constrained to apply to some profession by the distresses of his father, who had been reduced to part with his family-estate. His genius directed him to the art of painting, which his uncle Dr Sydenham enabled him to study by placing him with a middling painter; however, his own talents supplied the deficiencies of his instructor; and by a happy exertion of them, he gradually rose to the highest reputation. The dome of St Paul's church at London, with his works at Hampton-court and Greenwich hospital, are public proofs of his merit that will convey his name to posterity with the greatest honour. He enriched himself so far by his works that he purchased back his paternal estate; was appointed state-painter to queen Anne, received the honour of knighthood, and was several years a member of parliament. He died in 1732.

THOROUGH-WAX, in botany. See BUPLEURUM.

THOUGHT, a general name for all the ideas consequent on the operations of the mind, and even on the operations themselves. See METAPHYSICS.

THOUGHT, in composition, See ORATORY, n° 101, 104, 111.

When

Thomson
Thought.

Thought.

When speaking with a particular reference to the belles letters and polite arts, we mean, by thoughts, the ideas which the artist attempts, to raise by his performance, in contradistinction to the manner in which they are raised or expressed.

In works of art, thoughts are what remains of a performance, when stripped of its embellishments. Thus, a poet's thoughts are what remains of his poems, independently of the verification, and of some ideas merely serving for its decoration and improvement.

Thoughts, therefore, are the materials proposed and applied by art to its purposes: The drefs in which they appear, or the form into which they are moulded by the artist, is merely accidental. Consequently, they are the first object of attention in every work of art; the spirit, the soul of a performance, which, if its thoughts are indifferent, is but of little value, and may be compared to a palace of ice, raised in the most regular form of an habitable structure, but, from the nature of its materials, totally useless.

While, therefore, you are contemplating an historical picture, try to forget that it is a picture: forget the painter, whose magic art has, by lights and shades, created bodies where there are none. Fancy to yourself that you are actually looking at men, and then attend to their actions. Observe whether they are interesting; whether the persons express thoughts and sentiments in their faces, attitudes, and motions; whether you may understand the language of their air and gestures, and whether they tell you something remarkable. If you find it not worth your while to attend to the persons thus realised by your fancy, the painter has thought to little purpose.

Whilst listening to a musical performance, try to forget that you are hearing sounds of an inanimate instrument, produced only by great and habitual dexterity of lips or fingers. Fancy to yourself, that you hear a man speaking some unknown language, and observe whether his sounds express some sentiments; whether they denote tranquillity or disturbance of mind, soft or violent, joyful or grievous affections; whether they express any character of the speaker; and whether the dialect be noble or mean. If you cannot discover any of these requisites, then pity the virtuoso for having left so much ingenuity destitute of thought.

In the same manner we must also judge of poems, especially of the lyric kind. That ode is valuable which, when deprived of its poetical drefs, still affords pleasing thoughts or images to the mind. Its real merit may best be discovered by transposing it into simple prose, and depriving it of its poetical colouring. If nothing remains that a man of sense and reflection would approve, the ode, with the most charming harmony and the most splendid colouring, is but a fine drefs hung round a man of straw. How greatly then are those mistaken, who consider an exuberant fancy and a delicate ear as sufficient qualifications for a lyric poet!

It is only after having examined the thoughts of a performance in their unadorned state, that we can pronounce whether the attire, in which they have been dressed by art, fits and becomes them well or ill. A thought, whose value and merit cannot be estimated but from its drefs, is, in effect, as futile and insignifi-

cant as a man who affects to display his merit by external pomp.

THRACE, a country very frequently mentioned by the Greek and Latin writers, deriving its name, according to Josephus, from Tiras one of the sons of Japhet. It was bounded on the north by mount Hæmus; on the south, by the Ægean Sea; on the west by Macedon, and the river Strymon; and on the east by the Euxine Sea, the Hellespont, and the Propontis.—The Thracian Cherfonesus is a peninsula inclosed on the south by the Ægean Sea, on the west by the gulf of Melas, and on the east by the Hellespont; being joined on the north to the continent by a neck of land about 37 furlongs broad. The inland parts of Thrace are very cold and barren, the snow lying on the mountains the greatest part of the year; but the maritime provinces are productive of all sorts of grain and necessities for life; and withal so pleasant, that Mela compares them to the most fruitful and agreeable countries of Asia.

The ancient Thracians were deemed a brave and warlike nation, but of a cruel and savage temper; being, according to the Greek writers, quite strangers to all humanity and good-nature. It was to the Thracians, however, that the Greeks were chiefly indebted for the polite arts that flourished among them; for Orpheus, Linus, Musæus, Thamyras, and Eumolpus, all Thracians, were the first, as Eustathius informs us, who charmed the inhabitants of Greece with their eloquence and melody, and persuaded them to exchange their fierceness for a sociable life and peaceful manners; nay, great part of Greece was anciently peopled by Thracians. Tereus, a Thracian, governed at Daulis in Phocis, where the tragical story of Philomela and Progne was acted. From thence a body of Thracians passed over to Eubœa, and possessed themselves of that island. Of the same nation were the Aones, Tembices, and Hyanthians, who made themselves masters of Bœotia; and great part of Attica itself was inhabited by Thracians, under the command of the celebrated Eumolpus. It is not therefore without the utmost ingratitude and injustice that the Greeks style them *Barbarians*, since to them chiefly they were indebted both for the peopling and polishing of their country.

Thrace was anciently divided into a number of petty states; which were first subdued by Philip of Macedon. On the decline of the Macedonian empire, the country fell under the power of the Romans. It continued under subjection to them till the irruption of the Turks, in whose hands it still remains.

THRAVE, *or* CORN, an expression denoting 24 sheaves, or four shocks of six sheaves to the shock; though in some countries they only reckon 12 sheaves to the thrave.

THRASYBULUS, a renowned Athenian general and patriot, the deliverer of his country from the yoke of the 30 tyrants, lived about 294 B. C.*

THRASYMENUS LACUS, (*anc. geog.*) a lake of Etruria, near Perugia, and not far from the Tiber, *fa.* 174. ^{* See *Attica*.}

Now *il lago de Perugia* on the ecclesiastical state.

THREAD, a small line made up of a number of fine hairs of any vegetable or animal substance, such as flax, cotton, or silk; from which thread takes its name of linen, cotton, or silk.

Thrace

Thread.

Thread *Nettle* THREAD. See NETTLE and URTICA.
 Dyeing THREAD black. Linen and cotton thread may be dyed of a durable and deep black by solution of iron in four beer, in which the linen is to be steeped for some time, and afterwards boiled in madder. See the article DYEING, Part III.

THREATENING LETTERS. Knowingly to send any letter without a name, or with a fictitious name, demanding money, or any other valuable thing, or threatening (without any demand) to kill or fire the house of any person, is made felony without benefit of clergy. And sending letters, threatening to accuse any person of a crime punishable with death, transportation, pillory, or other infamous punishment, with a view to extort from him any money or other valuable chattels, is punishable by statute 30 Geo. 2. c. 24, at the discretion of the court, with fine, imprisonment, pillory, whipping, or transportation for seven years.

THRIPS, a genus of insects, belonging to the order of hemiptera. The rostrum is obscure, or so small as to be scarce perceptible. The antennæ are filiform, and as long as the thorax. The body is slender, and of equal thickness in its whole length. The abdomen is reflexible, or bent upwards. The four wings are extended, incumbent upon the back of the insect, narrow in proportion to their length, and cross one another at some distance from their base. The tarsi of the feet are composed of only two articulations. There are five species. The largest is the juniperina, of a glossy black colour with yellowish antennæ; the wings and elytra are whitish, narrow, and furnished at the point with a few small hairs. The insects live under the bark of old trees, in flowers, and under the juniper-tree. In the same places are to be found their larvæ, which only differ from them by the want of wings and elytra; but it is difficult to observe these differences in such diminutive creatures, which look rather like moving atoms than any thing else.

THROAT, the anterior part of an animal, between the head and the shoulders, wherein is the gullet.

THRONE, a royal seat or chair of state, enriched with ornaments of architecture and sculpture, raised on one or more steps, and covered with a kind of canopy. Such are the thrones in the rooms of audience of kings and other sovereigns.

THRUSH, in ornithology. See TURDUS.

THRUSH, or *Aphthe*. See MEDICINE, n° 214.

THUANUS (Jacobus Augustus), youngest son of the president de Thou, was famous for the depth and erudition of his works. He was born in 1553; and having finished his studies and travels, was made president a-Mortier, and took possession thereof in 1595. He was employed in several important offices of state, and in reforming of the university of Paris; which he discharged with so much prudence, that he was esteemed the Cato of his age, and the ornament of France. He wrote the history of his own time in Latin, from the year 1543 to 1608, in 138 books; a work, both for subject and style, worthy of the ancients. He also left memoirs of his own life, besides poems; and died at Paris, 1617.

THUCYDIDES, a celebrated Greek historian, was born at Athens 475 B.C. He was the son of

Olorus, and grandson of Miltiades, who is thought to have been descended from Miltiades the famous Athenian general, and to have married the king of Thrace's daughter. He was educated in a manner suitable to his quality, that is, in the study of philosophy and eloquence. His master in the former was Anaxagoras, in the latter Antiphon; one, by his description in the eighth book of his History, for power of speech almost a miracle, and feared by the people on that account. Suidas and Photius relate, that when Herodotus recited his history in public, a fashion in use then and many ages after, Thucydides felt so great a sting of emulation, that it drew tears from him; inasmuch that Herodotus himself took notice of it, and congratulated his father on having a son who showed so wonderful an affection to the muses. Herodotus was then 29 years of age, Thucydides about 16.

When the Peloponnesian war began to break out, Thucydides conjectured truly, that it would prove an argument worthy of his labour; and it no sooner commenced than he began his history, pursuing the same, not in that perfect manner in which we see it now, but by way of commentary, and in writing down plain actions or passages thereof, as from time to time they fell out and came to his knowledge. We know nothing with certainty of Thucydides, but what he himself has delivered in his history. He was a lover of contemplation and retirement; yet did not decline the service of the state, and accepted accordingly of a command in the army. This, however, proved unfortunate to him; for while he resided in the Isle Thasus, it happened that Brasidas the Lacedæmonian besieged Amphipolis, a city belonging to the Athenians, about half a day's sail from Thasus. Thucydides being one of the strategæ, or of those who had authority to raise forces in those parts for the service of the commonwealth, the Athenian captain sent him to levy a power and hasten to his relief. Thucydides did so; but not arriving till too late, and when the city was already yielded up, he was afterwards banished, as if he had done this either through negligence or fear of the enemy; which, however, there was no just reason to suspect; for he put himself into the city Eion, and preserved it to the Athenians, with the refusal of Brasidas, who came down the next morning from Amphipolis and besieged it.

After his banishment, which happened in his 48th year, he lived in Scapte-Hyle, a city of Thrace, from whence he married a very wealthy wife; and he had large possessions and rich mines of gold, as he himself tells us in his fourth book. He was not however so affected with his disgrace, as to shut himself up from the world, and drag on, as many have done, a life embittered with spleen and disappointment; on the contrary, he went abroad, and was present at the actions of the rest of the war. This appears from his own words, in the fifth book of his History; where he says, that he was present at the actions of both parties, and by reason of his exile no less at those of the Peloponnesians than those of the Athenians. During this time he perfected his History, so far as is now to be seen. He was very nice and curious concerning a perfect insight into affairs; in order to obtain which he employed great sums of money in procuring authentic memorials, not only from the Athenians but the Lacedæmonians also, that out of his collection

Thule
Thunder.

collections from both the great transactions of that time might be better and more impartially set forth.

At the end of 20 years, his sentence of banishment was revoked. Some authors affirm that he returned to Athens, and was treacherously killed in that city. But others assert that he died in Thrace, at the advanced age of 80 years, leaving his history unfinished. It is contained in eight books, and ends with the 21st year of the war of Peloponnesus. The most esteemed edition is that of Oxford in 1696, folio. Demosthenes set such a value on Thucydides's history, that he transcribed the whole several times with his own hand.

THULE, or THYLÆ, (anc. geog.) an island about the situation of which authors disagree. Strabo frankly owns that it lies in obscurity, and that what Pytheas of Marseilles says about it is not to be depended on. Pliny seems to have known a little more; namely, that it is the outmost or last of all the known islands, in which there are no nights at the summer-solstice: Ptolemy makes the longest day there 24 hours, and assigns it 63 degrees of north latitude. Stephanus allows but 20 for the longest day. From all which it appears evident to some, that the ancients could not mean Iceland, as is commonly thought, but either Stetland or Ferro, as agreeing tolerably well with the days and hours above-mentioned; though others are of opinion that Iceland is the Thule of the ancients. Agricola, in sailing round Britain, says, he had then a view of Thule, lying in snow and involved in winter; whereas Iceland lies at too great a distance to be seen in sailing round Britain. Nor is it certain whether they took it for some ordinary island, or for the great peninsula of Scandinavia; that is, Sweden and Norway, which very many authors formerly took for an island. Pliny, however, seems to have distinguished Norway from Thule; who places beyond it, at the distance of a day's sail, the Frozen Sea, called *Cronium* by some, and *Pigum* by Tacitus. All the knowledge either Greeks or Romans had of this island, Bochart supposes to have been derived from the Phœnicians. Antonius Diogenes, a very ancient author, who lived in the time of Alexander the Great, and who wrote concerning the island of Thule, professes he drew his tale or his story from the *Tabule Cyparißine* dug up at Tyre, when taken by Alexander, from the tomb of the Tyrian adventurers who sailed thither.

Southern THULE. See AMERICA, n° 21.

THUMB, in anatomy, one of the extremities of the hand.

THUMB-Cap, an island in the South-Sea, lies about seven leagues north-west of Lagoon-island; it is a low, woody island, of a circular form, and not much above a mile in compass. There was no appearance of inhabitants; the land was covered with verdure of many hues.

THUMMIM. See URIM.

THUNDER, the noise occasioned by the explosion of a flash of lightning echoed back from the inequalities on the surface of the earth, in like manner as the noise of a cannon is echoed, and in particular circumstances forms a rolling lengthened sound.

Although *thunder*, properly speaking, is only a mere sound capable of producing very little effect, yet

the word is generally supposed to include the phenomena of lightning also; and electrified clouds are by universal consent called *thunder-clouds*, and the explosions of many flashes of lightning proceeding from them are generally called *thunder-storms*. Though the phenomena of lightning, therefore, have been at great length explained and accounted for under the articles ELECTRICITY and LIGHTNING, and though the immediate cause of electrical explosions from clouds is explained under the article RAIN; yet the ultimate cause remains still to be shown, and properly belongs to the present article.

It is universally allowed, that the variation of the electricity in different parts of the atmosphere is the cause of thunder. Under the article ELECTRICITY, it has been shown why lightning explodes after the thunder-clouds are charged. Under the article LIGHTNING it is shown why that meteor puts on the various forms in which we see it, why it sometimes strikes houses or animals, and sometimes not, &c.; and under the article RAIN, why the atmosphere in some cases parts with the vapours which at other times it so obstinately retains. It remains, therefore, only to show why rains are sometimes attended with thunder, and sometimes not; which, to those who attentively peruse the articles above-mentioned, may be done in few words.

In this part of Great Britain, and for a considerable way along the eastern coast, although thunder may happen at any time of the year, yet the month of July is that in which it may almost certainly be expected. Its duration is of very uncertain continuance; sometimes only a few cracks will be heard at any particular place during the whole season; at others the storm will return at the interval of three or four days for a month, six weeks, or even longer; not that we have violent thunder in this country directly vertical in any one place so frequently in any year, but in many seasons it will be perceptible that thunder-clouds are formed in the neighbourhood even at these short intervals. Hence it appears, that during this particular period there must be some natural cause operating for the production of this phenomenon, which does not take place at other times. This cannot be the mere heat of the weather, for a great tract of hot weather is very often observed without any thunder being heard; and besides, though not common, it is sometimes heard in the winter also. As therefore the heat of the weather is common to the whole summer, whether there be thunder or not, we must look for the causes of it in those phenomena, whatever they are, which are peculiar to the months of July, August, and the beginning of September. Now it is generally observed, in the tract of country of which we now speak, that from the month of April an east or south-east wind generally takes place, and continues with little interruption till towards the end of June. At that time, sometimes sooner, and sometimes later, a westerly wind takes place; but as the causes producing the east wind are not removed, the latter opposes the west wind with its whole force. At the place of meeting, there is naturally a most vehement pressure of the atmosphere, and friction of its parts against one another; a calm ensues, and the vapours brought by both winds begin to collect and form dark clouds, which can have little motion

Thunder.

Thunder,
Thuringia

motion either way, because they are pressed almost equally on all sides. For the most part, however, the west wind prevails, and what little motion the clouds have is towards the east; whence the common remark in this country, that "thunder-clouds move against the wind." But this is by no means universally true: for if the west wind happens to be excited by any temporary cause before its natural period when it should take place, the east wind will very frequently get the better of it; and the clouds, even although thunder is produced, will move westward. Yet in either case the motion is so slow, that the most superficial observers cannot help taking notice of a considerable resistance in the atmosphere.

That when two streams of air are thus driven against each other, the space where they meet must become highly electrified, is as plain as that an electric globe must be excited when friction is applied. It is true, as the substances here to be excited are both electric *per se*, it may be objected, that no electricity could be produced; for we cannot excite one electric by rubbing it with another. Yet it is observed, that glass may be electrified by blowing strongly upon it, or by the explosion of cannon; and even when glass is strongly pressed upon glass, both pieces become electrified as soon as they are separated. When glass is rubbed upon glass, no attraction or repulsion can be perceived, nor is any sign of electricity observed on bodies brought near to it; yet a very bright electric light always appears on the glasses, and a phosphoreal smell is smelt; which shows, that though the electricity does not fly out through the air in the usual way, yet the fluid within the glass is agitated, and there is little reason to doubt that any conducting body inclosed within the substance of the glass would be electrified also. The vapours therefore, which are the conducting substances in the atmosphere, become immediately electrified in consequence of the pressure above-mentioned, and all the phenomena described under the various articles already referred to take place.

In like manner, by the struggle of two other winds as well as those of the east and west, may a thunder-storm be produced; but it is always necessary that the resistance of the air to the motion of the clouds should be very great, and nearly equal all round. For if the vapour should get off to a side, no thunder would take place; the electricity would then be carried off as fast as it was collected, and rain would only be the consequence, by reason of the electrified vapours parting with their latent heat, as is explained under the article RAIN. In fact, we very often observe that in the time of rain the clouds evidently move across the wind, and the nearer their motion is to a direct opposition, the heavier will the rain be; while on the other hand, if they move briskly before the wind, let the direction be what it will, the atmosphere soon clears up. But for a farther illustration of these matters, see the articles WEATHER, and WIND.

THURINGIA, a division of the circle of Upper Saxony in Germany. It is a fruitful track, abounding in corn, especially wheat; in black cattle, sheep, and horses; and in some places with vines and wood, and other valuable plants. It contains 47 towns, 14 boroughs, betwixt 700 and 800 villages, 300 noble estates, 7 superintendencies, and 5 under-consistories.

Thurloe
Thuya.

Thuringia, the country of the ancient Thuringi, or Catti, a branch of the Vandals, mentioned by Tacitus, was formerly a kingdom, afterwards a county, then a landgravate, and was governed by its own princes for many ages, till 1124, when it devolved to the marquis of Misnia, and, with that country, afterwards to the duke of Saxony. But the modern Thuringia is only a part of the ancient, nay, but a part of the ancient South Thuringia, which comprehends besides, a large share of the modern Franconia, Hesse, &c. On the extinction of the male line of the ancient landgraves in 1247, it came to the margraves of Meissen, ancestors to the present electoral family. The elector has no voice in the diet, on account of his share in the landgravate or circle of Thuringia.

THURLOE (John), an English statesman under Oliver Cromwel; was born at Abbots Roding in Essex in 1616, of which parish his father was rector; and was educated to the study of the law. In 1648 he was made receiver or clerk of the excise fines; and though his attachments were entirely on the side of the parliament, he declares himself totally unconcerned in all counsels relative to the death of the king: however, on that event, and on the establishment of the commonwealth, he was diverted from prosecuting his employments in the law, by engaging in public business. When Cromwel assumed the protectorship, he became secretary of state; in 1655, he had the care and charge both of foreign and inland postage committed to him by the protector; and was afterward sworn one of his privy-council, according to "The humble petition and advice." He was continued in the same capacities under Richard Cromwel, and until measures were taking for the restoration; when he made an offer of his services to that end, which however were not accepted. May 15th 1660, he was committed to the custody of the serjeant at arms on a charge of high-treason; but being soon released, he retired to Great Milton in Oxfordshire: and though he was afterward often solicited by Chas. II. to engage in the administration of public business, he thought proper to decline the offers. He died in 1668; and was a man of an amiable private character, who in the highest of his power exercised all possible moderation toward persons of every party. The most authentic testimony of his abilities is that vast collection of state-papers, 7 vols folio, now in the hands of the public; which place the affairs of Great Britain, and of Europe in general, during that remarkable period, in the clearest light.

THURSDAY, the fifth day of the Christian week, but the sixth of that of the Jews.

THUYA, the ARBOR VITÆ, a genus of the monodelphia order, belonging to the monoecia class of plants. The species are,

1. The occidentalis, or common arbor vitæ, grows naturally in Canada, Siberia, and other northern countries. In some of the English gardens a few of these trees are to be met with of a large size: it has a strong woody trunk, which rises to the height of 40 feet or more. The bark, while young, is smooth, and of a dark brown colour; but as the trees advance, the bark becomes cracked, and less smooth. The branches are produced irregularly on every side, standing almost horizontal, and the young slender shoots frequently hang downward, thinly garnished with leaves; so that when the

† See Elec-
tricity, no
17, 28, 96.

the trees are grown large, they make but an indifferent appearance. The young branches are flat, and their small leaves lie imbricated over each other like the scales of a fish; the flowers are produced from the side of the young branches pretty near to the foot-stalk; the male flowers grow in oblong catkins, and between these the female flowers are collected in form of cones. When the former have shed their farina, they soon after drop off; but the female flowers are succeeded by oblong cones, having obtuse smooth scales, containing one or two oblong seeds. The leaves of this tree have a rank oily scent when bruised.

2. The orientalis, or China arbor vitæ, grows naturally in the northern parts of China, where it rises to a considerable height; but this has not been long enough in Europe to have any trees of large size. The seeds of this sort were first sent to Paris by some of the missionaries; and there are some of the trees growing in the gardens of the curious there, which are more than 20 feet high. The branches of this sort grow closer together, and are much better adorned with leaves, which are of a brighter green colour, so make a much better appearance than the other, and being very hardy, it is esteemed preferable to most of the evergreen trees with small leaves, for ornament in gardens. The branches of this tree cross each other at right angles: the leaves are flat; but the single divisions of the leaves are slender, and the scales are smaller and lie closer over each other than those of the first sort. The cones are also much larger, and of a beautiful grey colour; their scales end in acute reflexed points.

These trees are propagated by seeds, layers, or cuttings.

THYMUS, THYME, a genus of the gymnospermia order, belonging to the didynamia class of plants. There are several species, all celebrated for their agreeable flavour, but so well known that no description is necessary. The whole plant is fragrant, and yields an essential oil that is very heating. An infusion of the leaves removes the headache occasioned by the debauch of the preceding evening. A general opinion prevails that the flesh of sheep that feed upon aromatic plants, particularly upon thyme, is much superior in flavour to common mutton: but the ingenious author of the account of the Sheep-walks in Spain (Gent. Mag. 1764.) considers this as a vulgar error. He says sheep are not fond of aromatic plants; that they will carefully push aside the thyme to get at the grass growing beneath it; and that they never touch it unless when walking apace, and then they will catch at any thing. — The attachment of bees to this and other aromatic plants is well known. In the experiments made at Upsal, sheep and goats were observed to eat it, and swine to refuse it.

THYMUS, in anatomy. See ANATOMY, n° 379.

THYRSUS, in antiquity, the sceptre which the poets put into the hand of Bacchus, and wherewith they furnished the menades in their Bacchanalia.

THYRSUS, in botany, a mode of flowering resembling the cone of a pine. It is, says Linnaeus, a pinnule contracted into an oval or egg-shaped form. The lower foot-stalks, which are longer, extend horizontally, whilst the upper ones are shorter and mount vertically. Lilac and butter-burr furnish examples.

TIARA, an ornament or habit wherewith the ancient Persians covered their head; and with which the Armenians and kings of Pontus are represented on medals; these last, because they were descended from the Persians. Latin authors call it indifferently *tiara* and *cidaris*. Strabo says, the tiara was in form of a tower; and the scholiast on Aristophanes's comedy, *AXEPOIS*, act. 1. scene 2. affirms, that it was adorned with peacock's feathers.

The kings of Persia alone had the right of wearing the tiara straight and erect; the priests and great lords wore it depressed, or turned down on the fore-side. Xenophon in his *Cyropædia* says, that the tiara was sometimes encompassed with the diadem, at least in ceremonies; and had frequently the figure of a half-moon embroidered on it: others are of opinion, that the diadem was in figure of a moon, and that it was hence the tiara was called *lunata*: lastly, others think that the tiara itself was sometimes in form of a half-moon. In fact, it appears that there were different forms of tiaras; and Pachelius *De coronis*, distinguishes no less than five different kinds.

TIARA is also the name of the pope's triple crown. The tiara and keys are the badges of the papal dignity; the tiara of his civil rank, and the keys of his jurisdiction: for as soon as the pope is dead, his arms are represented with the tiara alone, without the keys. The ancient tiara was a round high cap. John XXIII. first encompassed it with a crown. Boniface VIII. added a second crown; and Benedict XII. a third.

TIBER, a great river of Italy, which runs through the pope's territories, passing by Perugia and Orvieto; and having visited Rome, falls into Tuscan sea at Ostia, sixteen miles below that city.

TIBERIAS, (anc. geog.) the last town of Galilee, situated on the south side of the lake Tiberias; built by Herod the tetrarch, and called *Tiberias* in honour of the emperor Tiberius; distant 30 stadia from Hippus, 60 from Gadara, and 120 from Scythopolis: whence it appears to have been at no great distance from where the Jordan runs out of the lake. It is a number of times mentioned by John the Evangelist. Pliny places it on the west extremity of the lake, commending the salubrity of its hot waters. Jerome says, the ancient name was *Chinnereth*; which, if true, will account for the name of the lake.

TIBULLUS (Aulus Albius), a Roman knight, and a celebrated Latin poet, was born at Rome 43 B. C. He was the friend of Horace, Ovid, Macer, and other great men in the reign of Augustus. He accompanied Messala Corvinus in his expedition against the island of Coreyra: but falling sick, and being unable to support the fatigues of war on account of the weakness of his constitution, he quitted the profession of arms, and returned to Rome, where he died before the year 17; when Ovid showed his grief for his death by writing a fine elegy upon him. Tibullus wrote four books of elegies, which are still extant: they are written in a tender and agreeable style, and in a very elegant Latin. Muret and Joseph Scaliger have written learned and curious commentaries on the works of this poet. The best edition of Tibullus is that of Janus Bronchhius, published at

Tibur
||
Tide.

Amsterdam in 1708, in one volume quarto. We have an English poetical version of them by Mr Grainger.

TIBUR, (anc. geog.) a town of Latium, pleasantly situated on the Anio. Here Horace had his villa and house; and here he wished to end his days. Here Adrian built an extraordinary villa called *Tibur-tina*, inscribed with the names of the provinces and of the most considerable places, (Spartian; near which Zenobia had a house called *Zenobia*, (Trebellius, Pollio). Hither Augustus often retreated on account of its salubrity, (Suetonius): for which it is greatly commended, (Martial). Anciently, when the Romans had far extended their territory, it was the utmost place of banishment, (Ovid). It had a temple of Hercules; and therefore called *Herculeum*. In the temple was a library, (A. Gellius). Now *Tivoli* in the Campagna di Roma on the Teverone.

TICINUM, (anc. geog.) a town of Infubria, built by the Gauls; situated on the river Ticinus near its confluence with the river Po: a municipium, famous under the Cæsars. Now *Pavia* in the Milan, from its name *Pabia* or *Papia* in the middle age.

TICINUS, (anc. geog.) a river in Infubria, rising in mount Adula, traversing the Lacus Verbanus southwards, and falling into the Po near Ticinum. Between this river and the Po Hannibal gained his first victory over the Romans under P. Scipio. The general himself escaped with the utmost difficulty, and that by the bravery of his son the first Scipio Africanus. Now the *Tesino*, rising in mount Godard, running south through the Lago Maggiore and Milan, by Pavia, into the Po.

TICKELL (Thomas), an excellent English poet, was the son of a clergyman who enjoyed a considerable preferment in the north of England; but we have no account where or when he was born. He was educated at Queen's college, Oxford, of which he was made-fellow; and while he continued at that university, he addressed to Mr Addison a complimentary copy of verses on his Opera of Rosamond, which introduced him to an acquaintance with that gentleman, who discovering his merit, became his sincere friend. On Mr Addison's being made secretary of state, he appointed Mr Tickell his under-secretary; and on his being obliged to resign that office on account of his ill health, he recommended him so effectually to Mr Craggs his successor, that he was continued in his post till that gentleman's death. In 1724 Mr Tickell was appointed secretary to the lords justices in Ireland, and enjoyed that place as long as he lived. He wrote some poems, which, when separately published, met with a favourable reception, and passed through several editions: they are now printed in the second volume of The Minor Poets. After Mr Addison's death Mr Tickell had the care of the edition of his works printed in 4 vols 4to; to which he prefixed an account of Mr Addison's life, and a poem on his death. Mr Tickell died in the year 1740.

TIDES. See ASTRONOMY, n° 161. *et seq.*

TIDE-WAITERS, or *Tidesmen*, are inferior officers belonging to the custom-house, whose employment is to watch or attend upon ships until the customs be paid: they get this name from their going on board ships on their arrival in the mouth of the Thames or other ports, and so come up with the tide.

Tiend
||
Tillandfia.

TIEND, in Scots law. See LAW, n° clxxi.

TIERCE, or **TEIRCE**, a measure of liquid things, as wine, oil, &c. containing the third part of a pipe, or 42 gallons.

TIERCED, in heraldry, denotes the shield to be divided by any part of the partition-lines, as party, coupé, tranchy, or tailly, into three equal parts of different colours or metals.

TIGER, in zoology. See FELIS.

TIGRIS, a river of Asia, which has its source near that of the Euphrates in the mountain Tchildir in Turkomania: afterwards it separates Diarbeck from Erzerum, and Khufistan from Irac-Arabi; and uniting with the Euphrates at Gorno, it falls into the gulph of Buzarah, under the name of *Schat el-Arab*. This river passes by Diarbekar, Geziral, Mouful, Bagdad, Gorno, and Buzarah.

TILBURY, a fortress in the county of Essex, seated on the river Thames, opposite to Gravesend in Kent.

TILIA, the LIME OF LINDENTREE; a genus of the monogynia order, belonging to the polyandria class of plants. The most remarkable species is the *Europæa*, or common lime-tree, a native of Britain and other northern countries of Europe. The leaves are heart-shaped, with the apex produced, and serrated on the edges; the flowers grow in a thin umbel, from three to nine together, of a whitish colour and a fragrant smell; very grateful to bees. The wood is light, smooth, and of a spongy texture, used for making lalls and tables for shoemakers, &c. Ropes and bandages are made of the bark, and mats and rustic garments of the inner rind, in Carniola and some other countries.—The lime-tree contains a gummy juice, which being repeatedly boiled and clarified, produces a substance like sugar.

TILLANDSIA, the large barren WILD PINE of the West Indies; a genus of the monogynia order, belonging to the hexandria class of plants. It is called *Caragatua* by Father Plumier, and is a parasitic plant, and ought perhaps, in strict propriety, to be denominated an *aquatic*: for although it is suspended in the air among the branches of lofty trees, to whose boughs it is fastened by its numerous roots; yet it is not indebted to those boughs, like the mistletoe and other parasitic plants, for nourishment, but merely for support; provident nature having, in a very extraordinary manner, supplied this with other means to preserve its existence: for the leaves, which much resemble those of the pine-apple, but are larger, surround this plant in a circular manner; each leaf being terminated near the stalk with a hollow bucket, which contains about half a pint of water. It is by these numerous small reservoirs of water, that the roots, as well as every other part of this plant, are supplied with nourishment, without the help of any earth. The flourishing condition of this plant, as well as the great growth of fig-trees, upon barren rocks, shows that water is of greater use to vegetation than earth.

One contrivance of nature in this vegetable, says Dr Sloane, is truly admirable. The seed is crowned with many long, downy threads, not only that it may be carried everywhere by the wind; but that by those threads, when driven through the boughs, it may be held fast, and stick to the arms and prominent parts of the

Tillotmont
|
Tillotson.

the barks of trees. So soon as it sprouts or germinates, although it be on the under-part of a bough, its leaves and stalks rise perpendicular or erect; if they assumed any other direction, the cistern or reservoir just mentioned, made of the hollow leaves, could not hold water, which is necessary to the life and nourishment of the plant. In scarcity of water this reservoir is useful, not to the plant only, but to men, and even to birds and all sorts of insects, which come thither in troops, and seldom go away without refreshment.

To the same purpose, Dampier, in his voyage to Campeachy, relates, "that the wild pine has leaves that will hold a pint and a half or quart of rain-water, which refreshes the leaves and nourishes the roots. When we find these pines we stick our knives into the leaves, just above the root; and the water gushing out, we catch it in our hats, as I myself have frequently done, to my great relief."

TILLEMONT. See NAIN.

TILLER of a SHIP, a strong piece of wood fastened in the head of the rudder, and in small ships and boats called the *helm*.

TILLOTSON (John), a celebrated archbishop of Canterbury, was the son of Robert Tillotson of Sowerby, in the parish of Halifax in Yorkshire, clothier; and was born there in the year 1630. He studied in Clare-hall, Cambridge; and in 1656 left this college, in order to become tutor to the son of Edmund Prideaux, Esq; of Ford-abbey in Devonshire. He was afterwards curate to Dr Hacket vicar of Cheshunt, in Hertfordshire. In 1663, he was presented by Sir Thomas Barnardiston to the rectory of Ketton or Kedington in the county of Suffolk; but was the next year chosen preacher to Lincoln's Inn, when he procured Ketton to be bestowed on his curate. He was greatly admired in London for his sermons; and the same year was appointed Tuesday-lecturer at St Lawrence's church, London, where his lectures were frequented by all the divines of the city and many persons of quality and distinction. In 1666, he took the degree of doctor of divinity at Cambridge; in 1669, was made prebendary of Canterbury; in 1672, was admitted dean of that cathedral; and three years after, was made a prebendary of St Paul's cathedral, London. In 1679, he became acquainted with Charles earl of Shrewsbury, whom he converted from Popery; and the next year refused to sign the clergy of London's address of thanks to king Charles II. for not agreeing to the bill of exclusion of the duke of York. In 1683, he visited the unhappy lord Russell when under condemnation; and attended him in his last moments on the scaffold. In 1689, he was installed dean of St Paul's; made clerk of the closet to king William and queen Mary; and appointed one of the commissioners to prepare matters to be laid before the convocation, in order to a comprehension of all Protestants, as well dissenters as churchmen; but this attempt was frustrated by the zeal of those members of that body, that refused to admit of any alteration in things confessedly indifferent. In 1691, Dr Tillotson was, notwithstanding the warmest remonstrances and intreaties on his part, consecrated archbishop of Canterbury, and four days after was sworn one of the privy-council; their majesties always reposing an entire confidence in his prudence, moderation, and integrity. In 1694, he

was seized with a dead palsy, of which he died in the 65th year of his age. He was interred in the church of St Lawrence Jury, London, where a neat monument is erected to his memory. This learned and pious divine, while living, was greatly inveighed against by the enemies of the revolution. After his death there was found a bundle of bitter libels which had been published against him, on which he had written with his own hand, "I forgive the authors of these books, and pray God that he may also forgive them." It is remarkable, that while this truly great man was in a private station, he always laid aside two-tenths of his income for charitable uses. One volume in folio of Dr Tillotson's sermons was published in his life-time, and corrected by his own hand: these Barbeyrac translated into French. Those which came abroad after his death, from his chaplain Dr Barker, made two vols in folio, the copy of which was sold for 2500 l. and this was the only legacy he left to his family, his extensive charity having consumed his yearly revenues as constantly as they came to his hands. However, king William gave two grants to his widow; the first of which was an annuity of 400 l. during the term of her natural life, and the second of 200 l. as an addition to the former annuity. Dr Tillotson wrote some other works besides his Sermons; and also published Dr Barrow's works, and Dr Wilkins's Treatise of the Principles and Duties of Natural Religion, and a volume of that divine's Sermons.

TIMÆUS, a Greek historian, the son of Andronicus, who was eminent for his riches and excellent qualities, was born at Tauromenium in Sicily, and flourished in the time of Agathocles. He wrote several books, and among the rest an history of his own country; but they are all lost.

TIMÆUS, a famous Pythagorean philosopher, was born at Locres in Italy, and lived before Plato. There is still extant a small treatise of his on the Nature and Soul of the World, written in the Doric dialect. This treatise, which is to be found in the works of Plato, furnished that great philosopher with the subject of his treatise intitled *Timæus*.

TIMBER, a name for all kinds of felled and seasoned woods. See TREES and WOOD.

TIMBERS, the ribs of a ship, or the incurvated pieces of wood, branching outward from the keel in a vertical direction, so as to give strength, figure, and solidity to the whole fabric. It has been observed in the article *Naval ARCHITECTURE*, that one timber is composed of several pieces united into one frame, which is accordingly called a *frame of timbers* by the artificers. These different pieces are exhibited in Plate CCLXVI. fig. 3. by U, V, and W; the head of the lower piece, called the *floor-timber*, being cut square, to join the heel of the next above it. To support the connection of the timber in that place, another assemblage of pieces are formed, and joined in the same manner; so that when both the sets are fastened together, the joinings in one set will be nearly opposite to the middle of the pieces in the other. Hence it is evident, that the mould which serves for the lowest piece will conform to the under part of the corresponding piece above it; and thus the mould appropriated to every division of a timber will determine or answer to the figure of the next adjoining thereto.

Timæus
|
Timbers.

Time.

—The timbers, whose areas or planes are perpendicular to the keel, are called *square-timbers*; and those which are placed obliquely on the keel, as at the extremities of a ship, are called *cant-timbers*. The foremost of those pieces on the ship's bow are called the *knuckle-timbers*; and the hindmost on the quarter are called the *fashion-pieces*.—The outlines, or bends of the principal timbers of the ship, are geometrically delineated in the plane of projection, *ibid.* fig. 4. as also in Plate CLIX. fig. 2. and Plate CCLXXVII. fig. 2.; and their particular stations in the ship's length are represented in the horizontal plane, and that of the elevation, Plate CCLXVI. fig. 1, 2. In order to give a more comprehensive idea of their figures and dimensions, we have exhibited a perspective view of the carcase of a small vessel Plate CCLXXXVI. fig. 1. confining only of the keel A, the stern-post B, the stem C, the transoms KLM, and the ribbands FF.

TIME, a succession of phenomena in the universe, or a mode of duration marked by certain periods or measures, chiefly by the motion and revolution of the sun. See ASTRONOMY.

The general idea which time gives in every thing to which it is applied, is that of limited duration. Thus we cannot say of the Deity, that he exists in time; because eternity, which he inhabits, is absolutely uniform, neither admitting limitation nor succession.

TIME, in music, is that which measures the duration of sounds; and is marked by emphatic or accented notes, which are heard at equal distances, or by the regular returns of cadences.

A succession of sounds, says Rousseau, however happily it may be conducted in its procedure, in its transitions from low to high, or from high to low, will produce nothing, if we may speak so, but indeterminate effects. It is the relative and proportionate duration of these very sounds that fixes the genuine character of any music, and gives it its full energy. Time is the soul of melody: airs, whose movements are slow, naturally deject our spirits, and inspire sadness; but those which proceed with cheerfulness and vivacity, whose cadences are regular and properly marked, excite us to joy, and scarce can the feet restrain themselves from dancing. Remove measure, destroy the proportions of duration between sounds, and the same airs which those proportions rendered agreeable to you, will remain without charms and without force, will, in short, become incapable of pleasing or interesting. Time, on the contrary, has its own intrinsic power; it depends on itself alone, and can subsist without diversity of sounds. Of this the drum presents us with an example; rude indeed, and extremely inadequate, because in it the sounds cannot be supported.

Time in music is considered, either with respect to the general movement of an air, and in this sense it is said to be *swift or slow*; or it is considered with respect to the aliquot parts of every bar; these parts are marked by motions of the hand or foot, and in a particular sense are called *times*: or, in short, it is considered with respect to the proper value of each particular note in duration.

In his Musical Dictionary, at the word *Rhythme*, Rousseau has sufficiently treated concerning the time of music among the Greeks. Such readers as wish to examine the rhythmos of the ancients more curiously,

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may derive considerable advantage from reading Cicero's treatise *De Oratore*, and Burney's dissertation prefixed to his history. We are more particularly concerned in the *time of modern music*.

Those musicians who may be called *ancient moderns*, only recognize two different species of measures or times; one containing three equal divisions of time, which they called *perfect measure*; the other comprehending two, which they termed *imperfect measure*; and they denominated the signs which they added to the cleft, *times, modes, or prolations*, to fix the character of the bars, whether of the one or the other kind. These signs did not, as at present, serve for that use alone, but they likewise fixed the relative value of notes; as may be seen at the words *Mode and Prolation* in Rousseau's Musical Dictionary, with respect to the maximum or large, the long, the semibreve. With respect to the breve, the manner of dividing it was what they more precisely called *time*; and that time was *perfect* or *imperfect*.

When the time was *perfect*, the breve or square was equivalent to three semibreves; and this they signified by a full circle, sometimes with lines drawn through it and sometimes not, sometimes likewise it was marked thus 3.

When the time was *imperfect*, the breve was only equivalent to two semibreves; and this was marked by a semicircle or C. Sometimes this C was inverted; and this signified that the value or duration of each particular note was diminished by one half. We at present express the same thing by intersecting C with a line. Sometimes the quantity of a bar, signified by the intersected C, where the notes only are protracted to half their value, divided into what they called *minor times*; and that which was marked by the C without a line, where the notes occupied their full duration, into *major times*, in which the bar was generally divided into four equal parts or times.

We have exactly retained the triple time of the ancients, as well as the double, which we call *common time*; but, by an unaccountable caprice, we have hardly retained any thing in their manner of dividing notes except by duplicates, though their division into three equal parts is often no less necessary to us than to them; so that to divide a bar into three equal parts, or a time in the same manner, we are at a loss for characters of expression, and scarcely can we tell how to supply them. We must have recourse to the figure 3, or to other expedients of the same kind; which demonstrate how inadequate our musical characters are to answer their proper purposes. See TABLES in the *Musical Dictionary*.

To ancient music we had added a combination of time, by which the bar, instead of two, is divided by four, equal parts or times; but as they may always be reduced to bars containing only two, it may be said, that in reality we have only two or three times as the aliquot parts of all our different bars.

The value of times is as numerous and different as the diversities in the quantity of bars and the modifications of movement. But when the bar and the movement are once fixed, all the bars should be perfectly equal, and all the times contained in each bar perfectly equivalent one to another. Now, to render this equality sensible, every bar is struck, and every time distinguished, by a motion of the hand or foot; and by these motions

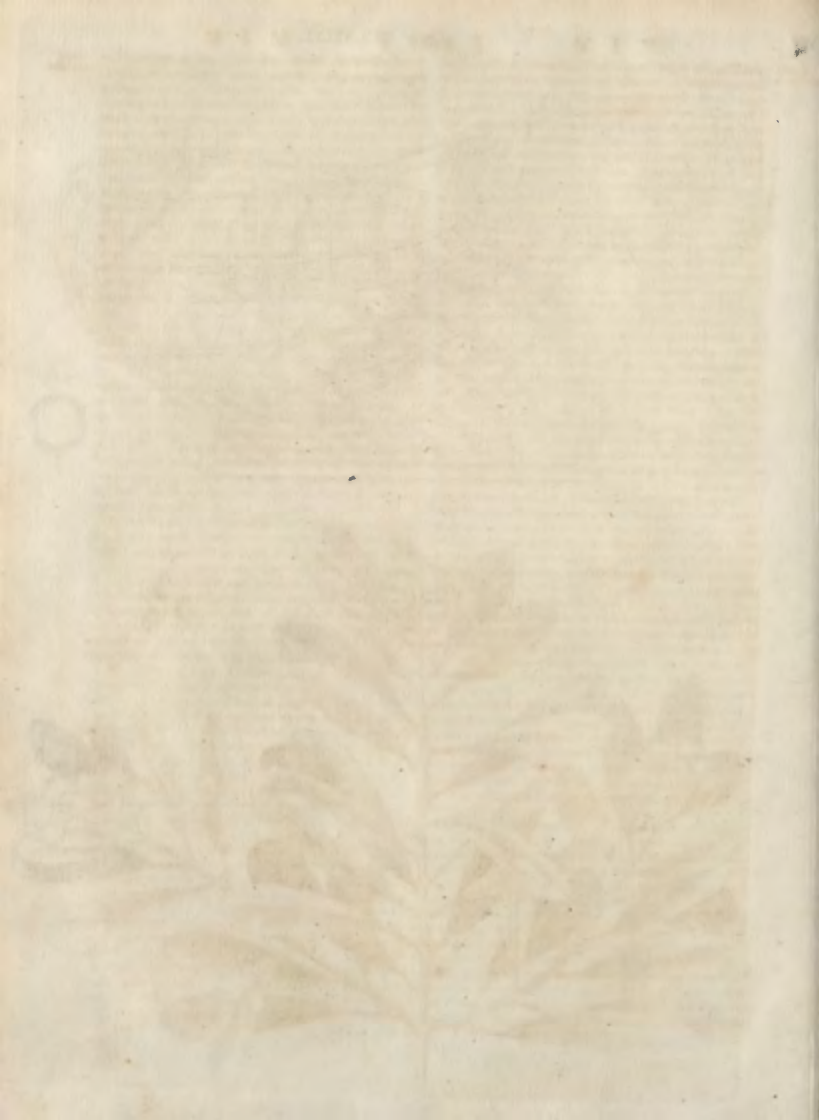
Fig. 1.
TIMBERS
of a Ship.



Fig. 2.
WINTERANIA
Canella.

Nº 1.





Time.

motions the different values of notes are exactly regulated, according to the genius and character of the bar. It is a surprising phenomenon to observe with how much precision, by the assistance of a little habit and practice, initiates may be brought to follow and distinguish the times, with an equality so perfect, that no pendulum can vibrate more justly than the hand or foot of a good musician, and that even the internal perception of this equality is sufficient to conduct them and to answer with accuracy every purpose of sensible motion; so that, in a concert, every performer plays or sings the bar with the utmost exactitude, without hearing the time distinguished by any other, or distinguishing it himself any other ways than by the succession of his own ideas.

Of the different times included in a bar, though all are equal, yet there are some more strongly and sensibly marked than others. This distinction is expressed in execution by emphatic or accented notes, and by such as are unaccented or common. The time which is thus more sensibly distinguished is called the *perfect time*; that which is more feebly distinguished, or which is occupied by unaccented notes, is called the *imperfect time*. (See MUSIC, art. 174.) The perfect is the first of every bar, consisting of two times; it is the first and third of such bars as include three or four times. The second time is always imperfect in every bar, and it is the same case with the fourth in bars containing four times.

If every time be subdivided into two other equal parts, which may likewise be called *isochronic* or *hemichronic times*, for the first part of this subdivision you will likewise have a perfect time, and for the second an imperfect; and there is no part of any time which may not, according to Rousseau, be subdivided in the same manner.

Here, however, we must dissent; and for this plain reason, that notes may be so minutely subdivided, as by the shortness of their duration to be rendered incapable of emphasis; and we should be glad to know how this author, either with his hand, his foot, or this thought, could distinguish the perfect and imperfect times of a demi-semiquaver.

Every note which begins in the imperfect and ends in the perfect time, is an *antichronic* note; and as it violates and shocks in some measure the order of the bar, its commencement in the middle of one time, and its continuation to another, is called *syncopation*.

These observations are necessary to such as would learn how they may employ dissonances with success. For every dissonance properly introduced, ought to be prepared in the imperfect, and struck in the perfect time: except, however, in successions of cadences avoided, where this rule, though applicable to the first dissonance, is not equally so to those which succeed it. See DISCORD and PREPARATION.

Time-Keepers, or Instruments for measuring Time. See CLOCK, DIAL, &c.

Time Keepers for finding the Longitude. Gemma Frisius seems to have been the first who suggested the method of finding the longitude at sea by means of watches or time-keepers; which machines were then, as he says, but lately invented. After him Metius, and some others, attempted it; but the state of watch-making was then too imperfect for this purpose. The

Time.

dispute between Hooke and Huygens, concerning the invention and application of the pendulum-spring to watches, was long and violent: each of them claiming this curious and most useful invention, and representing the other as a pirate. It is probable that their claims were each of them just; nor is this the only instance in which different persons have made the same discovery, nearly about the same time. Hooke and Huygens, each of them, on making this discovery, applied it to the purpose of discovering the longitude at sea. Some disputes, however, between the former of those gentlemen and the English ministry at that time, prevented the making any experiments with watches constructed by him; but many experiments were made with watches constructed by Mr Huygens, from which it appeared that those watches were of no real use at sea for this purpose. Dr Hooke never, as far as we know, made a full discovery of his inventions of this kind; but many hints are dropped in different parts of the Philosophical Transactions, his Philosophical Collections, and Culerian Lectures; of which later mechanics have undoubted availed themselves.

In 1714, an act passed for giving 20,000*l.* to that person who should first discover a method by which a ship might sail from England to any port in the West Indies, without having committed an error of 30' in her longitude, on arriving at the said port. The first who turned his thoughts this way, in consequence of this public encouragement, was Henry Sully, an Englishman, but who had left England before the passing of this act: for in 1714 he printed, at Vienna, a small tract on the subject of watch-making; and soon after he removed from thence and settled at Paris, where he spent the remainder of his life in improving time-keepers for the discovery of the longitude. In 1716 he presented a watch of his own making to the Royal Academy of Sciences, which was much approved. It is particularly said, that he had greatly diminished the friction; and that what he had not taken entirely away, he had by a very singular address rendered uniform. He went to Bourdeaux in 1726, for the convenience of trying his watches, and died there in 1728. The greater part of what is yet known of watch-making in France is principally to be attributed to him; for the famous Julien le Roy was his pupil, and owed most of his inventions to him, which he afterwards perfected and executed; and this gentleman, his son, and M. Berthoud, are the only persons in France who have turned their thoughts this way since the time of Sully. Several watches made by the two latter artists have been tried at sea at the expense of the king of France, and very voluminous accounts of these trials have been published with great pomp; but the facts which are there related are so very few, and those few enveloped in such a volume of words, vague and indeterminate in their meaning, that it is scarcely possible to discover from thence what these watches are capable of performing.

M. Berthoud, in a pretty bulky pamphlet in 4to, has with great labour collected together a few of the principal facts which resulted from the three last trials that were made of two time-keepers constructed by M. Le Roy, marked *A* and *S*; and of two of his own construction, denominated *N° 6.* and *N° 8.* which are as follow:

June

June 8th, 1768, being then at Havre de Grace, M. Le Roy's time-keeper *A* lost $1^{\circ} \frac{1}{2}$ a-day on mean time; and *S* gained 4° a-day. At the island of Miquelon, on the coasts of Newfoundland, *A* was losing at the rate of $0^{\circ} \frac{3}{4}$ a-day, and *S* gaining about 10° a-day on mean time. At Cadiz *S* gained on different days between the 16th and 30th of September $1^{\circ} \frac{1}{2}$, $1^{\circ} \frac{1}{4}$, 3° , $2^{\circ} \frac{1}{2}$, $3^{\circ} \frac{3}{4}$, $2^{\circ} \frac{1}{2}$ and $6^{\circ} \frac{1}{2}$ a-day on mean time; and *A* gained on the same day, respectively, 2° , $2^{\circ} \frac{1}{2}$, $3^{\circ} \frac{1}{2}$, $2^{\circ} \frac{1}{2}$, 5° , $4^{\circ} \frac{1}{2}$, and $14^{\circ} \frac{1}{2}$ a-day. *A* gained on mean time, at Brest, from the 4th of November to the 7th, at the rate of $7^{\circ} \frac{1}{2}$ in 24 hours, and *S* at the rate of $5^{\circ} \frac{1}{5}$.

In November 1768, the time-keepers, No 6. and No 8. made by M. Berthoud, were put to the trial in a voyage conducted by M. Fleuriu.

	No 8 lost per day.	No 6 lost per day.
Nov. 14th to Dec. 7th, at Rochford,	$4^{\circ} 12'$	$6^{\circ} 33'$
Dec. 22d to Jan. 18th, 1769, Île d'Aix,	$5^{\circ} 09'$	$4^{\circ} 80'$
March 1st to the 4th, at Cadiz,	$8^{\circ} 54'$	$5^{\circ} 61'$
April 13th to 18th, at St Jago,	$11^{\circ} 61'$	$7^{\circ} 81'$
May 11th to 14th, Martinico,	$13^{\circ} 47'$	$4^{\circ} 17'$
June 7th to the 11th, at St Domingo,	$14^{\circ} 42'$	$7^{\circ} 94'$
July 25th to the 31st, at Tercera,	$16^{\circ} 75'$	$12^{\circ} 78'$
Aug. 18th to the 21st, at Teneriffe,	$19^{\circ} 27'$	$14^{\circ} 05'$
Oct. 4th to the 10th, at Cadiz,	$15^{\circ} 92'$	$25^{\circ} 03'$
Nov. 1st to the 13th, at the Île of Aix,	$18^{\circ} 60'$	$25^{\circ} 10'$

In the month of October 1771, two watches made by M. Le Roy, marked *A* and *S*, and M. Berthoud's, No 8. were again sent out on trial under Mess. Verdun, Borda, and Pingre. *A* was the same watch which had been tried before by the Marquis de Courtauvau and M. Cassini; but that marked *S* was a new one. They had also with them a small watch made by M. Le Roy, which, on account of its size and form, they called *La petite ronde*; but this did not answer at all. The performances of the other three were as follow:

	No 8.	Watch A.	Watch S.
At Brest, Oct. 10th to 26th, 1771,	Gain. $1^{\circ} 39'$	Lost $2^{\circ} 14'$	Gain. $1^{\circ} 48'$
Cadiz, Nov. 21st to Decem. 1st,	Do. $0^{\circ} 50'$	Do. $1^{\circ} 00'$	Do. $1^{\circ} 38'$
St Cruz, Dec. 24th to Jan. 3d, 1772,	Do. $0^{\circ} 19'$	Gain. $0^{\circ} 44'$	Do. $2^{\circ} 63'$
Goree, 16th to 25th January,	Do. $1^{\circ} 46'$	Do. $1^{\circ} 44'$	Do. $1^{\circ} 67'$
Fort Royal, 17th to 26th Feb.	Do. $1^{\circ} 11'$	Do. $2^{\circ} 66'$	Do. $0^{\circ} 66'$
Fort Royal, 12th to 16th March,	—	Do. $4^{\circ} 19'$	Do. $1^{\circ} 12'$
Fort Royal, 28th Mar. to 7th Apr.	Do. $0^{\circ} 50'$	—	Do. $1^{\circ} 09'$
Cape Francois, 18th Mar. to 30th Apr.	Lost $0^{\circ} 63'$	—	Do. $2^{\circ} 24'$
Miquelon, 30th May to 4th June,	Do. $3^{\circ} 00'$	—	Do. $9^{\circ} 00'$
Patuxford, 10th to 18th July,	Do. $4^{\circ} 72'$	—	Do. $8^{\circ} 22'$
Copenhagen, 20th Aug. to 4th Sept.	Gain. $0^{\circ} 51'$	—	Do. $7^{\circ} 01'$
Brest, 10th to 17th October,	Do. $0^{\circ} 04'$	—	Do. $8^{\circ} 07'$

On the 17th of March the ship struck on the Wil-

lington Rock, which lies off the island of Antigua; and the thermometer of compensation for heat and cold of the watch *A* was broken by the shock, and the watch put entirely out of order. This accident was the cause of their putting back to Port Royal.

From this account it would appear, that M. Berthoud's time-keepers greatly exceed those of M. Le Roy: but it ought perhaps to be observed, that this (No 8.) is the only one of his making which has performed so well; and even this, on the former trial, did not go with any very great degree of regularity.

About the year 1726, Mr John Harrison, whose name is now so well known on account of his time-keepers, began to apply himself to the construction of them: and in the year 1736, one of them was tried on board his Majesty's ships, in a voyage to and from Lisbon; in which trial it gave so much satisfaction, that he received public encouragement to proceed, and began to entertain hopes of obtaining the reward offered by the act of the 12th of Queen Anne; in order to which, he made three other time-keepers, every one of which was more accurate, and better adapted to the purpose of measuring time truly at sea, than the former. The second of these was finished in 1739; and during the next ten years, its going was so much admired by the ingenious men of those times, that the annual prize-medal, distributed by the Royal Society, for improvements in experimental philosophy, was given to Mr Harrison on St Andrew's day, 1749. Mr Harrison did not finish his third machine until the year 1758; having then a fourth in considerable forwardness, and which he finished in October 1761: this proved so much to his satisfaction, that he wrote immediately to the commissioners of the board of longitude, informing them that he was then ready to make the ultimate trial prescribed by the above-mentioned act. Accordingly Mr William Harrison, son of the inventor, embarked on board his Majesty's ship *Deptford*, in November 1761, with this fourth time-keeper, on a voyage for Jamaica; and the longitude of the island, as shown by the time-keeper on his arrival there, differed but one minute and a quarter of the equator from the true longitude deduced from astronomical observations. The time-keeper also pointed out the longitudes of the several places which they saw in the course of the voyage, in a very exact manner. Mr Harrison junior returned to England with the time-keeper, in the latter end of March 1762, and found that it had erred in the whole, from its setting out to its return to England, no more than $1^{\circ} 54^{\circ} \frac{1}{2}$ in time, or $28 \frac{1}{2}$ minutes of longitude.

Mr Harrison now claimed the whole reward of 20,000*l.* offered by the act of the 12th of Queen Anne (1714); but some doubts arising in the minds of the commissioners concerning the true situation of the island of Jamaica, the manner in which the time at that place had been found, as well as at Portsmouth; and it being further suggested by some, that although the time-keeper happened to be right at these two times, namely when at Jamaica and on its return to England, it was by no means a proof that it had been always so in the intermediate times, another trial was proposed in a voyage to the island of Barbadoes, in which precautions were taken to obviate as many of those objections as possible. Accordingly, the commissioners having

Time. ving previously sent out proper persons to make astronomical observations at that island, which, when compared with other corresponding ones made in England, would determine beyond a doubt its true situation; Mr William Harrison again set out with his father's time-keeper, in the latter end of the month of March 1764, the watch having been compared with equal altitudes before he set out at Portsmouth; and arrived at Barbadoes about the middle of May: where, on comparing it again with equal altitudes of the sun, it was found to show the difference of longitude between Portsmouth and Barbadoes $3^{\circ} 55' 3''$. The true difference of longitude between these places, resulting from astronomical observations, is $3^{\circ} 54' 26''$: consequently the error of the watch was $43''$, or $10' 45''$ of longitude. The watch gained at the rate of $2''$, 58 a-day on mean time, from February 29th to March 21st, at Portsmouth; and lost at the rate of $2''$, 8 a-day, from May 14th to May 17th, at Barbadoes.

In consequence of this and the former trials, Mr Harrison received a moiety of the reward offered by the act of the 12th of Queen Anne, on his explaining the principles by which his time-keeper was constructed, and delivering it, as well as the former three, up to the commissioners of the longitude for the use of the public. He was also promised the other moiety of the reward, when other time-keepers were made on the same principles, either by himself or others, which performed equally well with that which he had last made. This last time-keeper was also sent down to the royal observatory at Greenwich, to be tried there under the direction of the Rev. Mr Maskelyne, his Majesty's astronomer royal. It did not appear, however, that during the time of this trial the watch went with the regularity that was expected; nor indeed with any thing near the regularity that it must actually have gone with during the course of the two voyages that had been made with it; which surprised many, and conveyed no favourable impression of the general utility of this method of discovering the longitude at sea; as it gave reasons for apprehending that the performance, even of the same watch, was not at all times equal; and consequently that little certainty could be expected in the performance of different ones. Moreover, the watch was now found to go faster than it did during its voyage to and from Barbadoes, by about 18 or 19 seconds in 24 hours: but this circumstance was accounted for by Mr Harrison, in a publication intitled, *Remarks on a Pamphlet lately published by the Rev. Mr Maskelyne*; where he tells us, that not expecting the watch would be required of him so soon as it was, he had altered the rate of its going, by trying some experiments which he had not time to finish before he was ordered to deliver the watch up to the board. It is possible that the watch might be disordered by these experiments, and that disorder be the cause of its subsequent irregularity.

Soon after this trial, the commissioners of longitude agreed with Mr Kendall, one of the watchmakers appointed by them to receive Mr Harrison's discoveries, to make another watch on the very same construction with this, in order to determine whether other watchmakers could make them from the account which Mr Harrison had given, as well as himself. The event proved the affirmative: for the watch produced by Mr

Kendall, in consequence of this agreement, went considerably better than that which had been made by Mr Harrison himself: and indeed better than any which have been made since on other principles, this only excepted which is the subject of the account before us.

This watch, made by Mr Kendall on Mr Harrison's construction, was sent out in the second voyage which Captain Cook made towards the South Pole, and round the world, in the years 1772, 1773, 1774, and 1775, to be tried under the care of Mr Wales, who was employed by the board of longitude for that purpose: and it appears from his account, that this watch was losing at the rate of $\frac{1}{2}$ of a second a-day, from March the 24th to April 25th 1772, at the royal observatory at Greenwich. August 1st 1772, at the island of Madeira, latitude $32^{\circ} \frac{1}{2}$ N. longitude 17° W. it lost at the rate of $1''$, 77 a-day on mean time. At the Cape of Good Hope, latitude $33^{\circ} \frac{1}{2}$ S. longitude 18° E. it gained at the rate of $1''$, 2 a-day on mean time, from November 2d to the 14th, 1772; and the greatest variation between the rates of its going on any two days was $5''$, 4. At Dusky Bay, in New Zealand, latitude $45^{\circ} \frac{1}{2}$ S. longitude 166° E. the watch gained at the rate of $6''$, 7 a-day, from the 6th of April to the 25th, 1773, and its greatest variation was $3''$, 6 from any one day to any other in that time. The watch gave the longitude of the island of Madeira $17^{\circ} 6' \frac{1}{2}$ W. which, for aught that is yet known to the contrary, is the exact longitude of that place. It made the longitude of the Cape of Good Hope $18^{\circ} 12' \frac{1}{2}$ E. which is about $11'$ short of the truth; and the longitude of Dusky Bay, in New Zealand, $163^{\circ} 47' \frac{1}{2}$ E. or too little by about $2^{\circ} 15' \frac{1}{2}$. But we ought, perhaps, with the person who had this watch then under his care, to observe, that in the compass of these 13 months the watch had passed through all climates, from the latitude of $51^{\circ} \frac{1}{2}$ N. to 67° S. and over a space nearly equal to the whole equatorial circumference of the earth. The only defect which appears to have been in this watch is, that its rate of going was continually accelerated; but in the three years and a half that it was under this trial, it never amounted to $14'' \frac{1}{2}$ a-day; for on its return to Greenwich, in the month of August 1775, it gained only $13''$ a-day; and its greatest rate during the voyage was at Fayal, one of the western islands, where it gained at the rate of $13''$, 5 a-day on mean time.

In consequence of the going of this watch, the House of Commons were pleased, in 1774, to order the other moiety of the reward offered by the act of the 12th of Queen Anne, to be given to Mr Harrison: and to enact, that any other person who, by means of a time-keeper, the principles of which had not then been made public, should enable a ship to keep her longitude during a voyage of six months, within 60 geographical miles, or a degree of a great circle, should be entitled to a reward of 5000l.; that in case he could enable her to keep her longitude for the same time within 40 geographical miles, or two-thirds of a degree of a great circle, he should be entitled to a reward of 7500l.; or to a reward of 10,000l. if he enabled her to keep it for that time, within 30 geographical miles, or half a degree of a great circle. This determination, however, ought clearly to have been in minutes of the equator; as it now is, it may be subject to numberless disputes.

Time.

This reward was in 1780 claimed by Mr Arnold, who invented a new balance spring, with a compensation for the effects of heat and cold in the balance.

It appears from this report of the going of Mr Arnold's watch, that the mean rate which it went at during the month of February 1779, was losing $0''$, 31 a-day on mean solar time: during the month of March, its mean daily loss was $1''$, 37: during the month of April, $1''$, 38; during the month of May, $1''$, 34; the month of June, $1''$, 47; July $0''$, 31; August $0''$, 55. In the month of September it gained, on mean solar time, at the rate of $0''$, 44 a-day; in October, at the rate of $0''$, 38; at the rate of $0''$, 04 in the month of November; and it lost at the rates $0''$, 50, $0''$, 68, and $0''$, 60, respectively, in the months of December 1779, January and February 1780. From hence it appears, that the parts of this machine which are to counteract the effects of heat and cold, are most exactly adjusted; and perform their office with all the regularity that can ever be expected.

It further appears, that Mr Arnold has very happily adjusted his balance, to go alike in the different positions that the watch may be put into: for we find, that when the watch was in an horizontal position, with the face upwards, it gained at the rate of $1''$, 72 a-day, on mean solar time; with the face downwards, it gained $2''$, 83: in a vertical position, with the hour XII. upwards, it gained at the rate of $0''$, 95 a-days; with the hour VI. highest, at the rate of $3''$, 85 a-days; with the hour IX. highest, at the rate of $0''$, 29 a-day; and with the hour III. highest, it lost at the rate of $0''$, 35 per day.—The greatest difference between the rates at which the watch went on any two days in these 13 months, is $6''$, 69; namely, between its rates on October 8th and December 26th. The greatest difference between its rates of going on any day, and the next to it, is $4''$, 11; namely, between the 26th and 27th of December. So that the greatest error that it would have committed in the difference of longitude on any one day, would have been very little more than one minute; which, as Mr Arnold justly observes, is determining the longitude daily, to as great precision as the latitude can in general be determined.

If we take the mean rate which it went at during the month of February 1779, as a standard rate with which we may compare its going for the following 12 months, we shall find that the greatest error which it would have committed in the longitude shown by it, would have been $2'$, $33''$, 2, or $38'$ $18''$ in longitude: and this error happened about the end of six months, or in the beginning of September; for during these six months, the watch had all along gone slower than it did in the month of February, with which rate of going it is compared; but about the beginning of September it began rather to go faster than it did in the month of February, and by that means began to lessen its total error. And it continued to do so until the latter end of November, when it began again to go slower than it had done in the month of February, and of course to increase the quantity of its total error. And this it continued to do until the latter end of February 1780, when the error appeared again to be at a maximum, and equal to $2'$ $6''$, 6 in time, or $31'$ $39''$ of longitude. After this time it rather decreased to the end of the month,

Harrison's Time-Keeper. See LONGITUDE, and the preceding article.

TIMOLEON, a celebrated Corinthian general, who restored the Syracusans to their liberty, and drove the Carthaginians out of Sicily. See SYRACUSE, n^o 50—54.

TIMON, surnamed *Misanthropos*, or the *Misanth*, a famous Athenian, who lived about 420 B. C. He was one day asked, why he loved the young Alcibiades while he detested all the rest of the human race? on which he replied, "It is because I foresee that he will be the ruin of the Athenians." He carefully avoided all sorts of company; yet went one day to an assembly of the people, and cried with a loud voice, "That he had a fig-tree on which several persons had hanged themselves; but as he intended to cut it down, in order to build a house on the place where it stood, he gave them notice of it, that if any of them had a mind to hang themselves, they must make haste and do it speedily." He had an epitaph engraved on his tomb, filled with imprecations against those who read it. Shakespeare has formed an excellent tragedy on his story.

TIMOR, an island of Asia, in the East-Indian sea, to the south of the Moluccas, and to the east of the island of Java, being 150 miles in length, and 37 in breadth. It abounds in sandal-wood, wax, and honey; and the Dutch have a fort here. The inhabitants are Pagans, and are little better than savages; and some pretend they had not the use of fire many years ago.

TIMOTHEUS, one of the most celebrated poet-musicians of antiquity, was born at Miletus, an Ionian city of Caria, 446 years B. C. He was contemporary with Philip of Macedon and Euripides; and not only excelled in lyric and dithyrambic poetry, but in his performance upon the cithara. According to Pausanias, he perfected that instrument, by the addition of four new strings to the seven which it had before; though Suidas says it had nine before, and that Timotheus only added two, the tenth and eleventh, to that number. See LYRE.

With respect to the number of strings upon the lyre of Timotheus: The account of Pausanias and Suidas is confirmed in the famous *senatus-consultum* against him, still extant, preserved at full length in Boethius. Mr Stillingfleet has lately given an extract from it, in proof of the simplicity of the ancient Spartan music. The fact is mentioned in Athenæus; and Casaubon, in his notes upon that author, has inserted the whole original text from Boethius, with corrections. The following is a faithful translation of this extraordinary Spartan act of parliament. "Whereas Timotheus the Milesian, coming to our city, has dishonoured our ancient music, and despoiling the lyre of seven strings, has, by the introduction of a greater variety of notes, corrupted the ears of our youth; and by the number of his strings, and the novelty of his melody, has given to our music an effeminate and artificial dress, instead of the plain and orderly one in which it has hitherto appeared; rendering melody infamous, by composing in the chromatic instead of the enharmonic:

—The kings and the ephori have therefore resolved to pass censure upon Timotheus for these things: and, farther, to oblige him to cut all the superfluous strings of his eleven, leaving only

Timothy,
Tin.

Tindal
Tintoretto.

only the seven tones; and to banish him from our city; that men may be warned for the future not to introduce into Sparta any unbecoming custom."——]

The same story, as related in Athenæus, has this additional circumstance, That when the public executioner was on the point of fulfilling the sentence, by cutting off the new strings, Timotheus, perceiving a little statue in the same place, with a lyre in his hand of as many strings as that which had given the offence, and showing it to the judges, was acquitted.

It appears from Suidas, that the poetical and musical compositions of Timotheus were very numerous, and of various kinds. He attributes to him nineteen nomes, or canticles, in hexameters; thirty-six proems, or preludes; eighteen dithyrambics; twenty-one hymns; the poem in praise of Diana; one panegyric; three tragedies, the Persians, Phinidas, and Laertes; to which must be added a fourth, mentioned by several ancient authors, called *niohe*, without forgetting the poem on the birth of Bacchus. Stephen of Byzantium makes him author of eighteen books of nomes, or airs, for the cithara, to eight thousand verses; and of a thousand *epithymia*, or preludes, for the nomes of the flutes.

Timotheus died in Macedonia, according to Suidas, at the age of ninety-seven; though the Marbles, much better authority, say at ninety; and Stephen of Byzantium fixes his death in the fourth year of the tenth Olympiad, two years before the birth of Alexander the Great; whence it appears, that this Timotheus was not the famous player on the flute so much esteemed by that prince, who was animated to such a degree by his performance, as to seize his arms; and who employed him, as Athenæus informs us, together with the other great musicians of his time, at his nuptials. However, by an inattention to dates, and by forgetting that of these two musicians of the same name the one was a Milesian and the other a Theban; they have been hitherto almost confounded.

TIMOTHY (St), the disciple of St Paul, was the son of a Gentile: but his mother was a Jewish convert. St Paul wrote two epistles to him, which are acknowledged to be canonical. St Timothy was stoned at Ephesus for opposing the worship of Diana and the superstition of the Gentiles, at one of that goddess's festivals, about the year 109.

TIN, one of the seven perfect metals. See CHEMISTRY, n° 150, 203, 246, 285, 406. See also METALLURGY.

This metal is found very plentifully in the southern parts of Britain, particularly Cornwall, to which and Devonshire the mines are now principally confined. Though in itself the lightest, it is in its ore the heaviest of all the metals. It is very seldom, if ever, found pure, and the appearances of its ore are very different. The finest and richest are styled *tin grains*, or *corns of tin*, being crystals of a black colour of different sizes. It is also found in a heavy black stone, sometimes in a more porous yellow-coloured one, and is commonly intermixed with spar, arsenic, &c. Tin-mines are generally found on the sides of the hills, though veins sometimes pass through valleys or brooks between two hills, and may be traced to the opposite hill. The miners work with the utmost difficulty through hard rocks from three to 70 fathoms depth;

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and it is no less troublesome, as well as dangerous, where the earth is loose and apt to crumble. The veins are of an uncertain thickness; from three inches to three feet. Tin grains or corns of tin yield five parts in eight of metal; whereas tin stones yield only from one in 30 to one in 60, and to one in 120; for these last are also wrought with some small profit.

After melting it is called *black tin*; but before it can be exposed to sale it is carried to one of the five coinage-towns, where, after examination of a piece that is broke from the corner of a block, the arms of the duchy of Cornwall are impressed with an hammer, and then it is called *white tin*. The duty on coinage, which is four shillings on the hundred-weight, belongs to the prince of Wales as duke of Cornwall, and produces a revenue of upwards of 10,000*l. per annum*.

TINDAL (Dr Matthew), a famous English writer, was the son of the reverend Mr John Tindal of Beer-Ferres in Devonshire, and was born about the year 1657. He studied at Lincoln college in Oxford, whence he removed to Exeter, and was afterwards elected fellow of All Souls. In 1683; he took the degree of doctor of law, and in the reign of James II. declared himself a Roman Catholic; but soon renounced that religion. After the Revolution he published several pamphlets in favour of government, the liberty of the press, &c. His "Rights of the Christian Church asserted," occasioned his having a violent contest with the high-church clergy, and his treatise "Christianity as old as the Creation," published in 1730, made much noise, and was answered by several writers, particularly by Dr Conybeare, Mr Forster, and Mr Leland. Dr Tindal died at London in August 1733. He left in manuscript a second volume of his "Christianity as old as the Creation;" the preface to which has been published. Mr Pope has satyrized Dr Tindal in his *Dunciad*.

TINDALE, or TYNDALE. See TYNDALE.

TINE. There are two rivers of this name; the one called *North Tine*, which rises on the borders of Scotland; and the other called *South Tine*, which rises on the confines of Cumberland; the one running south-east, and the other north-east. They unite their waters at Hexham; and continuing to run east, divide the counties of Durham and Northumberland, passing by Newcastle, and falling into the German sea at Timouth.

TINNING, the covering or lining any thing with melted tin, or tin reduced to a very fine leaf. Looking-glasses are foliated or tinned with thin plates of beaten tin, the whole bigness of the glass, applied or fastened thereto by means of quicksilver. See FOLIATING.

TINNITUS AURIUM, a noise in the ears like the continued sound of bells, very common in many disorders, particularly in nervous fevers.

TINTORETTO, so called from being the son of a dyer, but whose proper name was *Giacomo Robusti*; was an excellent painter, born at Venice in 1512. He was a disciple of Titian; who having observed something extraordinary in his genius, dismissed him from his family, for fear he should become his rival: yet he adhered to Titian's manner of colouring as the most natural, while he studied Michael Angelo's gusto

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Tipperary of designating as the most correct. He was called the *Furious Tintoret*, from his bold manner of painting, with strong lights and deep shadows; from the rapidity of his genius; and from his grand vivacity of spirit, so much admired by Paul Veronese. Venice was the place of his constant abode, where he was made a citizen, and was wonderfully beloved: he died in 1594. Tintoret had a son and a daughter, both of whom excelled in the art of painting; his daughter Maria especially, who was eminent for an admirable style in portraits, and for her musical talents. She married a German, and died in 1530. Dominico his son gave great hopes in his youth of being a considerable portrait-painter; but fell short by neglecting his talents: he died in 1637.

TIPPERARY, a county of the province of Munster in Ireland, bounded on the west by that of Limerick and the river Shannon, on the east by the county of Kilkenny, on the south by the counties of Cork and Waterford, and on the north and north-east by King's-county and the territory of the ancient O'Carols. It extends about 60 miles in length, 36 in breadth, containing 599,600 acres, divided into 14 baronies, in which are several market-towns and boroughs. It sends eight members to parliament, viz. two for the county, two for the city of Cashel, and two for each of the boroughs of Clonmell, Fethard, and Thurles. The north part of it is mountainous and cold; but in the south the air is milder, and the soil much more fertile, producing plenty of corn, and good pasture for the numerous herds of cattle and flocks of sheep with which it abounds. The north part is called *Ormond*, and for a long time gave the title of *earl*, and afterwards of *marquis and duke*, to the noble family of Butler, descended from a sister of Thomas a Becket archbishop of Canterbury, till, at the accession of George I. the last duke was attainted of high-treason, and died abroad. In that part of the county, the family had great prerogatives and privileges granted them by Edward III. Another district in this county was anciently called the *county of the Holy Cross of Tipperary*, from a famous abbey in it styled *Holy Cross*, on account of a piece of Christ's cross that was said to be preserved there. This abbey and district enjoyed also special privileges in former times. The remains of the abbey, or rather the spot where it stood, are still held in great veneration, and much resorted to by the Roman Catholics.

TIPSTAFF, an officer who attends the judges with a kind of staff tipped with silver, and takes into his charge all prisoners who are committed or turned over at a judge's chambers.

TIPULA, the CRANE-FLY; a genus of insects belonging to the order of diptera. The mouth is a prolongation of the head; the upper-jaw is arched. They have two palpi, which are curved, and longer than the head. The proboscis is short, and bends inwards. They are divided into two families. 1. Those with wings displayed. 2. Those with wings incumbent, and which in form resemble a gnat.

This two-winged insect is often taken for the gnat, which it resembles, but has not its mischievous instinct, nor its murderous proboscis. The larger tipulæ go by the name of *sensitiffes*, the small ones by that of *caliciform*; which latter, in fine summer-evenings, flutter

about the water-side in legions, through which a person may pass on his way unharmed. The shrill noise they make with their wings is not very discernible. Tipulæ, before they become inhabitants of the air, creep under the form of grubs. Those which turn to larger tipulæ dwell in holes of decayed willows, in the dampest places, where they change into chrysalids, and in that state have the faculty of breathing through two small curve horns; besides which they are endowed with progressive motion, but not retrogressive, being impeded by little spines placed on every ring of the abdomen. When the shroud is torn, the insect, prettily apparelled, escapes from his gloomy habitation by means of his wings, which often are variegated, and takes his pasture in the fields. Its long legs, and its wings, mutually assist each other when it either walks or flies. The larvæ and chrysalids of the little tipulæ are found in water. They are various in colour, form, and carriage; some being grey, others brown, and others red; some, like the polypus, furnished with a pair of arms; several with cylindrical tubes that perform the office of vent-holes. These swim with nimbleness; those never leave the holes they have dug themselves in the banks of rivulets. Lastly, others make a silken cocoon that receives part of their body; but all of them, after a period, renounce their reptile and aquatic life, and receive wings from the hands of nature. Their frame is then so weak, that a touch is enough to crush them. They are sometimes of a beautiful green, sometimes coal-black; and the most remarkable are those whose fore-legs, extraordinarily long, do not touch the ground, and are moveable like antennæ. In this state of perfection, the tipulæ being provided with proper organs, apply themselves to the propagation of the species. Those same poor insects, who in the state of larvæ have escaped the voraciousness of fishes, often become, in their progress through the air, a prey to equally merciless birds.

TIRE, in the sea-language, is a row of cannon placed along a ship's side, either above upon deck, or below, distinguished by the epithets of *upper and lower tires*.

TIRESIAS, a famous soothsayer of antiquity, was the son of Evros and the nymph Chariclo. Phercydes says, that Minerva being accidentally seen by Tiresias, as she was bathing with Chariclo in the fountain of Hippocrene, the goddess was enraged, and declared that he should see nothing more, on which he instantly lost his sight: but afterwards received from the goddesses superior endowments. Others say, that Juno struck him stone-blind for deciding a case between Jupiter and her, to her dissatisfaction; for which Jupiter gave him the faculty of divination: He was the most celebrated prophet in the Grecian annals. Ulysses is ordered by Circe to consult him in the shades.

There seek the Theban bard depriv'd of sight,
Within irradiate with prophetic light.

But, besides the honour done to him by Homer, Sophocles makes him act a venerable and capital part in his tragedy of Oedipus. Callimachus ascribes to Minerva the gift of his superior endowments; the pre-eminence of his knowledge is likewise mentioned by Tully in his first book of Divination. And not only Tiresias is celebrated by Diodorus Siculus, but his daughter Daphne, who, like her father, was gifted with

a prophetic spirit, and was appointed priestess at Delphos. She wrote many oracles in verse, from whence Homer was reported to have taken several lines, which he interwove in his poems. As she was often seized with a divine fury, she acquired the title of *sibyl*, which signifies "enthusiast." She is the first on whom it was bestowed: in after-times this denomination was given to several other females that were supposed to be inspired, and who uttered and wrote their predictions in verse; which verse being sung, their function may be justly said to unite the priesthood with prophecy, poetry, and music.

TIROL, or TYROL, a county of Austria, under which may be included the territories belonging to the bishops of Brixen, Trent, and Chur, Teutonic Order, and the prince of Deitrichstein, the Austrian feignories before the Arlberg, and the Austrian districts in Swabia.

This county, with regard to the face of it, is very mountainous. Of these mountains, some have their tops always buried in snow; others are covered with woods, abounding with a variety of game; and others are rich in metals, and marble of all colours. Of the lower, some yield plenty of corn, others wine, and woods of chestnut trees. The valleys are exceeding fertile also, and pleasant. In some places considerable quantities of flax are raised, in others there is a good breed of horses and horned cattle; and, among the mountains, abundance of chamois and wild goats. In this country are also found precious stones of several sorts, as granates, rubies, amethysts, emeralds, and a species of diamonds, agates, cornelians, chalcedonies, malachites, &c. nor is it without hot-baths, acid waters, salt-pits, mines of silver, copper, and lead, mineral colours, alum, and vitriol. The principal river of Tyrol is the Inn, which after traversing the country, and receiving a number of lesser streams into it, enters Bavaria, in which, at Passau, it falls into the Danube. The men here are very tall, robust, and vigorous; the women also are stout, and generally fair: and both sexes have a mixture of the Italian and German in their tempers and characters. As there is little trade or manufacture in the country, except what is occasioned by the mines and salt-works, many of the common people are obliged to seek a subsistence elsewhere. A particular kind of salutation is used all over Tyrol. When a person comes into a house, he says, "Hail! Jesus Christ!" the answer is, "May Christ be praised, and the Holy Virgin his mother." Then the master of the house takes the visitor by the hand. This salutation is fixed up in print at all the doors, with an advertisement tacked to it, importing, that pope Clement XI. granted an hundred days indulgence, and a plenary absolution, to those who should pronounce the salutation and answer, as often as they did it. The emperor has forts and citadels so advantageously situated on rocks and mountains all over the country, that they command all the valleys, avenues, and passes that lead into it. The inhabitants, however, to keep them in good humour, are more gently treated, and not so highly taxed as those of the other hereditary countries. As to the states they are much the same in this country as in the other Austrian territories, except that the peasants here send deputies to the diets. Tyrol came to the house of Austria in the year 1363, when

Margaret, countess thereof, bequeathed it to her uncles the dukes of Austria. The arms of Tyrol are an eagle gules, in a field argent. The counts of Trap are hereditary stewards; the lords of Gloitz, chamberlains; the princes of Trautson, marshals; the counts of Wolkenstein, masters of the horse and carvers; the house of Spaur, cup-bearers; the counts of Kunigl, stewards and rangers; the counts of Brandis, keepers of the jewels; the house of Welfperg, purveyors and staff-bearers; and the counts of Coalto, falconers. Besides the governor, here are three sovereign colleges, subordinate to the court at Vienna, which sit at Inspruck, and have their different departments. Towards the expences of the military establishment of this county, the proportion is 100,000 florins yearly; but no more than one regiment of foot is generally quartered in it.

Tyrol is divided into six quarters, as they are called, namely, those of the Lower and Upper Inthal, Vintigow, Etch, Eisack, and Pustertal.

TITAN, in fabulous history, the son of Cælus and Terra, and the eldest brother of Saturn, suffered the latter to enjoy the crown, on condition that he should bring up none of his male issue, by which means the crown would at length revert to him; but Jupiter being spared by the address of Rhea, Saturn's wife, Titan and his children were so enraged at seeing their hopes frustrated, that they took up arms to revenge the injury; and not only defeated Saturn, but kept him and his wife prisoners, till he was delivered by Jupiter, who defeated the Titans; when from the blood of these Titans slain in the battle, proceeded serpents, scorpions, and all venomous reptiles. See SATURN.

TITHES, in ecclesiastical law, are defined to be the tenth-part of the increase, yearly arising and renewing from the profits of lands, the stock upon lands, and the personal industry of the inhabitants: the first species being usually called *predial*, as of corn, grass, hops, and wood; the second *mixed*, as of wool, milk, pigs, &c. consisting of natural products, but nurtured and preserved in part by the care of man; and of these the tenth must be paid in gross: the third *personal*, as of manual occupations, trades, silviculture, and the like; and of these only the tenth part of the clear gains and profits is due.

We shall, in this article, consider, 1. The original of the right of tithes. 2. In whom that right at present subsists. 3. Who may be discharged, either totally or in part, from paying them.

1. As to their original, we will not put the title of the clergy to tithes upon any divine right; though such a right certainly commenced, and we believe as certainly ceased, with the Jewish theocracy. Yet an honourable and competent maintenance for the ministers of the gospel, is undoubtedly *jure divino*, whatever the particular mode of that maintenance may be. For, besides the positive precepts of the New Testament, natural reason will tell us, that an order of men who are separated from the world, and excluded from other lucrative professions for the sake of the rest of mankind, have a right to be furnished with the necessaries, conveniences, and moderate enjoyments of life, at their expence; for whose benefit they forego the usual means of providing them. Accordingly all municipal laws have provided a liberal and decent maintenance for their national priests or clergy: ours, in parti-

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particular, have established this of tithes, probably in imitation of the Jewish law : and perhaps, considering the degenerate state of the world in general, it may be more beneficial to the English clergy to found their title on the law of the land, than upon any divine right whatsoever, unacknowledged and unsupported by temporal sanctions.

We cannot precisely ascertain the time when tithes were first introduced into this country. Possibly they were cotemporary with the planting of Christianity among the Saxons by Augustin the monk, about the end of the sixth century. But the first mention of them which we have met with in any written English law, is a constitutional decree, made in a synod held A. D. 786, wherein the payment of tithes in general is strongly enjoined. This canon or decree, which at first bound not the laity, was effectually confirmed by two kingdoms of the heptarchy, in their parliamentary conventions of estates, respectively consisting of the kings of Mercia and Northumberland, the bishops, dukes, senators, and people. Which was a few years later than the time that Charlemagne established the payment of them in France, and made that famous division of them into four parts ; one to maintain the edifice of the church, the second to support the poor, the third the bishop, and the fourth the parochial clergy.

The next authentic mention of them is in the *sedes Edwardi et Guthruni* ; or the laws agreed upon between king Guthrun the Dane, and Alfred and his son Edward the Elder, successive kings of England, about the year 900. This was a kind of treaty between those monarchs, which may be found at large in the Anglo-Saxon laws : wherein it was necessary, as Guthrun was a Pagan, to provide for the subsistence of the Christian clergy under his dominion ; and accordingly, we find the payment of tithes not only enjoined, but a penalty added upon non-observance : which law is seconded by the laws of Athelstan, about the year 930. And this is as much as can certainly be traced out with regard to their legal original.

2. Upon the first introduction, though every man was obliged to pay tithes in general, yet he might give them to what priests he pleased ; which were called *arbitrary consecrations of tithes* ; or he might pay them into the hands of the bishop, who distributed among his diocesan clergy the revenues of the church, which were then in common. But when dioceses were divided into parishes, the tithes of each parish were allotted to its own particular minister ; first by common consent or the appointments of lords of manors, and afterwards by the written law of the land.

However, arbitrary consecrations of tithes took place again afterwards, and became in general use till the time of king John. Which was probably owing to the intrigues of the regular clergy, or monks of the Benedictine and other rules, under archbishop Dunstan and his successors ; who endeavoured to wean the people from paying their dues to the secular or parochial clergy, (a much more valuable set of men than themselves), and were then in hopes to have drawn, by sanctimonious pretences to extraordinary purity of life, all ecclesiastical profits to the coffers of their own societies. And this will naturally enough account for the number and riches of the monasteries and religious

houses which were founded in those days, and which were frequently endowed with tithes. For a layman, who was obliged to pay his tithes somewhere, might think it good policy to erect an abbey, and there pay them to his own monks, or grant them to some abbey already erected : since for this donation, which really cost the patron little or nothing, he might, according to the superstition of the times, have masses for ever sung for his soul. But in process of years, the income of the poor laborious parish-priests being scandalously reduced by these arbitrary consecrations of tithes, it was remedied by pope Innocent III. about the year 1200, in a decretal epistle sent to the archbishop of Canterbury, and dated from the palace of Lateran : which has occasioned Sir Henry Hobart and others to mistake it for a decree of the council of Lateran, held A. D. 1179, which only prohibited what was called the *infodation of tithes*, or their being granted to mere laymen ; whereas this letter of pope Innocent to the archbishop enjoined the payment of tithes to the parsons of the respective parishes where every man inhabited, agreeable to what was afterwards directed by the same pope in other countries. This epistle, says Sir Edward Coke, bound not the lay subjects of this realm ; but being reasonable and just, it was allowed of, and so became *lex tertia*. This put an effectual stop to all the arbitrary consecrations of tithes ; except some footsteps which still continue in those portions of tithes which the parson of one parish hath, though rarely, a right to claim in another : for it is now universally held, that tithes are due, of common right, to the parson of the parish, unless there be a special exemption. This parson of the parish may be either the actual incumbent, or else the appropriator of the benefice : appropriations being a method of endowing monasteries, which seems to have been devised by the regular clergy, by way of substitution to arbitrary consecrations of tithes.

Lands and their occupiers may be exempted or discharged from the payment of tithes, either in part or totally, first, by a real composition ; or, secondly, by custom or prescription.

First, a real composition is when an agreement is made between the owner of the lands and the parson or vicar, with the consent of the ordinary and the patron, that such lands shall for the future be discharged from payment of tithes, by reason of some land or other real recompense given to the parson in lieu and satisfaction thereof. This was permitted by law, because it was supposed that the clergy would be no losers by such composition ; since the consent of the ordinary, whose duty it is to take care of the church in general, and of the patron, whose interest it is to protect that particular church, were both made necessary to render the composition effectual : and hence have arisen all such compositions as exist at this day by force of the common law. But experience showing that even this caution was ineffectual, and the possessions of the church being by this and other means every day diminished, the disabling statute 13 Eliz. c. 10. was made ; which prevents, among other spiritual persons, all parsons and vicars from making any conveyances of the estates of their churches, other than for three lives or 21 years. So that now, by virtue of this statute, no real composition made since the 13 Eliz. is good for any longer

term

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term than three lives or 21 years, though made by consent of the patron and ordinary: which has indeed effectually demolished this kind of traffic; such compositions being now rarely heard of, unless by authority of parliament.

Secondly, a discharge by custom or prescription, is where time out of mind such persons or such lands have been, either partially or totally, discharged from the payment of tithes. And this immemorial usage is binding upon all parties; as it is in its nature an evidence of universal consent and acquiescence, and with reason supposes a real composition to have been formerly made. This custom or prescription is either *de modo decimandi*, or *de non decimando*.

A *modus decimandi*, commonly called by the simple name of a *modus* only, is where there is by custom a particular manner of tithing allowed, different from the general law of taking tithes in kind, which are the actual tenth-part of the annual increase. This is sometimes a pecuniary compensation, as twopence an acre for the tithe of land: sometimes it is a compensation in work and labour, as that the parson shall have only the twelfth cock of hay, and not the tenth, in consideration of the owner's making it for him: sometimes, in lieu of a large quantity of crude or imperfect tithe, the parson shall have a less quantity when arrived to greater maturity, as a couple of fowls in lieu of tithe-eggs, and the like. Any means, in short, whereby the general law of tithing is altered, and a new method of taking them is introduced, is called a *modus decimandi*, or special manner of tithing.

A prescription *de non decimando* is a claim to be entirely discharged of tithes, and to pay no compensation in lieu of them. Thus the king by his prerogative is discharged from all tithes. So a vicar shall pay no tithes to the rector, nor the rector to the vicar, for *ecclesia decimas non solvit ecclesie*. But these personal privileges (not arising from or being annexed to the land) are personally confined to both the king and the clergy; for their tenant or lessee shall pay tithes, tho' in their own occupation their lands are not generally tithable. And, generally speaking, it is an established rule, that in lay hands, *modus de non decimando non valet*. But spiritual persons or corporations, as monasteries, abbots, bishops, and the like, were always capable of having their lands totally discharged of tithes by various ways: as, 1. By real composition. 2. By the pope's bull of exemption. 3. By unity of possession; as when the rectory of a parish, and lands in the same parish, both belonged to a religious house, those lands were discharged of tithes by this unity of possession. 4. By prescription; having never been liable to tithes, by being always in spiritual hands. 5. By virtue of their order; as the Knights Templars, Cistercians, and others, whose lands were privileged by the pope with a discharge of tithes. Though, upon the dissolution of abbeyes by Henry VIII. most of these exemptions from tithes would have fallen with them, and the lands become tithable again, had they not been supported and upheld by the statute 31 Henry VIII. c. 13. which enacts, that all persons who should come to the possession of the lands of any abbey then dissolved, should hold them free and discharged of tithes, in as large and ample a manner as the abbeyes themselves formerly held them. And from this original have

sprung all the lands which, being in lay hands, do at present claim to be tithe-free: for if a man can show his lands to have been such abbey-lands, and also immemorially discharged of tithes by any of the means before-mentioned, this is now a good prescription *de non decimando*. But he must show both these requisites: for abbey-lands, without a special ground of discharge, are not discharged of course; neither will any prescription *de non decimando* avail in total discharge of tithes, unless it relates to such abbey-lands.

TITHING, (*Tithinga*, from the Sax. *Theothunga*, i. e. *Decuriam*), is in its first appointment the number or company of ten men with their families, held together in a society, all being bound for the praeable behaviour of each other; and of these companies there was one chief person, who was called *teothung-man*, at this day *tithing-man*: but the old discipline of tithings is long since left off. In the Saxon times, for the better conservation of the peace, and more easy administration of justice, every hundred was divided into ten districts or tithings; and within every tithing, the tithing-men were to examine and determine all lesser causes between villages and neighbours; but to refer greater matters to the then superior courts, which had a jurisdiction over the whole hundred.

TITHING-MEN, are now a kind of petty constables, elected by parishes, and sworn in their offices in the court-leet, and sometimes by justices of the peace, &c. There is frequently a tithing-man in the same town with a constable, who is as it were a deputy to execute the office in the constable's absence; but there are some things which a constable has power to do, that tithing-men and head-boroughs cannot intermeddle with. When there is no constable of a parish, the office and authority of a tithing-man seems to be all one under another name.

TITHONUS, in fabulous history, the son of Laomedon king of Troy, and the brother of Priamus; was beloved by Aurora, who carried him to Delos, thence to Ethiopia, and at last to heaven, where she prevailed on the Destinies to bestow upon him the gift of immortality; but forgot to add that of youth, which could only render the present valuable. At length Tithonus grew so old that he was obliged to be rocked to sleep like an infant, when Aurora, not being able to put an end to his misery by death, transformed him into a grasshopper; which renews its youth by casting his skin, and in his chirping retains the loquacity of old age.

TITIANO, or TITIAN, the most universal genius for painting of all the Lombard school, the best colourist of all the moderns, and the most eminent for histories, portraits, and landscapes, was born at Cadore, in the province of Friuli, in the state of Venice, in 1477. His parents sent him at ten years of age to one of his uncles at Venice, who finding that he had an inclination to painting, put him to the school of Giovanni Bellini, where he greatly improved himself, by his endeavouring to excel Giorgione his fellow disciple, and became the greatest colourist ever known. He designed with much greater ease than Giorgione. Some of his women and children, says du Fresnoy, are admirable both for the design and colouring; they are in a delicate and noble gusto, with a certain pleasing negligence of the head-dresses, draperies, and ornaments

Tithing
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Titiano.

Titiano,
Title.

of the habits peculiar to him. However, the figures of his men are designed but moderately well, and some of their draperies are mean. His painting is wonderfully glowing, sweet, and delicate. He made portraits that were extremely noble; the attitudes being very graceful, grave, and adorned after a becoming manner. Nobody ever painted landscapes with so great a manner, so good a colouring, and with such a resemblance of nature. For eight or ten years he took the pains to copy with great exactness whatever he performed, in order to obtain an easy method, and to establish some general maxims for his future conduct. Besides his excellent gusto in colours, in which he excelled all mankind, he perfectly understood how to give every thing the touches most proper and suitable to it, such as distinguish them from each other, and which give the greatest spirit and the most of truth. He was, however, censured by Michael Angelo Buonarroti for want of correctness in design, a fault common to all the Lombard painters who had not been acquainted with the antiques, yet that defect was abundantly supplied by his being master of all the other parts of an accomplished artist.

Titian made three portraits of the emperor Char. V. who honoured him with knighthood, created him count palatine, made all his descendants gentlemen, and assigned him a considerable pension out of the chamber of Naples. It is said this emperor one day took up a pencil that Titian dropped when drawing his picture; and that upon the compliment made him by the artist on this occasion, he replied, "Titian deserves to be served by Cæsar." In short, some of that emperor's courtiers being unable to conceal their jealousy on the visible preference he showed to Titian's person and conversation, the emperor told them, that he could never want courtiers, though he might a Titian. He accordingly loaded him with wealth; and whenever he sent him money, he did it with this obliging observation, That it was not to pay him the value of his pictures, because that was above all price. Titian also painted that emperor's son Philip II. Solymann emperor of the Turks, three kings, two empresses, several queens, two popes, and almost all the princes of Italy; and so great was his reputation, that there was hardly a person of any eminence in Europe from whom he did not receive some marks of esteem; for being of an obliging and generous temper, his house at Venice was the constant rendezvous of all the virtuosi and people of quality. He was of so happy a constitution, that he was never ill till the year 1576, when he died of the plague, at 99 years of age. His disciples were Paolo Veronese, Giacomo Tintoret, Giacomo de Ponte Baffano, and his sons.

Horatio, Titian's youngest son, painted several portraits that might stand in competition with those of his father. He was also famous for many history-pieces, which he executed at Venice in concurrence with Paul Veronese and Tintoret: but, bewitched at last with alchemy, he laid aside his pencil, and, in search of the philosophers' stone, converted all his paternal inheritance into smoke.

TITLE, an appellation of dignity or quality, given to princes and other persons of distinction. Thus the title of his Britannic majesty is, *King of Great Britain, France, and Ireland*; that of the French king is,

King of France and Navarre: and so of others. The pope assumes the title of *Holiness*, and the cardinals that of *Eminence*, &c.

TITLE, in law, denotes any right which a person has to the possession of a thing, or an authentic instrument whereby he can prove his right. See the articles, RIGHT, PROPERTY, &c.

TITLE to the Crown in the British Constitution. See SUCCESSION.

TITMOUSE, in ornithology. See PARUS.

TITULAR, denotes a person invested with a title, in virtue of which he holds an office or benefice, whether he perform the functions thereof or not.

TITUS VESPASIANUS, the Roman emperor, the son of Vespasian; of whom it is related, that not being able to recollect any remarkable good action he had done on a certain day, he exclaimed, "I have lost a day!" He might truly be called the *father of his people*; and though Rome laboured under various public calamities during his reign, such was his equitable and mild administration, that he constantly preserved his popularity. He was a great lover of learning, and composed several poems. He reigned but two years; and it is thought Domitian his brother poisoned him, A. D. 81, aged 41. See (*History of*) ROME.

TIVIOT, or CHEVIOT, HILLS, are high hills in the county of Northumberland in England.

TOAD, in zoology. See RANA.

TOAD Fish. See LOPHIUS.

TOAD-Flax, in botany. See ANTIRRHINUM.

TOBACCO, in botany. See NICOTIANA.

TOBACCO-Pipe-Fish. See FISTULARIA.

TOBAGO, one of the Caribbee islands, ceded to Great Britain by the treaty of Paris in 1763, but taken by the French in the course of last war. It lies in the latitude of 11 degrees 10 minutes north, and 59 degrees 40 minutes longitude west from London, about 40 leagues south-by-west from Barbadoes, 35 south-east from St Vincents, 20 south-east from Grenada, 12 north-east from the Spanish island of Trinidad, and between 30 and 40 north-east from the Spanish main. According to the latest accounts, it is somewhat more than 30 miles in length from north-east to south-west, between 8 and 9 in breadth, and from 23 to 25 leagues in circumference. The English visited this island very early, Sir Robert Dudley being there in the reign of queen Elizabeth. In that of Charles I. William Earl of Pembroke procured a grant of this, with two other small islands; but died before he was able to carry into execution his design of settling them. In A. D. 1632 some merchants of Zealand sent over a small colony thither, and gave it the name of *New Walcheren*; but before they were able thoroughly to establish themselves, they were destroyed by the Indians assisted by the Spaniards. Ten years after, James Duke of Courland sent a colony thither, who settled themselves upon Great Courland bay, and made a considerable progress in planting. A. D. 1654, Messieurs Adrian and Cornelius Lampins, two opulent merchants of Flushing, sent a considerable number of people thither, who settled on the other side of the island, and lived in amity with the Courlanders until they learned that the king of Sweden had seized the person of their duke and dispossessed him of his dominions, when they attacked and forced his subjects to submit.

Title
Tobago.

Tobago,
Tobolski.

submit. The duke being afterwards restored, he obtained from Charles II. a grant, dated the 17th of November 1664, of this island. In the second Dutch war the count d'Estrees, by order of his master, totally ruined it at the close of the year 1677, and from that time it continued waste till we took possession of it after the treaty of Paris. The climate, notwithstanding its vicinity to the line, is so tempered by the breezes from the sea, as to be very supportable even to Europeans; and hath the same advantages with that of Grenada, in having regular seasons, and also in being exempt from the hurricanes. There are throughout the island many rising grounds, though, except at the north-east extremity, there is no part of it that can be styled mountainous, and even there the country is far from being rugged or impassable. The soil, if we may credit either Dutch or French writers, is as fertile and luxuriant as any of the islands, and very finely diversified. Ground provisions of all sorts have been raised in great plenty, a vast variety of vegetables, excellent in their kind, some for food, some for physic. Almost every species of useful timber is to be found here, and some of an enormous size; amongst others, the true cinnamon and nut-meg tree, as the Dutch confess, and of which none could be better judges; whole groves of salafra, and of trees that bear the true gum copal, with other odoriferous plants that render the air wholesome and pleasant. It is as well watered as can be wished, with rivers that fall into the sea on both sides, many smaller streams, and fine fresh springs in almost every part of the island. The sea-coast is indented by 10 or 12 fair and spacious bays, and there are amongst these one or two ports capable of receiving as large ships as ever visited those seas. There are wild hogs in great plenty, abundance of fowls of different kinds, and a vast variety of sea and river fish. At the north-east extremity lies Little Tobago, which is two miles long, and about half a mile broad, very capable of improvement.

TOBOLSKI, the capital of Siberia, is situated at the confluence of the rivers Tobol and Irtysh, in N. Lat. 58. E. Long. 63. The city stands upon the ascent of a high hill, the lower part of which is inhabited by Mahometan Tartars, who carry on a considerable traffic upon the river Irtysh, and convey their merchandise quite across Great Tartary, as far as China. The river Irtysh is reckoned as rapid as the Danube; runs from the south, and empties itself into the Ob; the Tobol washes the other side of the town, and a little below it falls into the Irtysh. By means of these two rivers, there is a constant flow of merchandise into the city during the summer-season. Tobolski is therefore a great mart for the commodities of Muscovy, Tartary, and other countries; and here is a great concourse of merchants. All sorts of provisions are plentiful and cheap. An hundred weight of rice is sold for sixteen copeks, equal to about eightpence sterling; a sturgeon, weighing forty pounds, for half that money; an ox for two rix-dollars, and every other article in proportion: the adjacent country abounds with game in great variety. The supreme court of judicature for all Siberia is held in this city, which is also the seat of a metropolitan, sent hither from Moscow to exercise spiritual jurisdiction over the whole kingdom. Tobolski is well fortified,

and defended by a strong garrison, under the command of the waiwode, who resides in the place, and takes charge of the fur tribute, which is here deposited in proper magazines. This governor enjoys a very extensive command, and can occasionally bring into the field nine thousand men, besides a strong body of Tartars on horseback, to make head against the Khalmucks and Cossacks, in their repeated incursions. A sufficient number of Russians, called *Jemskoiks*, are kept in continual pay by the government, on the banks of the Irtysh, to supply travellers on the czar's account with men, boats, or carriages, to convey them as far as Surgut on the Ob, a voyage of two hundred leagues by water. This is the common method of travelling in the summer; but in winter the journey by land is not half so long, being performed in sleds over the ice and snow, with which the country is covered. These sleds are moved by a pair of dogs, which will draw a load of three hundred pounds with surprising expedition. They are hired at easy rates, and during one half of the year may be seen flying over the snow in great numbers.

TOCKAY, a very strong town of Upper Hungary, in the county of Zimplin, with a castle. It is noted for its excellent wine, which is produced but in one vineyard, inasmuch that it is scarce at Vienna itself; so that it is no wonder to find other wines often sold for it. Some distance from the town are large salt-works. It is seated at the confluence of the rivers Bodrag and Teisse. E. Long. 21. 5. N. Lat. 48. 0.

TODDY. See ARACK.

TOGA, in Roman antiquity, a wide woollen gown or mantle; which seems to have been of a semicircular form, without sleeves; differing both in richness and largeness, according to the circumstances of the wearer, and used only upon occasion of appearing in public.

Every body knows that the toga was the distinguished mark of a Roman; hence, the *jus togæ*, or privilege of a Roman citizen; *i. e.* the right of wearing a Roman habit, and of taking, as they explain it, fire and water through the Roman empire.

TOISE, a French measure containing six of their feet, or a fathom.

TOLAND (John), a very famous writer, was born near Londonderry in Ireland, 1670, and educated in the Popish religion; but at sixteen years of age embraced the principles of the Protestants. He studied three years at the university of Glasgow; was created master of arts in the university of Edinburgh; and afterwards completed his studies at Leyden, where he resided two years. He then went to Oxford, where, having the advantage of the public library, he collected materials upon various subjects, and composed some pieces, among which was, A Dissertation to prove the received history of the tragical death of Atilius Regulus, the Roman consul, to be a fable. He began likewise a work of greater consequence, in which he undertook to show that there are no mysteries in the Christian religion. He published it in 1696 at London, under the title of *Christianity not mysterious*. This book gave great offence, and was attacked by several writers. He afterward wrote in favour of the Hanoverian succession, and many other pieces. In 1717 he went into Germany, where he vi-

Tockay
Toland.

sited

Toledo,
Toleration.

sited several courts; and in 1710 he was introduced to prince Eugene, who gave him several marks of his generosity. Upon his return to England he was for some time supported by the liberality of the earl of Oxford lord-treasurer, and kept a country-house at Epfom; but soon losing his lordship's favour, he published several pamphlets against that minister's measures. In the four last years of his life he lived at Putney, but used to spend most part of the winter in London. Mr Toland died at London in 1722. He was a man of uncommon abilities, published a number of curious tracts, and was perhaps the most learned of all the infidel writers: but his private character was far from being an amiable one; for he was extremely vain, and wanted those social virtues which are the chief ornaments as well as duties of life. His posthumous works, 2 vols 8vo, were published in 1726, with an account of his life and writings, by Mr Desmaizeaux.

TOLEDO, an ancient and trading city of Spain in New Castile, of which it was formerly the capital. It is advantageously seated on the river Tajo, which surrounds it on two sides; and on the land-side it has an ancient wall built by a Gothic king, and flanked with 100 towers. It is seated on a mountain, which renders the streets uneven, and which are narrow; but the houses are fine, and there are a great number of superb structures, besides 17 public squares, where the markets are kept. The finest buildings are the royal castle and the cathedral church; which last is the richest and most considerable in Spain. It is seated in the middle of the city, joining to a handsome street, with a fine square before it. Several of the gates are very large, and of bronze. There is also a superb steeple extremely high, from whence there is a very distant prospect. The Sagrario, or principal chapel, is a real treasury, in which are 15 large cabinets let into the wall, full of prodigious quantities of gold and silver vessels, and other works. There are two mitres of silver gilt, set all over with pearls and precious stones, with three collars of massy gold, enriched in like manner. There are two bracelets and an imperial crown of the Virgin Mary, consisting of large diamonds and other jewels. The weight of the gold in the crown is 15 pounds. The vessel which contains the consecrated wafer is of silver gilt, as high as a man, and so heavy, that it requires 30 men to carry it; within it is another of pure gold enriched with jewels. Here are 38 religious houses, most of which are worthy a traveller's notice, with many other sacred buildings, a great number of churches belonging to 27 parishes, and some hospitals. Without the town are the remains of an amphitheatre, and other antiquities. It is an archbishop's see, has a famous university, and several manufactories of silk and wool. It is very pleasantly seated in E. Long. 3. 15. N. Lat. 43. 6.

TOLERATION, in matters of religion, is either civil or ecclesiastical. Civil toleration is an impunity and safety granted by the state to every sect that does not maintain doctrines inconsistent with the public peace: and ecclesiastical toleration is the allowance which the church grants to its members to differ in certain opinions, not reputed fundamentals. See NON-CONFORMISTS.

On the subject of religious toleration, we have the

following observations in Dr Robertson's history of Charles V. "Among the ancient heathens, all whose deities were local and tutelary, diversity of sentiments concerning the objects or rites of religious worship seems to have been no source of animosity; because the acknowledging veneration to be due to one God, did not imply a denial of the existence or the power of any other god; nor were the modes and rites of worship established in one country incompatible with those which other nations approved and observed. Thus the errors in their system of theology were of such a nature as to be productive of concord; and notwithstanding the amazing number of their deities, as well as the infinite variety of their ceremonies, a sociable and tolerating spirit subsisted almost universally in the Pagan world.

"But when the Christian revelation declared one Supreme Being to be the sole object of religious veneration, and prescribed the form of worship most acceptable to him, whoever admitted its truth, held every other mode of religion to be absurd and impious. Hence the zeal of the first converts to the Christian faith in propagating its doctrines, and the ardour with which they laboured to overturn every other form of worship. They employed, however, for this purpose, no methods but such as suited the nature of religion. By the force of powerful arguments, they convinced the understandings of men; by the charms of superior virtue, they allured and captivated their hearts. At length the civil power declared in favour of Christianity, and though numbers, imitating the example of their superiors, crowded into the church, many still adhered to their ancient superstitions. Enraged at their obliquity, the ministers of religion, whose zeal was still unabated, though their facility and virtue were much diminished, forgot so far the nature of their own mission, and of the arguments which they ought to have employed, that they armed the imperial power against these unhappy men; and as they could not persuade, they tried to compel them to believe.

"At the same time, controversies concerning articles of faith multiplied, from various causes, among Christians themselves; and the same unhallowed weapons which had first been used against the enemies of their religion were turned against each other. Every zealous disputant endeavoured to interest the civil magistrate in his cause, and each in his turn employed the secular arm to crush or to exterminate his opponents. Not long after, the bishops of Rome put in their claim to infallibility in explaining articles of faith, and deciding points in controversy; and, bold as the pretension was, they, by their artifices and perseverance, imposed on the credulity of mankind, and brought them to recognize it. To doubt or to deny any doctrine to which these unerring instructors had given the sanction of their approbation, was held to be not only a resisting of truth, but an act of rebellion against their sacred authority; and the secular power, of which, by various arts, they had acquired the absolute direction, was instantly employed to avenge both.

"Thus Europe had been accustomed, during many centuries, to see speculative opinions propagated or defended by force, the charity and mutual forbearance which Christianity recommends with so much warmth, were forgotten, the sacred rights of conscience and of private

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private judgment were unheard of; and not only the idea of toleration, but even the word itself, in the sense now affixed to it, was unknown. A right to extirpate error by force, was universally allowed to be the prerogative of those who possessed the knowledge of truth; and as each party of Christians believed they had got possession of this invaluable attainment, they all claimed, and exercised, as far as they were able, the rights which it was supposed to convey. The Roman Catholics, as their system rested on the decisions of an infallible judge, never doubted that truth was on their side, and openly called on the civil power to repel the impious and heretical innovators who had risen up against it. The Protestants, no less confident that their doctrine was well-founded, required with equal ardour the princes of their party to check such as presumed to impugn or oppose it. Luther, Calvin, Cranmer, Knox, the founders of the reformed church in their respective countries, inflicted, as far as they had power and opportunity, the same punishments which were denounced against their own disciples by the church of Rome, on such as called in question any article in their creeds. To their followers, and perhaps to their opponents, it would have appeared a symptom of diffidence in the goodness of their cause, or an acknowledgment that it was not well-founded, if they had not employed in its defence all those means which it was supposed truth had a right to employ.

"It was towards the close of the 17th century, before toleration, under its present form, was admitted first into the republic of the United Provinces, and from thence introduced into England. Long experience of the calamities of mutual persecution, the influence of free government, the light and humanity acquired by the progress of science, together with the prudence and authority of the civil magistrate, were all requisite in order to establish a regulation so repugnant to the ideas which all the different sects had adopted from mistaken conceptions concerning the nature of religion and the rights of truth."

TOLOSA, a town of Spain, in the province of Biscay, and capital of Guipuscoa. It is not large, but it is the capital of the province. It is seated in a pleasant valley, between two rivers, Araxes and Oriz; over which there are two handsome bridges, and near them are several natural cascades. W. Long. 2. 3. N. Lat. 43. 12.

TOLU, a town of South America, in Terra Firma, and in the government of Carthagena; famous for the fine balsam of Tolu, brought into Europe from thence, and produced from a tree like a pine. It is seated on a bay of the north sea, 60 miles south of Carthagena. W. Long. 72. 55. N. Lat. 9. 40.

TOLUIFERA, the BALSAM OF TOLU TREE; a genus of the monogynia order, belonging to the decandria class of plants. There is but one species, growing naturally near Carthagena in America, from whence the late Dr Houstoun sent the seeds to England: in its native place this grows to a tree of a large size. The bark is very thick, rough, and of a brown colour; the branches spread out wide on every side, and are garnished with winged leaves, composed of several oblong lobes, placed alternately along the foot-stalk, terminated by an odd one, rounded at both ends, but run out to an acute point at the top; they are

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smooth, of a light-green colour, and sit close to the foot-stalk. The flowers are produced in small bunches at the wings of the branches, each standing upon a slender foot-stalk almost an inch long; their empalements are of the round bell-shape, being of one leaf, which is slightly scalloped at the brim into five obtuse parts. The flower has four narrow petals of a yellow colour, which are a little longer than the empalement, and one more whose tail is of the same length with the other petals; the top is of an oval heart-shape, stretched out beyond the other parts; it has ten short stamina within the tube of the flower, which are terminated by oblong erect summits, of a sulphur colour; and at the bottom of the tube is situated a roundish germen, having a very short style, crowned by an acute-pointed stigma. After the flower is past, the germen turns to a roundish fruit the size of a large pea, divided into four cells, each containing one oblong oval seed.—This tree may be propagated by seeds, which must be procured from the country where it grows naturally, and should be fresh, otherwise they will not grow. When they are gathered from the tree, they should be put up in sand to preserve them; for when they are sent over in papers, the insects generally devour them. These seeds must be sown in pots filled with light earth as soon as they arrive, and plunged into the tan. If it should happen in autumn or winter, they should be plunged into the stove; but in spring or summer, they may be plunged into the tan-bed under a frame; they should be taken out of their covers, otherwise they will be long in the ground before they vegetate. When the plants come up, and are fit to remove, they should be carefully transplanted, each into a separate pot, and plunged into a good hot-bed of tanners bark, shading them from the sun till they have taken new root; after which they should be treated in the same way as the coffee-tree, with which management the plants will succeed.

TOMPION, a sort of bung or cork used to stop the mouth of a cannon. At sea this is carefully encircled with tallow or putty, to prevent the penetration of the water into the bore, whereby the powder contained in the chamber might be damaged or rendered incapable of service.

TON, a measure or weight. See TUN.

STONE, or TUNE, in music, has several senses.

1. It is most immediately taken for that interval which characterizes the diatonic system or species, or what, in our language, we call a note played or sung. In this acceptance there are two kinds of tones; viz. the *major tone*, whose proportion is as 8 to 9, and which results from the difference between the fourth and the fifth; and the *minor tone*, whose proportion is as 9 to 10, and which results from the difference between the third minor and the fourth.—The production of the major and that of the minor tone, are equally found beginning with *ut* at the second *re*, which forms a fifth above *sol*: for the quantity by which this *re* is superior to the octave of the first *ut*, is exactly in the proportion of 8 to 9; and that by which the same *re* is inferior to *mi*, the third major of that octave, is in the proportion of 9 to 10.

2. That degree of elevation which is taken by voices or instruments for performing a piece of music, is likewise called the *tone* or *pitch*. It is in this sense that

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Tone.

we say, in a concert, the *tone* is too high or too low.

3. Tone is taken for a rule of modulation with relation to a fundamental note or principal sound, which is called the *tonic* or *key note*. See Tonic.

With respect to the tones of the ancients, may be consulted Rousſſeau's Dictionary, at the word *Modes*.

As our modern system contains in each octave 12 different notes or sounds, which, relatively to that octave, are called *semi-tones*; each of these sounds may serve for the fundamental of a tone, that is to say, may be its tonic. These tones are already 12; but as the major and minor modes are applicable to each of them, upon these 12 there are 24 different modulations of which our music is susceptible. See MODULATION.

These tones differ one from another by various degrees of elevation between the lowest and highest, according as the tonic takes its station. They differ also by the different alteration of sounds and intervals produced in each tone by the temperament; so that, upon a harpsichord properly in tune, a practised ear recognizes any tone whatever whose modulation it hears; and these tones are equally recognized upon harpsichords, though tuned higher or lower some than others: which shows, that this discernment proceeds at least as much upon the modification which every note receives from the whole chord, as upon the degree of elevation which the tonic occupies in the harpsichord.

From hence arises a succession of varieties and beauties in modulation. From hence arises a wonderful diversity and energy in the expression. From hence arises, in short, the power of exciting different feelings by similar chords, when struck in different tones. Would you produce the majestic, the grave? The *F ut fa*, and the major tones effectuated by a flat, will express it nobly. Would you produce the gay and the cheerful? Take *A mi la*, *D la re*, the major tones effectuated by a sharp. Would you produce such strains as are moving and tender? Take the minor tones effectuated by a flat. *C sol ut* minor, inspire the soul with tenderness; *F ut fa* minor, carry it even to melancholy and grief. In a word, every tone, every mode, has its peculiar expression, which ought to be known and perceived with delicacy; and this is one of the means which render a composer of art and genius in some degree master of the affections of those who hear him. It is, however, a kind of succedaneum to the ancient modes, though far from reaching their expression or energy.

Yet it is this rich and agreeable diversity of which (says Rousſſeau) M. Rameau would deprive music, in wholly reducing every mode to one insipidly equal and monotonous harmony, by his rule for temperament, though it had been so often proposed and neglected before him. According to this author, the whole harmony would be more perfect by its observation. It is nevertheless absolutely certain, that nothing can be gained by this on one hand, without losing its equivalent on the other; and though we should grant (what is by no means true) that by this temperament the harmony in general would be rendered more pure, would this compensate what we lose in point of expression? See TEMPERAMENT.

To what has been already said by M. Rousſſeau, we must beg leave to add two observations. 1. The essence of the tone consists in this, that by it the series

of diatonic intervals immediately rising or descending, whether major or minor, is regulated and known from any fundamental note which we assume. Tone, therefore, is the constitution of the octave, as determined by that fundamental note. The fundamental note itself is the key. Hence the *tone* differs from the *mode*, as the former regulates the nature and succession of intervals contained in the octave; the latter modifies all the chords whether natural or artificial, particularly the third and fifth. 2. M. D'Alembert, in the second edition of his Elements, (see the article Music, n° 72. note u) has considered at some length, and with some degree of accuracy, the advantages and inconveniences resulting from temperament. He seems fairly to have stated the objections of musicians against it. He affirms, that without it, in passing from one mode to another, the ear is shocked; and agrees with M. Rameau, that the character of different harmonies does not arise from any differences in the intervals of the diatonic scale, but from the ingenious and agreeable intertexture of the modes, and from other circumstances enumerated in the note. He adds, that from all which has been said in his work concerning the formation of the diatonic scale, and that species of music which it characterizes, it must appear to be the obvious intention of nature, that the intervals in that system, whether major or minor, whether consisting of a semi-tone or a full note, should each of them be exactly similar one to another, which cannot be effectuated without having recourse to temperament.

TONGUE, in anatomy. See there n° 366, d. and 403.

TONIC, in music, signifies a certain degree of tension, or the sound produced by a vocal string in a given degree of tension, or by any sonorous body when put in vibration. It has already been observed in other articles, that the word *tone* signifies the natural series or succession of the diatonic scale, whether major or minor, or consisting in intervals of both kinds, commencing from any particular note. The tonic therefore, or key, is the sound from whence that series commences; and it is so called, because it establishes the nature of the series, and, as it were, opens a passage to it. With this every piece of music, whether in harmony or melody, for the most part begins, at least when the excluded notes are finished. By excluded notes we mean those notes which are separated from the air by a bar, yet which do not constitute a bar; because they are parts of a time, the rest of which is supposed to have passed before the commencement of the air; and for which, at the end of the strain, there is, or ought to be, always an interval in duration left unoccupied.

Here then we have said, that the air commences for the most part with its tonic or key; that it should end with the same note, is a rule more generally observed, and more necessary to be observed; but that its basis should end upon the tonic, is indispensable. Whatever kind of third the key or tonic has above it, determines the mode. If the third be major, such likewise is the mode; if minor, the mode is also minor. Thus, upon every tonic or key, we may compose in either mode. In short, musicians recognize this peculiarity in the tonic, that the perfect chord does not rigorously belong to any other note except itself. When that chord is struck upon another note, either some dissonance

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Tonic
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Tonquin.

nance is underfoot, or some other note becomes the key for that instant.

By this method of transposition, the tonic or key bears the name of *C* or *at* in the major mode, and of *A* or *la* in the minor. See Music, Chap. XII.

Tonic, says Rousseau, is likewise the name given by Aristoxenus to one of the three kinds of chromatic music whose divisions he explains, and which was the ordinary chromatic of the Greeks, proceeding by two semi-tones in succession, and afterwards a third minor.

Tonic Dominant. See DOMINANT.

TONNAGE and POUNDAGE, an ancient duty on wine and other goods. The origin of tonnage and poundage seems to have been this. About the 21st of Edward III. complaint was made that merchants were robbed and murdered on the seas. The king thereupon, with the consent of the peers, levied a duty of 2s. on every ton of wine, and 6d. in the pound on all goods imported; which was treated as illegal by the commons. About 25 years after, the king, when the knights of shires were returned home, obtained a like grant from the citizens and burghes, and the year after it was regularly granted in parliament. These duties were diminished sometimes, and sometimes increased; at length they seem to have been fixed at 3s. tonnage and 1s. poundage. In old times these were distinguished from customs, which were considered as duties on staple commodities, though they have been long since blended together. The fixing of staple towns had its advantages and disadvantages; and even the great staple at Calais, which rendered the loss of that place so much regretted, cramped our navigation. By successive acts of the legislature, the liberty and property of the subjects of all ranks being better secured, promoted domestic industry, and thereby the welfare and happiness of the people.

TONQUIN, a kingdom of Asia, in the East Indies, beyond the Ganges; bounded on the north by the province of Yunnan in China, on the east by the province of Canton and the bay of Tonquin, on the south by Cochinchina, and on the west by the kingdom of Laos. It is about 1200 miles in length, and 500 in breadth; and is one of the finest and most considerable kingdoms of the East, as well on account of the number of inhabitants, as the riches it contains and the trade it carries on. The country is thick set with villages; and the natives in general are of a middle stature and clean-limbed, with a tawny complexion. Their faces are oval and flatfish, and their noses and lips well proportioned. Their hair is black, long, lank, and coarse; and they let it hang down their shoulders. They are generally dexterous, nimble, active, and ingenious in mechanic arts. The weave a multitude of fine silks, and make curious lacker-works, which are transported to other countries. There is such a number of people, that many want employment; for they seldom go to work but when foreign ships arrive. The money and goods brought hither by the English and Dutch put them in action, for they have not money of their own sufficient to employ themselves; and therefore one-third at least, must be advanced beforehand by the merchants: and the ships must stay here till the goods are finished, which is generally five or six months. They are so addicted to gaming, that when every thing else is lost, they will stake their wives and children.

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The garments of the Tonquinese are made either of silk or cotton; but the poor people and soldiers wear only cotton of a dark tawny colour. Their houses are small and low; and the walls either of mud, or hurdles daubed over with clay. They have only a ground-floor, with two or three partitions; and each room has a square hole to let in the light. The villages consist of 30 or 40 houses, surrounded with trees; and in some places there are banks to keep the water from overflowing their gardens, where they have oranges, betels, melons, and salad-herbs. In the rainy season they cannot pass from one house to another without wading through the water: they sometimes have boats. In the capital city called *Cacho*, there are about 20,000 houses, with mud-walls, and covered with thatch; a few are built with brick, and roofed with pan-tiles. In each yard is a small arched building like an oven, about six feet high, made of brick, which serves to secure their goods in case of fire. The principal streets are very wide, and paved with small stones. The king of Tonquin has three palaces in it, such as they are; and near them are stables for his horses and elephants. The house of the English factory is seated at the north end of the city, fronting the river; and is the best in the city. The people in general are courteous, and civil to strangers; but the great men are proud, haughty, and ambitious; the soldiers insolent, and the poor thieves. They buy all their wives, of which the great men have several; but the poor are stinted for want of money. In hard times the men will sell both their wives and children, to buy rice to maintain themselves. The women offer themselves to strangers as wives, while they stay, and agree with them for a certain price. Even the great men will offer their daughters to the merchants and officers who are likely to stay six months in the country. They are not afraid of being with child; for if they are girls, they can sell them well when they are young, because they are fairer than the other inhabitants. These women are said to be very faithful; and are trusted with money and goods by the Europeans during their absence; and will make great advantage with them. The first new moon in the year that happens after the middle of January, is a great festival; when they rejoice for 10 or 12 days together, and spend their time in all manner of sports. Their common drink is tea, but they make themselves merry with arrack. The language is spoken very much in the throat; and some of the words are pronounced through the teeth, and has a great resemblance to the Chinese. They have several mechanic arts or trades; such as smiths, carpenters, joiners, turners, weavers, taylor, potters, painters, money-changers, paper-makers, workers in lacker, and bell-founders. Their commodities are gold, musk, silks, calicoes, drugs of many sorts, woods for dyeing, lacquered wares, earthen wares, salt, aniseeds, and worm-seeds. The lacquered ware is not inferior to that of Japan, which is accounted the best in the world. With all these merchandises, one would expect the people to be very rich, but they are in general very poor; the chief trade being carried on by the Chinese, English, and Dutch. The goods imported, besides silver, are salt-petre, sulphur, English broad cloth, pepper, spices, and great guns.

TONSILS, in anatomy. See there n° 366, p.
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Top.

TONSURE, in ecclesiastical history, a particular manner of shaving or clipping the hair of ecclesiastics or monks. The ancient tonsure of the clergy was nothing more than polling the head, and cutting the hair to a moderate degree, for the sake of decency and gravity: and the same observation is true with respect to the tonsure of the ancient monks. But the Romans have carried the affair of tonsure much farther; the candidate for it kneeling before the bishop, who cuts the hair in five different parts of the head, *viz.* before, behind, on each side, and on the crown.

TOOL, among mechanics, denotes in general any small instrument used as well for making other complex instruments and machines, as in most other operations in the mechanic arts.

TOOTH, in anatomy. See there, n^o 26.

TOOTHACH. See MEDICINE, n^o 621, 622, and ELECTRICITY, parag. ult.

TOOTHACH Tree. See XANTHOXYLUM.

TOP, a sort of platform, surrounding the lower mast-head, from which it projects on all sides like a scaffold.

The principal intention of the top is to extend the top-mast shrouds, so as to form a greater angle with the mast, and thereby give additional support to the latter. It is sustained by certain timbers fixed across the hounds or shoulders of the mast, and called the *treble-trees* and *cross-trees*.

Besides the use above-mentioned, the top is otherwise extremely convenient to contain the materials necessary for extending the small sails, and for fixing or repairing the rigging and machinery with more facility and expedition. In ships of war it is used as a kind of redoubt, and is accordingly fortified for attack or defence; being furnished with swivels, musketry, and other fire-arms, and guarded by a thick fence of corded hammocks. Finally, it is employed as a place for looking out, either in the day or night.

The frame of the top is either close-planked like a platform, or open like a grating. The former kind is generally stronger and more convenient; but the latter is much better in tempestuous weather, as presenting a smaller surface to the wind when the ship leans over to one side, and by consequence being less exposed to its efforts.

In all ships of war, and in the largest merchantmen, the top is fenced on the aft-side by a rail of about three feet high, stretching across, and supported by stanchions, between which a netting is usually constructed. The outside of this netting is generally covered with red baize or red painted canvas, which is extended from the rail down to the edge of the top, and called the *top-armour*. By this name it seems to have been considered as a sort of blind, behind which the men may conceal themselves from the aims of the enemy's fire-arms in time of action, whilst they are charging their own muskets, carabines, or swivels.

Top-Mast, the second division of a mast; or that part which stands between the upper and lower pieces. See the article MAST.

Top Sails, certain large sails extended across the top-masts by the topail-yard above, and by the yard attached to the lower mast beneath; being fastened to the former by robands, and to the latter by means of two great blocks fixed on its extremities, thro' which

the topail-sheets are inserted, passing from thence to two other blocks fixed on the inner part of the yard close by the mast: and from these latter the sheets lead downwards to the deck, where they may be slackened or extended at pleasure. See the article SAIL.

TOPAZ, in natural history, a gem called by the ancients *chrysolite*, as being of a gold colour.

The topaz, when perfect and free from blemishes, is a very beautiful and valuable gem; it is, however, very rare in this state. It is of the number of those gems which are found only in the round or pebble form, there never having been yet seen a true and genuine topaz of a columnar figure, though the far greater part of what our jewellers call such are in that form. The greatest part of the true topazes are no larger than grains of a coarse seed; among these there are, however, some met with of the size of a pea, and some much larger, though these are very rare. It is of a roundish or oblong figure in its native or rough state, and usually is flatted on one side; and is generally of a bright and naturally polished surface, tolerably transparent. They are ever of a fine yellow colour; but they have this, like the other gems, in several different degrees: the finest of all are of a true and perfect gold colour; but there are some much deeper, and others extremely pale, so as to appear scarce tinged. The oriental topaz is equal to the ruby in hardness, and is second only to the diamond in lustre. The topazes of the other parts of the world fall off greatly from this hardness; but the purest of the genuine ones are considerably harder than crystal. The topaz on being thrown into a charcoal fire entirely loses its colour; and when taken out, is a very fine colourless stone, undistinguishable from that known by the name of the *white sapphire*. Upon the whole it appears, that the oriental-coloured gems are much alike in their matter, differing scarce at all, except in colour; and that when they are found either naturally colourless, or rendered so by art, it is not easy to distinguish one of them from the other.

The finest topazes in the world are found in the East Indies; but they are very rare there of any great size: the Great Mogul, however, at this time, possesses one which is said to weigh 157 carats, and to be worth more than 20,000 pounds. The topazes of Peru come next after these, in beauty and in value. The European are principally found in Silesia and Bohemia, and are generally full of cracks and flaws, and of a brownish yellow.

Besides all these degrees of value in the genuine topazes, our jewellers keep what they call a kind of them, inferior greatly to the true ones; all these are common hexangular crystals, coloured to a paler or deeper yellow in mines: these they cut into stones for rings, and sell under the name of topazes; and most of the stones we see under that name are such.

TOPHUS, in medicine, denotes a chalky or stony concretion in any part of the body; as the bladder, kidney, &c. but especially in the joints.

TOPIC, a general head, or subject of discourse.

TOPICS, in oratory. See ORATORY, n^o 2—23.

TOPICS, or *Topical Medicines*, are the same with external ones, or those applied outwardly to some diseased and painful part: such are plasters, cataplasms, unguents, &c.

Topaz

Topics.

TOPOGRAPHY, a description or draught of some particular place, or small track of land, as that of a city or town, manor or tenement, field, garden, house, castle, or the like; such as surveyors set out in their plots, or make draughts of, for the information and satisfaction of the proprietors.

TOPSHAM, a town of Devonshire, in England, seated on the river Exmouth, five miles south-east of Exeter, to which place the river was formerly navigable; but in time of war was choked up defignedly, so that ships are now obliged to load and unload at Topsham. W. Long. 3. 40. N. Lat. 50. 37.

TOR, a town of Asia, in Arabia Petrea, seated on the Red Sea, with a good harbour defended by a castle. There is a handsome Greek convent, in whose garden are fountains of bitter water, which they pretend are those rendered sweet by Moses by throwing a piece of wood into them. Some think that this town is the ancient Elana. E. Long. 31. 25. N. Lat. 28. 0.

TORBAY, a fine bay of the English channel, on the coast of Devonshire, a little to the east of Dartmouth, formed by two capes, called *Bury Points*, and *Bob's Nose*.

TORIES, in the history of England, a faction or party opposed to the whigs. See **WHIGS**.—The Tories are great sticklers for the prerogatives of the crown, as the whigs are for the liberties and privileges of the people: though, in truth, the principles of the moderate people of both parties do not greatly differ.

TORMENTILLA, **TORMENTIL**, a genus of the polygynia order, belonging to the iconfandria class of plants. There are two species, the most remarkable of which is the erecta, growing very frequently in barren pastures, moors, and heaths, in Scotland, England, and the neighbouring islands. The roots consist of thick tubercles, an inch or more in diameter, replete with a red juice, of an astringent quality. They are used in most of the Western Isles, and in the Orkneys, for tanning of leather; in which intention they are proved by some late experiments to be superior even to the oak-bark. They are first of all boiled in water, and the leather is afterwards steeped in the liquor. In the islands of Tirey and Col the inhabitants have destroyed so much ground by digging them up, that they have lately been prohibited the use of them. A decoction of these roots in milk is also frequently administered by the inhabitants of the same islands in diarrhoeas and dysenteries, with good success; but perhaps it would be most proper not to give it in dysenteries till the morbid matter be first evacuated. A spirituous extract of the plant stands recommended in the sea-scurvy, to strengthen the gums and loosen the teeth. Linnaeus informs us, that the Laplanders paint their leather of a red colour with the juice of the roots.

TORNADO, a sudden and vehement gulf of wind from all points of the compass, frequent on the coast of Guinea.

TORNE, the capital of Torne Lapmark, a province of Sweden, situated at the mouth of the river Torne, at the bottom of the Bothnic Gulph, upon a little island made by the river, 400 miles north of Stockholm. E. Long. 22. 45. N. Lat. 65. 45.

TORPEDO, the **CRAMP-FISH**. See **RAJA**.

The surprising property of this fish in giving a violent shock to the person who takes it in his hands, or

who tread upon it, was long an object of wonder. Torpedo. For some time it was in general reckoned to be entirely fabulous; but at last the matter of fact being ascertained beyond a doubt, philosophers endeavoured to find out the cause. M. Reaumur resolved it into the action of a vast number of minute muscles, which by their accumulated force gave a sudden and violent stroke to the person who touched it. But solutions of this kind were quite unsatisfactory, because the stroke was found to be communicated through water, iron, wood, &c. When the phenomena of electricity began to be better known, it was then suspected that the shock of the torpedo was occasioned by a certain action of the electric fluid; but as not the least spark of fire, or noise, could ever be perceived, this too seemed insufficient. Of late, however, Mr Walfsh has with indefatigable pains, not only explained this surprising phenomenon on the known principles of electricity, but given a demonstration of his being in the right, by constructing an artificial torpedo, by which a shock resembling that of the natural one can be given.

The electric organs of the torpedo consist of two sets of very small cylinders lying under the skin, one of which is electrified positively and the other negatively, seemingly at the pleasure of the fish. When a communication is made between the set of cylinders positively electrified, and those which are negatively so, a discharge and shock ensue, like what happens in the case of the Leyden vial. The only difficulty now is to account for the total absence of a spark, (which in the case of the torpedo never exists even in the smallest degree,) and the impossibility of conducting the shock through the smallest interval of air. But this also is explained in a satisfactory manner by Mr Walfsh, and shown to be nothing else than what every day takes place in our electrical experiments. It is well known, that a small charge of electricity, if put into a little vial, will occasion a bright spark and loud noise when discharged. But if the same charge is put into a vial much larger, the spark and noise will be less in proportion; neither will the spark break through near such a space of air in the latter case as in the former; though the shock would in both cases be the same to a person who received it through his body. If, instead of a large vial, we suppose the charge to be diffused all over a large battery, the shock would still be the same, and yet the spark and noise attending it would be almost imperceptible. The case is just the same with the torpedo. Each of the electric organs is a battery composed of innumerable small cylinders, which discharging themselves all at once produce a formidable shock; but by reason of the smallness of the charge of each, the spark is imperceptible, and cannot break through the smallest space of air. The truth of this was exemplified in Mr Walfsh's artificial torpedo, which though it would give a very considerable shock through a conductor totally uninterrupted, yet on the least breach therein, even for the breadth of a hair, no shock was felt.

In every other respect the electricity of the torpedo agrees with that exhibited by the common electrical machines. An insulated person cannot receive a shock by touching one of the electric organs of the fish; but a violent stroke is given to the person, whether insulated or not, who lays one hand on the positive and the

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the other on the negative organ. The fish, as is reasonable to imagine, seems to have this electric property in its own power; and appears sensible of his giving the shock, which is accompanied by a kind of winking of his eyes.

TORPOR, a numbness, or defect of feeling and motion. Galen says it is a sort of intermediate disorder between palsy and health.

TORREFACTION, in chemistry, is the roasting or scorching of a body by the fire, in order to discharge a part either unnecessary or hurtful in another operation. Sulphur is thus discharged from an ore before it can be wrought to advantage.

TORRENT, denotes a temporary stream of water falling suddenly from mountains, whereon there have been great rains, or an extraordinary thaw of snow.

TORRENTIUS (John), a painter of Amsterdam, born at Haerlem in 1589, who excelled in representing objects of still life, and sometimes painted conversations which were admired for a lovely tone of colouring. While he practised in this manner, he lived in general esteem and affluence; but, unhappily, he grew abandoned in his morals, and equally so in his style of painting, prostituting a delicate pencil to the most obscene and depraved purposes. At last, by instituting a secret society of Adamites, he attracted the notice of the magistrates, who brought him to trial; and as he denied his own performances, and any connection with his detestable assembly, he was condemned to the torture, his lewd pictures were burned by the common executioner, and he was sentenced to the house of correction for 20 years. He supported the torture with incredible obliquity; and after some time of confinement, being released at the request of the English ambassador, he went to London, where he resided for a few years. But the English, who detested his profligacy more than they admired his art, discountenanced him so much that he retired to Amsterdam, where he died in obscurity and contempt in 1640.

TORRICELLI (Evangeliste), an illustrious Italian mathematician and philosopher, born at Faenza in 1608. He was trained in Latin literature by his uncle a monk; and after cultivating mathematical knowledge for some time without a master, he studied it under father Benedict Castelli, professor of mathematics at Rome. Having read Galileo's dialogues, he composed a treatise on motion, on his principles, which brought him acquainted with Galileo, who took him home as an assistant; but Galileo died in three months after. He became professor of mathematics at Florence, and greatly improved the art of making telescopes and microscopes: but he is best known for finding out a method of ascertaining the weight of the atmosphere by quicksilver; the barometer being called, from him, the *Torricellian tube*. He published *Opera Geometrica*, 4to, 1644; and died in 1647.

TORRICELLIAN EXPERIMENT, a famous experiment made by Torricelli, a disciple of the great Galileo, by which he demonstrated the pressure of the atmosphere in opposition to the doctrines of suction, &c. finding that pressure able to support only a certain length of mercury, or any other fluid, in an inverted glass tube. See **BAROMETER**.

TORSK, or **TUSK**, in ichthyology. See **GADUS**.

TORTOISE, in zoology. See **TESTUDO**.

TORTOISE-SHELL. The upper shell of the tortoise is composed of two dissimilar substances: that which immediately invests the back of the animal is of the bony kind, and almost as hard as stone; the outer lamina is horny, flexible, here and there transparent. It is only this last that is called *tortoise-shell*, and in which the beautiful colours and variegations reside. The horny shell consists of several pieces, whose seams and junctures with one another, and with the bony part underneath, are sufficiently distinguishable. The workmen split them asunder by certain instruments, and employ the elegant horn for a variety of toys and utensils, combs, sword-hilts, clock-cases, boxes, coverings for musical instruments, perspective-glasses, &c. &c.

Working and joining of TORTOISE-SHELL—Tortoise-shell and horn become soft in a moderate heat, as that of boiling water, so as to be pressed, in a mould, into any form, the shell or horn being previously cut into plates of a proper size.

Plumier informs us, in his *Art de tourner*, that two plates are likewise united into one by heating and pressing them; the edges being thoroughly cleaned, and made to fit close to one another. The tortoise-shell is conveniently heated for this purpose by applying a hot iron above and beneath the juncture, with the interposition of a wet cloth to prevent the shell from being scorched by the irons: these irons should be pretty thick, that they may not lose their heat before the union is effected.

Both tortoise-shell and horns may be stained of a variety of colours, by means of the colouring drugs commonly used in dyeing, and by certain metallic solutions.

TORTURE, a grievous pain inflicted on criminals to make them confess the truth. See **RACK**. The statute-law of England doth very seldom, and the common law doth never, inflict any punishment extending to life or limb, unless upon the highest necessity.

But note—on an indictment for high-treason, or for the lowest species of felony, viz. petit larceny, and in all misdemeanors, standing mute is equivalent to conviction. But upon appeals or indictment for other felonies or petit treason, the prisoner shall not be looked upon as convicted, so as to receive judgment for the felony; but shall, for his obliquity, receive the terrible sentence of penance, or *peine forte & dure*. See **ARRAIGNMENT**, and *PEINE forte & dure*.

The rack, or question, to extort a confession from criminals is a practice of a different nature: this being only used to compel a man to put himself upon his trial; that being a species of trial in itself. And the trial by rack is utterly unknown to the law of England. No person is to be subject to torture in Scotland, 7 Ann. c. 21.

TORUS, in architecture, a large round moulding used in the bases of columns. See **PLATE XXIX. fig. 3.**

TOUCAN, in ichthyology. See **RHAMPHASTOS**.

TOUCH-NEEDLE, among assayers, refiners, &c. little bars of gold, silver, and copper, combined together in all the different proportions and degrees of mixture; the use of which is to discover the degree of purity of any piece of gold or silver, by comparing the

Tortoise.
||
Touch.

the mark it leaves on the touchſtone with thoſe of the bars.

The metals uſually tried by the touchſtone are gold, ſilver, and copper, either pure, or mixed with one another in different degrees and proportions, by fuſion. In order to find out the purity or quantity of baſer metal in theſe various admixtures, when they are to be examined they are compared with theſe needles, which are mixed in a known proportion, and prepared for this uſe. The metals of theſe needles, both pure and mixed, are all made into laminæ or plates, one-twelfth of an inch broad, and of a fourth part of their breadth in thickneſs, and an inch and half long; theſe being thus prepared, you are to engrave on each a mark indicating its purity, or the nature and quantity of the admixture in it.

The black rough marbles, the baſaltes, or the ſofter kinds of black pebbles, are the moſt proper for touchſtones.

Now the method of uſing the needles and ſtone is this: The piece of metal to be tried ought firſt to be wiped well with a clean towel or piece of ſoft leather, that you may the better ſee its true colour; for from this alone an experienced perſon will, in ſome degree, judge beforehand what the principal metal is, and how and with what debaſed.

Then chooſe a convenient, not over large, part of the ſurface of the metal, and rub it ſeveral times very hardily and ſtrongly againſt the touchſtone, that in caſe a deceitful coat or cruſt ſhould have been laid upon it, it may be worn off by that friction: this, however, is more readily done by a grindſtone or ſmall file. Then wipe a flat and very clean part of the touchſtone, and rub againſt it, over and over, the juſt mentioned part of the ſurface of the piece of metal, till you have, on the flat ſurface of the ſtone, a thin metallic cruſt, an inch long and about an eighth of an inch broad: this done, look out the needle that ſeems moſt like to the metal under trial, wipe the lower part of this needle very clean, and then rub it againſt the touchſtone, as you did the metal, by the ſide of the other line, and in a direction parallel to it.

When this is done, if you find no difference between the colours of the two marks made by your needle and the metal under trial, you may with great probability pronounce that metal and your needle to be of the ſame alloy, which is immediately known by the mark engraved on your needle. But if you find a difference between the colour of the mark given by the metal, and that by the needle you have tried, chooſe out another needle, either of a darker or lighter colour than the former, as the difference of the tinge on the touchſtone directs; and by one or more trials of this kind you will be able to determine which of your needles the metal answers, and thence what alloy it is of, by the mark of the needle; or elſe you will find that the alloy is extraordinary, and not to be determined by the comparison of your needles.

TOUCHWOOD. See BOLETUS.

TOULON, an ancient, ſtrong, rich, and populous city of France, with a famous harbour, well covered from the north winds; and a biſhop's ſee. It is the principal town for naval ſtores on the Mediterranean ſea, and is fortified with ſtrong walls defended with baſtions. It has two moles, each ſeven hundred paces

in length, which almoſt ſurround the harbour, and leave but a narrow entrance for ſhips. There are always men of war here, as well as other ſhips; and there is a very fine quay paved with bricks. Near the arſenal, on the ſide of the quay, are magazines full of naval ſtores. The cathedral is remarkable for its high altar, and two fine chapels on each ſide, where there are ſeveral ſilver ſhrines ſet with precious ſtones. There are ſeveral other churches and convents; and a ſchool for officers, where they are taught every thing that regards the land or ſea ſervice. The harbour is defended by ſeveral forts, and is one of the beſt in Europe. E. Long. 6. 2. N. Lat. 43. 7.

TOULOUSE, one of the principal cities of France, in Upper Languedoc, and capital of the whole province, with an archbiſhop's ſee, a famous univerſity, a parliament, a mint, and an academy of belles lettres. It is ſeated on the river Garonne, which divides it into two unequal parts, that communicate by a large ſtone-bridge. It is very large, but is not peopled in proportion to its extent. The ſtreets are very handſome, and the walls of the city, as well as the houſes, are built with brick. The metropolitan church ſtands in a large ſquare, adorned with a fountain. It has ſeveral fine chapels, and the choir is very magnificent. There are ſeveral other churches and convents, too numerous to mention in particular. The town-houſe, which they call the *Capital*, is very magnificent. It is a place of ſome trade, and is ſeated at the end of the canal of Languedoc. E. Long. 1. 30. N. Lat. 42. 36.

TOUR (Henry de la), viſcount Turenne, a celebrated French general, was the ſecond ſon of Henry de la Tour duke of Bouillon, and was born at Sedan in 1611. He made his firſt campaigns in Holland under Maurice and Frederic Henry princes of Orange, who were his uncles by the mother's ſide; and even then diſtinguiſhed himſelf by his bravery. In 1634 he marched with his regiment into Lorraine; and having contributed to the taking of La Mothe, was, though very young, made mareſchal de camp. In 1636 he took Savre, and the year following the caſtles of Hirſon and Sorle; on which occaſion he performed an action like that of Scipio's, with reſpect to a very beautiful woman whom he ſent back to her husband. The viſcount Turenne continued to diſtinguiſh himſelf in ſeveral ſieges and battles, and in 1644 was made marſhal of France; but had the miſfortune to be defeated at the battle of Mariendal in 1645. However, he gained the battle of Nortlingen three months after; reſtored the elector of Treves to his dominions; and the following year made the famous junction of the French army with that of Sweden commanded by general Wrangel, which obliged the duke of Bavaria to demand a peace. Afterwards that duke breaking the treaty he had concluded with France, he was defeated by the viſcount Turenne at the battle of Zinnshausen, and in 1648 driven entirely out of his dominions. During the civil wars in France he ſided with the princes, and was defeated at the battle of Rhetel in 1650; but ſoon after was reſtored to the favour of the king, who in 1652 gave him the command of his army. He acquired great honour at the battles of Jerngau, Gien, and the ſuburbs of St Anthony, and by the retreat he made before the army commanded by

Touraine
Tournam-
ments.

the princes at Ville-Neuve St. George. In 1654 he made the Spaniards raise the siege of Arras: the next year he took Condé, St. Guilian, and several other places; gained the famous battle of Dunes; and made himself master of Dunkirk, Oudenarde, and almost all Flanders: this obliged the Spaniards to conclude the peace of the Pyrenees in 1660. These important services occasioned his being made marshal-general of the king's camps and armies. The war being renewed with Spain in 1667, Turenne commanded in Flanders; and took so many places, that in 1668 the Spaniards were obliged to sue for peace. He commanded the French army in the war against the Dutch in 1672; took 40 towns in 22 days; pursued the elector of Brandenburg even to Berlin; gained the battles of Slinthheim, Ladenburg, Enshiem, Mulhausen, and Turkeim; and obliged the Imperial army, which consisted of 70,000 men, to retrace the Rhine. By this campaign the viscount Turenne acquired immortal honour. He passed the Rhine to give battle to general Montecuculi, whom he followed as far as Saspach; but mounting upon an eminence to discover the enemy's camp, he was killed by a cannon-ball in 1675. All France regretted the loss of this great man, who by his military exploits had raised the admiration of Europe.

TOURAINNE, a province of France, bounded on the north by Maine, on the east by Orleansois, on the south by Berri, and on the west by Anjou and Poitou. It is about 58 miles in length, and 55 in breadth where it is broadest. This country is watered by 17 rivers, besides many brooks, which not only render it delightful, but keep up a communication with the neighbouring provinces. The air is temperate, and the soil is so fruitful, that it is called the *garden of France*. Tours is the capital town.

TOURNAY, a town of the Austrian Netherlands, in Flanders, and capital of a district called *Tournaysis*, with a bishop's see. It is divided into two parts by the river Scheld; and is large, populous, well built, and carries on a great trade in woollen stuffs and stockings. The cathedral is a very handsome structure, and contains a great many chapels with rich ornaments, and several magnificent tombs of marble and brass. The town was taken by the allies in 1709; but was ceded to the house of Austria by the treaty of Utrecht, tho' the Dutch had a right to put in a garrison. It was taken by the French in June 1745, who demolished the fortifications. E. Long. 3. 36. N. Lat. 50. 41.

TOURNAMENTS, in chivalry, were honourable exercises formerly used by all persons of note that desired to signalize themselves by their dexterity, &c. They were first instituted in Germany, according to historians, towards the beginning of the 10th century, and became afterwards a general practice: they derived their name from the French word *turner*, i. e. "to turn round," because to be expert in these exercises, much agility both of horse and man was requisite, they riding round a ring in imitation of the ancient Circi. They were the principal diversion of the 13th and 14th century.

The following account of English tournaments, extracted from Maitland's History of London, will not, it is hoped, be disagreeable to the reader.—In the reign of Edward IV. Roch, who was better known by the appellation of the *Bastard of Burgundy*, being

greatly celebrated for his acts of chivalry, came over and challenged the Lord Scales, brother to the queen, to fight with him; which Scales readily accepting, the king commanded lifts to be prepared in Smithfield (wherein to perform combat), of the length of 370 feet, and breadth of 260, with magnificent galleries for the reception of the illustrious spectators; where assembled the king, the nobility, and the principal gentry of both sexes. The first day they fought with spears, without a visible advantage on either side. The second they tourneyed on horseback, when the Lord Scales having a long pike fixed on his chaffron (pomel of his saddle), which as they closed, ran into the nostrils of the Bastard's horse, by the anguish whereof he reared himself with that violence, that he stumbled backwards, whereby his rider was unfortunately unhorsed: which occasioned him to cry out, "That he could not hold by the clouds;" and that though his horse had failed him, he would not fail to meet his adversary the next day. This being accordingly performed, they fought on foot with pole-axes; when Scales soon penetrating the Bastard's helmet, the king threw down his warder, whereupon they were immediately parted by the marshal. But the Bastard insinuating upon fighting out that weapon, a council was held to deliberate thereon. The result was, that if he persisted in renewing the combat, he must, according to the law of arms, be delivered to his adversary in the same condition he was in at his horse's misfortune: but rather than submit to those terms, he waved his pretension.

King Richard II. designing to hold a tournament at London on the Sunday after Michaelmas, sent divers heralds to make proclamations of it in all the principal courts of Europe; and accordingly not a few princes, and great numbers of the prime nobility, resorted hither from France, Germany, the Netherlands, &c. This solemnity began on Sunday afternoon, from the Tower of London, with a pompous cavalcade of 60 ladies, each leading an armed knight by a silver chain, being attended by their 'quires of honour, and, passing through Cheapside, rode to Smithfield, where the jousts and tournaments continued several days with magnificent variety of entertainments; on which occasion the king kept open house at the bishop of London's palace for all persons of distinction, and every night concluded with a ball.

Not long after this, three Scotch champions challenged three English to fight, which was performed in Smithfield with the greatest solemnity: the earl of Mar against the Lord Nottingham; Sir William Dorel the king of Scotland's banner-bearer, against Sir Pierce Courtney the king of England's standard-bearer; Cockburn, Esq; against Sir Nicholas Hawkirke. Mar and Cockburne were unhorsed; but the two standard-bearers were so well matched, that betwixt them it was a drawn battle. Voltaire, in his Essay upon the Civil Wars of France, p. 4, observes, that this romantic and dangerous sport was put an end to by the death of Henry II. king of France, who was killed at Paris in a tournament, which was the last in Europe.

TOURNEFORT (Joseph Pitton de), a famous French botanist, born at Aix in Provence in 1656. He had a passion for plants from his childhood, which overcame his father's views in putting him to study philo-

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philosophy and divinity; therefore on his death he quitted theology, and gave himself up entirely to physics, natural history, and botany. He wandered over the mountains of Dauphine, Savoy, Catalonia, the Pyrenees, and the Alps, in search of new species of plants, which he acquired with much fatigue and danger. His fame in 1683 procured him the employment of botanic professor in the king's garden; and by the king's order, he travelled into Spain, Portugal, Holland, and England, where he made prodigious collections of plants. In 1700, Mr Tournesot, in obedience to another order, sailed over all the isles of the Archipelago, upon the coasts of the Black Sea, in Bithynia, Pontus, Cappadocia, Armenia, and Georgia; making observations on natural history at large, ancient and modern geography, religion, manners, and commerce. He spent three years in this learned voyage; and then resuming his profession, was made professor of physic in the college-royal. He died in consequence of an accidental crush of his breast by a cart-wheel, which brought on a spitting of blood and hydrothorax, that carried him off in 1708. He wrote Elements of Botany, both in French and Latin; A Relation of his Voyage into the Levant; with other pieces of less consideration.

TOURNIQUET, in surgery, an instrument formed with screws, for compressing any part with rollers, &c. for the stopping of hæmorrhages. See SURGERY, n° 407, *et seq.*

TOWER, a tall building consisting of several stories, usually of a round form, though some are square or polygonal. Towers are built for fortresses, prisons, &c. as the Tower of London, the Tower of the Bafilie, &c.

TOWN, a place inhabited by a considerable number of people, being of a middle size between a city and a village.

TOXICODENDRON, in botany. See RUUS.

TRACHEA, in anatomy. See there, n° 380.

TRACHINUS, the WEEVER, a genus of fishes belonging to the order of jugularis. There is but one species, *viz.* the draco, or common weever. The qualities of this fish were well known to the ancients, who take notice of them without any exaggeration: the wounds inflicted by its spines are exceedingly painful, attended with a violent burning and most pungent stinging, and sometimes with an inflammation that will extend from the arm to the shoulder.

It is a common notion that these symptoms proceed from something more than the small wound this fish is capable of inflicting; and that there is a venom infused into it, at least such as is made by the spines that form the first dorsal fin, which is dyed with black, and has a most suspicious aspect; though it is possible, that the malignity of the symptoms arises from the habit of body the person is in, or the part in which the wound is given. The remedy used by some fishermen is the sea-sand, with which they rub the place affected for a considerable time. At Scarborough, stale urine, warmed, is used with success. In the Universal Museum for November 1765, is an instance of a person who was reduced to great danger by a wound from this fish, and who was cured by the application of sweet oil, and tacking opium and Venice treacle.

This fish buries itself in the sands, leaving only its
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nose out, and if trod on immediately strikes with great force; and they have been seen directing their blows with as much judgment as fighting cocks. Notwithstanding this noxious property of the spines, it is exceeding good meat.

The English name seems to have no meaning, being corrupted from the French, *la vive*, so called as being capable of living long out of the water, according to the interpretation of Belon. It grows to the length of 12 inches, but is commonly found much less. The irides are yellow: the under jaw is longer than the upper, and slopes very much towards the belly: the teeth are small. The back is straight, the sides are flat, the belly is prominent, the lateral line straight: the covers of the gills are armed with a very strong spine. The first dorsal fin consists of five very strong spines, which, as well as the intervening membranes, are tinged with black; this fin, when quiescent, is lodged in a small hollow. The second consists of several soft rays, commences just at the end of the first, and continues almost to the tail. The pectoral fins are broad and angular; the ventral fins small. The vent is placed remarkably forward, very near the throat: the anal fin extends to a small distance from the tail, is a little hollowed in the middle, but not so much as to be called forked. The sides are marked lengthwise with two or three dirty yellow lines, and transversely by numbers of small ones: the belly silvery.

TRACT, in geography, an extent of ground, or a portion of the earth's surface.

TRACT, in matters of literature, denotes a small treatise or written discourse upon any subject.

TRADE, in general, denotes the same with commerce, consisting in buying, selling, and exchanging of commodities, bills, money, &c. See COMMERCE, COIN, MONEY, COMPANY, &c.

TRADE-WINDS, denote certain regular winds at sea, blowing either constantly the same way, or alternately this way and that; thus called from their use in navigation, and the Indian commerce. See WIND.

TRADESCANT (John), an ingenious naturalist and antiquary, was, according to Anthony Wood, a Fleming or a Dutchman. We are informed by Parkinson, that he had travelled into most parts of Europe, and into Barbary; and from some emblems remaining upon his monument in Lambeth church-yard, it plainly appears that he had visited Greece, Egypt, and other eastern countries. In his travels he is supposed to have collected not only plants and seeds, but most of those curiosities of every sort which after his death were sold by his son to the famous Elias Ashmole, and deposited in his museum at Oxford. When he first settled in this kingdom cannot at this distance of time be ascertained. Perhaps it was at the latter end of the reign of queen Elizabeth, or the beginning of that of king James I. His print, engraven by Hollar before the year 1656, which represents him as a person very far advanced in years, seems to countenance this opinion. He lived in a great house at South Lambeth, where his museum was frequently visited by persons of rank, who became benefactors thereto: among these were king Charles I. (to whom he was gardener), Henrietta Maria his queen, archbishop Laud, George duke of Buckingham, Robert and William Cecil earls of Salisbury, and many other persons of distinction. John Tradescant may there-

Tradescant.

Tradefcant therefore be juſtly conſidered as the earlieſt collector (in this kingdom) of every thing that was curious in natural hiſtory, viz. minerals, birds, fiſhes, inſects, &c. He had alſo a good collection of coins and medals of all forts, beſides a great variety of uncommon rarities. A catalogue of theſe, publiſhed by his ſon, contains an enumeration of the many plants, ſhrubs, trees, &c. growing in his garden, which was pretty extenſive. Some of theſe plants are, if not totally extinct, at leaſt become very uncommon, even at this time: though this able man by his great induſtry made it manifeſt, in the very infancy of botany, that there is ſcarce any plant extant in the known world that will not with proper care thrive in this kingdom.

When his houſe at South Lambeth, then called *Tradefcant's Ark*, came into Aſhmole's poſſeſſion, he added a noble room to it, and adorned the chimney with his arms, impaling thoſe of Sir William Dugdale, whoſe daughter was his third wife, where they remain to this day.

It were much to be wiſhed, that the lovers of botany has viſited this once famous garden, before, or at leaſt in the beginning of the preſent century. But this ſeems to have been totally neglected till the year 1749, when Dr Watſon and the late Dr Mitchell favoured Royal Society with the only account now extant of the remains of Tradefcant's garden.

When the death of John Tradefcant happened is not known; no mention being made thereof in the register-book of Lambeth church.

TRADITION, among eccleſiaſtical writers, denotes certain regulations concerning the rites, ceremonies, &c. of religion, which we ſuppoſe to have been handed down from the days of the apoſtles to the preſent time.

TRAGACANTH. See *Gum Tragacanth*.

TRAGEDY, a dramatic poem, repreſenting ſome final action performed by illuſtrious perſons, and which has frequently a fatal iſſue or end. See *POETRY*, Part. II. ſect. 1.

TRAGI-COMEDY, a dramatic piece, partaking both of the nature of tragedy and comedy; the event whereof is not bloody nor unhappy, and wherein is admitted a mixture of leſs ſerious characters.

TRAJAN (Marcus Ulpian), a celebrated Roman emperor, who gained many victories over the Parthians and Germans, puſhing the empire to its utmoſt extent on the eaſt and north ſides. He died at Silinunte, a city of Cilicia, which from him was called *Trajanopolis*, in the year 117.

TRAJAN'S Column, a famous hiſtorical column erected in Rome, in honour of the emperor Trajan. It is of the Tuſcan order, though ſomewhat irregular; its height is eight diameters, and its pedeaſt Corinthian: it was built in a large ſquare there called *Forum Romanum*. Its baſe conſiſts of 12 ſtones of an enormous ſize, and is raiſed on a ſocle, or foot, of eight ſteps: withinſide is a ſtair-caſe illuminated with 44 windows. It is 140 feet high, which is 35 feet ſhort of the Antonine column, but the workmanſhip of the former is much more valued. It is adorned from top to bottom with baſſo relievo, repreſenting the great actions of the emperor againſt the Dacians.

TRAJECTUS RHENI (anc. geog.), a town of Belgica; diſtant 15 miles by the Itinerary, but ſcarce fix,

from Mannaricum. Its name and ſituation ſhow it to be *Utrecht*, capital of the province of that name. E. Long. 5°, Lat. 52°, 7'. The appellation *Utrecht*, is from *Oud trecht*, the "old paſſage;" *Vetus Trajectus*, as it was called in Charlemagne's days; whence ſome barbarouſly form *Ultrajectum*; more elegantly called *Trajectus Rheni*, or *ad Rhenum*.

TRAIN, a line of gun-powder laid to give fire to a quantity thereof, in order to do execution by blowing up earth, works, buildings, &c.

TRAIN of Artillery, includes the great guns and other pieces of ordnance belonging to an army in the field.

TRAIN-Oil, the oil procured from the blubber of a whale by boiling.

TRALLIAN (Alexander), a Greek writer on phyſic, a native of Tralles in Lydia, who lived about the middle of the fixth century. His works are divided into 12 books, in which he treats of diſtempers as they occur, from head to foot; he was the firſt who opened the jugular vein, and that uſed cantharides as a bliſter for the gout. Dr Friend, in his *Hiſtory of Phyſic*, ſtyles him one of the moſt valuable authors ſince the time of Hippocrates. Though he appears on the whole to have been a rational phyſician, yet there are things in his writings that favour of enthuiſaſm and ſuperſtition.

TRALOS MONTES, a province of Portugal, called in Latin *Transmontana*; becauſe ſituated on the eaſt ſide of a chain of hills that ſeparate it from Entre Minho e Douro. It is bounded on the north by Galicia; on the ſouth by the provinces of Beira and Leon; by the laſt of which it is bounded alſo to the eaſt. Its length from north to ſouth is upwards of 120 miles, and its breadth about 80. It is full of mountains, and produces little corn, but plenty of wine, fruits of ſeveral forts, and abundance of game.

TRANSACTION, an accommodation of ſome buſineſs or diſpute between two parties by a mutual and voluntary agreement between them.

TRANSCENDENTAL, or TRANSCENDENT, ſomething elevated, or raiſed above other things; which paſſes and tranſcends the nature of other inferior things.

TRANSCRIPT, a copy of any original writing, particularly that of an act or inſtrument inſerted in the body of another.

TRANSFER, in commerce, an act whereby a perſon ſurrenders his right, intereſt, or property in any thing moveable or immoveable to another.

TRANSFORMATION, in general, denotes a change of form, or the aſſuming a new form different from a former one.

TRANSFUSION, the act of pouring a liquor out of one veſſel into another.

TRANSFUSION of Blood, an operation by which it was ſome time ago imagined that the age of animals would be renewed, and immortality, or the next thing to it, conferred on thoſe who had undergone it. The methods of performing it were as follow.

1. Take up the carotid artery of the dog, or other animal, whole blood is to be expended; ſeparate it from the nerve of the eighth pair, and lay it bare for above an inch. Then make a ſtrong ligature, not to be untied again, on the upper part of the artery; but

Transfusion an inch below, viz. towards the heart, make another

ligature with a running knot, which may be loosened or fastened as occasion requires. Having made these two knots, draw two threads under the artery, between the two ligatures; then open the artery, and put in a quill, or rather a crooked pipe of silver or brass, so slender that one end may enter a quill, and having at the other end, which is to go into the artery, a small knob. This being done, make fast the artery to the pipe by means of the two threads abovementioned, stopping the end of the quill with a peg till there be occasion for opening it. Perform a similar operation on the jugular vein of another dog; and having made a communication between the two animals, let another vein be opened in the animal into which the blood is to be transfused, and let the blood run freely out from it. The blood from the animal which is to be killed will run into the jugular vein, and supply the place of that which runs out from him; and thus the one dog will be bled to death, while the other suffers nothing, but will run about briskly as soon as he is unloosed and the wounds tied up.

2. In making this experiment, the following circumstances are to be attended to. 1. That the animals be fastened at such convenient distance from one another that the vein or artery be not stretched. 2. If the pulse fails beyond the quill in the jugular vein, the passage will be stopped up by coagulated blood, in which case the quill must be taken out and cleaned.

3. It must also be considered, that after a few minutes the blood of the emittent animal will mix with the other, and run out at the orifice; therefore, in order to be assured that the recipient animal has none of his own blood in him, two or three or more animals may be prepared, and all of them bled into one.

4. The most probable use of this experiment may be, that from several found animals a diseased one may be supplied with an entire new mass of blood, and that without destroying or hurting in the least the animals which give it; as an healthy animal could at any time spare a pretty large quantity of blood without any apparent detriment.

5. In this manner a mastiff dog was bled into a cur; and the little dog emitted, at least, double the quantity of blood which he could be supposed to possess naturally, when the mastiff died. The cur being untied, ran away and shook himself as if he had been thrown into water.

6. A communication was made between the jugular vein of a calf and a sheep; the former being designed for the emittent, and the latter for the recipient animal. The sheep lost 49 ounces, avoirdupois weight, of blood, before any of the calf's blood was received; and at this time it was judged that the sheep must have been very faint. The calf's blood was then suffered to run into a porringer for 40 seconds, in which time the animal had bled 10 ounces. This was done with a view to ascertain the quantity which should be received by the sheep; but as it could not be supposed that the blood would run so fast into the sheep's vein as into the porringer, the calf was allowed to bleed for five minutes; when it was supposed that the sheep had received as much blood as she had lost. Being then untied, she seemed to have as much strength as before the operation.

7. A sheep, having bled 45 ounces, was supplied with as much or more from a calf; after which she appeared not at all to be hurt by the experiment, but continued lusty and strong.

8. A young land-spaniel was bled to 14 or 16 ounces, which was at the same time supplied by the blood of an old mongrel curr all over-run with the mange; but the spaniel was not in the least hurt by the exchange, though the curr was cured of his mange by the evacuation.

9. The blood of a young dog being transfused into the veins of an old one almost blind with age, the latter began to leap and frisk, though he could hardly stir before. What became of him afterwards is not mentioned.

10. The blood of three calves was transfused into three dogs; after which all the dogs eat as well as before; and one from whom so much blood had been drawn the day before that he could scarcely stir, having been supplied the next morning with the blood of a calf, instantly recovered his strength, and showed a surprising vigour.

11. A bitch, having lost 30 ounces of blood, and being supplied with an equal quantity from some other animal, not only survived that experiment, but also the loss of her spleen, which was afterwards cut out, without tying up the vessels.

12. The blood of one lamb was entirely transfused into another; after which the lamb that had received the blood seemed to be well, and grew like other lambs; but in eight months after the operation it died; whether from the consequences of the transfusion or not, cannot be determined.

13. The blood of a lamb was transfused into the veins of a spaniel 13 years old, who for three years had been so deaf that he was insensible to the loudest noise. He walked very little, and was so feeble, that being unable to lift up his feet, he only trailed his body forward. After the operation he remained for an hour upon the table, then he leaped down, and went to seek his master who was in another room. Two days after he went abroad, and ran up and down the street with other dogs, without trailing his body as he had done formerly. He also began to recover his hearing, and in a month's time had recovered it so far that he always returned at the voice of his master.

14. The blood of four widders was transfused into a horse 26 years old, who by that means was much invigorated, and had his appetite greatly increased.

15. The experiment of transfusing blood into an human vein was performed by Dr Richard Lower and Sir Edmund King, upon one Mr Arthur Coga, on the 23d of November 1667. The manner of doing it is related in the following words. "Having prepared the carotid artery in a young sheep, we made an incision in the vein, observing the method above-mentioned without any alteration but in the shape of one of our pipes, which was found more convenient for our purpose. And having opened the vein in the man's arm with as much ease as in common venæsection, we let thence run out six or seven ounces of blood. Then we planted our silver pipe into the said incision, and inserted quills between the two pipes already advanced in the two subjects, to convey the arterial blood from the sheep into the vein of the man. The blood ran

Lowthorp's
Phil. Transf.
abridged,
vol. III. p.
231.

Transfusion
Transyl-
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freely into the vein for the space of two minutes at least; so that we could feel a pulse in the said vein just beyond the end of the silver pipe. The patient said he did not feel the blood hot, (as had been reported of a man upon whom the like transfusion had been practiced in France); which may very well be imputed to the length of the pipes, through which the blood passed, losing thereby so much of the heat as to come into a temper very agreeable to the venous blood. That the blood did run all the time of those two minutes we conclude from hence. First, Because we felt a pulse during that time. Secondly, Because when, upon the man's saying he thought he had enough, we drew the pipe out of the vein, the sheep's blood ran through it in a full stream; which it would not have done if there had been any stop before, in the space of those two minutes, the blood being so very apt to coagulate in the pipes upon the least stop, especially as the pipes were as long as three quills. From the quantity of blood which run through the pipe into a porringer, we judged that about nine or ten ounces were received into the man's veins. The man, after the operation, as well as in it, found himself very well."

These are very favourable testimonies for this practice. However, according to Heister, it could scarce be ventured upon even in the most desperate cases: "For (says he) almost all the patients who have been this way treated, have degenerated into a stupidity, foolishness, or a raving or melancholy madness; or else have been taken off with sudden death, either in or not long after the operations. These lamentable and fatal consequences have brought the art of injections and transfusion into neglect at present: so that being suspected and condemned by proper judges at Paris, where they most flourished, we are told they were in a little time prohibited by a public edict of that parliament."—Yet, a little after, the same author adds, "But whether or no this method of injecting proper medicines into the blood may succeed, especially in desperate apoplexies, anginas, hydrophobia, &c. and whether it may not be often useful to discharge the morbid blood, and transfuse such as is found, or warm milk or broth in its stead, ought, in my opinion, to be determined by future and repeated experiment. Burmannus, in his Surgery, (Part III. cap. 31.) tells us, that he has not only performed the operation with success on others, but very happily on himself, being by this means cured not only of a troublesome itch, but also of a stubborn fever."

On the whole, it seems yet to be a matter of doubt whether the infusion of certain liquors, or the transfusion of blood into the veins, ought to be accounted a poisonous operation or a medicinal one; but if ever the transfusion of blood is meddled with, common sense seems to indicate that it is the blood of a human creature which ought to be received by one of the same species, and not that of a beast.

TRANSYLVANIA, a province of Europe, annexed to Hungary, and bounded on the north by Upper Hungary and Poland, on the east by Moldavia and Walachia, on the south by Walachia, and on the west by Upper and Lower Hungary. It is surrounded on all parts by high mountains, which, however, are not barren. The inhabitants have as much corn and wine as they want themselves; and there are

rich mines of gold, silver, lead, copper, quicksilver, and alum. It has undergone various revolutions; but it now belongs to the house of Austria. The inhabitants are of several sorts of religions; as Papists, Lutherans, Calvinists, Socinians, Photinians, Arians, Greeks, and Mahometans. It is about 162 miles in length, and 150 in breadth. The administration of affairs is conducted by 12 persons; namely, three Roman Catholics, three Lutherans, three Calvinists, and three Socinians. The militia is commanded by the governor, whose commission is the more important, as Transylvania is the bulwark of Christendom. It is divided into several small districts, called *palatinates* and *counties*; and is inhabited by three different nations, Saxons, Sicilians, and Hungarians. Hermanstadt is the capital town.

TRAON, or TRAW, a strong and populous town of the republic of Venice, in Dalmatia, with a bishop's see, seated on the gulph of Venice, in a small island, joined to Terra Firma by a long bridge of wood, and to the isle of Bua by another of stone. It is not very large, but strong and populous. E. Long. 17. 10. N. Lat. 43. 50.

TRAPANI, or TRAPANO, a town of Italy in Sicily, seated on the west side of it, in the Val-di-Mazara, with a harbour and a castle. It is seated in a small peninsula, and built in the form of a sickle; is a trading place, and the harbour defended by a fort. It is famous for its salt-works, and its fisheries of tunnies and coral. E. Long. 12. 45. N. Lat. 38. 5.

TRANSIT, in astronomy, signifies the passage of any planet just by or over a fixed star or the sun; and of the moon, in particular, covering or moving over any star. See ASTRONOMY, n° 193.

TRANSITION, the passage of any thing from one place to another.

TRANSITION, in oratory. See ORATORY, n° 38.

TRANSITIVE, in grammar, an epithet applied to such verbs as signify an action which passes from the subject that does it, to or upon another subject which receives it. Under the head of verbs transitive come what we usually call *verbi active* and *passive*; other verbs, whose action does not pass out of themselves, are called *neuters*.

TRANSLATION, the act of transferring or removing a thing from one place to another; as we say, the translation of a bishop's see, a council, a seat of justice, &c.

TRANSLATION is also used for the version of a book or writing, out of one language into another.

TRANSMARINE, something that comes from or belongs to the parts beyond seas.

TRANSMIGRATION, the removal or translation of a whole people into another country, by the power of a conqueror.

TRANSMIGRATION is particularly used for the passage of the soul out of one body into another, being the same with what we otherwise call *METEMPSYCHOSIS*.

TRANSMUTATION, the act of changing or transforming one nature into another.

TRANSMUTATION of Acids. See CHEMISTRY, n° 170, 192, 219.

TRANSMUTATION of Metals. See CHEMISTRY, n° 351, 374, 423.

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TRANSOM, among builders, denotes the piece that is framed across a double-light window.

TRANSOMS, in a ship, certain beams or timbers extended across the stern-post of a ship, to fortify her after-part, and give it the figure most suitable to the service for which she is calculated.—Transoms are here defined beams or timbers, because they partake equally of the form and purpose of those pieces. Thus the deck-transom is the aftmost or hindmost beam of the lower deck, whereon all the deck-planks are rabbeted: and all the transoms are fixed athwart the stern-post, in the same manner as the floor-timbers are laid upon the keel. As the floor-timbers also, with regard to their general form and arrangement, have a rising, by which the bottom becomes narrower as it ascends towards the extremities; so the arms of the transoms, being gradually closer in proportion to their distance from the wing-transom downwards, give a similar figure to that part of the ship, which accordingly becomes extremely narrow, from the counter towards the keel; and this general figure or curve is called the *flight of the transoms*.—Although these pieces are therefore extremely different in their figures, according to the extent of the angles formed by their branches or horns, each of them has nevertheless a double curve, which is partly vertical and partly horizontal, with regard to its situation in the ship. The former of these is called by the artificers the *round-up*, and the latter the *round-ast*.—As the transoms fill up the whole space comprehended between the head of the stern-post above and the aftmost floor-timbers below, it is necessary to distinguish them by particular names. Thus the highest is called the *wing transom*; the next, the *deck-transom*; and afterwards follow the first, second, and third transoms; together with the intermediate ones.—The vertical direction of the arms or angles of the transoms, with regard to the ship's length, are expressed in the plane of *Elevation*, and their horizontal curves are also delineated on the plane of *Projection*. See *SHIP-BUILDING*.—The highest transoms are connected to the ship's quarter by knees, which are bolted to those pieces and to the after-timbers.

TRANSPARENCY, in physics, a quality in certain bodies, whereby they give passage to the rays of light; in contradistinction to opacity, or that quality of bodies which renders them impervious to the rays of light.

It has been generally supposed by philosophers, that transparent bodies have their pores disposed in straight lines, by which means the rays of light have an opportunity of penetrating them in all directions; but some experiments in electricity have made it apparent, that by the action of this fluid the most opaque bodies, such as sulphur, pitch, and sealing-wax, may be rendered transparent as glass, while yet we cannot suppose the direction of their pores to be in any way altered from what it originally was. A curious instance of an increase of transparency we have in rubbing a piece of white paper over one that has been written upon or printed: while the white paper is at rest, the writing or print will perhaps scarce appear through it; but when in motion, will be very easily legible, and continue so till the motion is discontinued.

TRANSPPOSITION, in grammar, a disturbing or dislocating the words of a discourse, or a changing

their natural order of construction, to please the ear by rendering the contexture more smooth, easy, and harmonious.

TRANSPPOSITION, in music. See *MUSIC*, par. 236. the note.

TRANSUBSTANTIATION, in theology, the conversion or change of the substance of the bread and wine in the eucharist, into the body and blood of Jesus Christ; which the Romish church suppose to be wrought by the consecration of the priest.

TRANSVERSALIS, in anatomy. See there, *Table of the Muscles*.

TRANSVERSE, something that goes across another from corner to corner: thus bends and bars in heraldry are transverse pieces or bearings; the diagonals of a parallelogram or a square are transverse lines.

TRAPEZIUM, in geometry, a plane figure contained between four unequal right lines.

TRAPEZIUS, in anatomy. See there, *Table of the Muscles*.

TRAPP (Dr Joseph), an English divine of excellent parts and learning, was born at Cherington in Gloucestershire, of which place his father was rector in 1579. He was the first person chosen to the professorship of poetry founded at Oxford by Dr Birkhead; and published his lectures under the title of *Praelectiones Poeticae*, in which he laid down excellent rules for every species of poetry in very elegant Latin. He showed afterwards, however, by his translation of Virgil, that a man may be able to direct who cannot execute, and may have the critic's judgment without the poet's fire. In the early part of his life Dr Trapp is said to have been chaplain to the father of the famous lord Bolingbroke; he obtained the living of Christ-church in Newgate Street, and St Leonard's, Foster-lane, London; and his very high-church principles probably obstructed his farther preferment. He published several occasional poems, a tragedy called *Abramule*, translated Milton's *Paradise Lost* into Latin verse, and died in 1747.

TRAVERSE, or **TRANSVERSE**, in general, denotes something that goes athwart another; that is, crosses and cuts it obliquely.

TRAVERSE, in navigation, implies a compound course, or an assemblage of various courses, lying at different angles with the meridian. Thus fig. 6. Plate CCLXXVI. exhibits the traverses formed by a ship, when making an oblique progression against the direction of the wind, as explained in the article **TACKLING**.

The true course and distance resulting from this diversity of courses is discovered by collecting the difference of latitude and departure of each course, and reducing the whole into one departure and one difference of latitude, according to the known rules of trigonometry. This reduction will immediately ascertain the base and perpendicular; or, in other words, will give the difference of latitude and departure to discover the course and distance. See **NAVIGATION**.

TRAVERSE-BOARD, a thin circular piece of board, marked with all the points of the compass, and having eight holes bored in each, and eight small pegs hanging from the centre of the board. It is used to determine the different courses run by a ship during the

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the period of the watch, and to ascertain the distance of each course. This implement is particularly useful in light and variable winds, at which time the helmsman marks the course every half hour, by fixing a peg in that point of the compass whereon the ship had advanced. Thus, if the wind is northerly at the beginning of the watch, the ship, being close-hauled on the larboard tack, will steer W. N. W. If, after the first half hour, the wind changes to N. by W. the ship will fall off to W. by N. both of these courses are marked by the helmsman upon the traverse-board, by putting in one peg for every half hour on which she steers the same course; as, one peg into W. N. W. and two pegs into W. by N. if she sails an hour on the latter course; and so on. The lee-way and variation of the compass are afterwards allowed by the pilot, on summing up the whole.

TREACLE. See THERIACA.—Some also give the name *treacle* to melleas.

TREASON (*proditio*), in its very name (which is borrowed from the French) imports a betraying, treachery, or breach of faith. It therefore happens only between allies, faith the Mirror of Justice: for treason is indeed a general appellation, made use of by the law, to denote not only offences against the king and government; but also that accumulation of guilt which arises whenever a superior reposes a confidence in a subject or inferior, between whom and himself there subsists a natural, a civil, or even a spiritual relation; and the inferior so abuses that confidence, so forgets the obligations of duty, subjection, and allegiance, as to destroy the life of any such superior or lord. This is looked upon as proceeding from the same principle of treachery in private life, as would have urged him who harbours it to have conspired in public against his liege lord and sovereign: and therefore for a wife to kill her lord or husband, a servant his lord or master, and an ecclesiastic his lord or ordinary; these, being breaches of the lower allegiance, of private and domestic faith, are denominated *petit* treasons. But when disloyalty so rears its crest, as to attack even majesty itself, it is called by way of eminent distinction *high-treason*, *alta proditio*; being equivalent to the *crimen lese majestatis* of the Romans; as Glanvil denominates it also in our English law.

High-Treason. As this is the highest civil crime, which (considered as a member of the community) any man can possibly commit, it ought therefore to be the most precisely ascertained. For if the crime of high-treason be indeterminate, this alone (says the president Montesquieu) is sufficient to make any government degenerate into arbitrary power. And yet, by the ancient common law, there was a great latitude left in the breast of the judges, to determine what was treason, or not so: whereby the creatures of tyrannical princes had opportunity to create abundance of constructive treasons; that is, to raise, by forced and arbitrary constructions, offences into the crime and punishment of treason, which never were suspected to be such. But to prevent the inconveniences which began to arise in England from this multitude of constructive treasons, the statute 25 Edw. III. c. 2. was made; which defines what offences only for the future should be held to be treason: in like manner as the *lex Julia majestatis* among the Romans, promulgated by Au-

gustus Cæsar, comprehended all the ancient laws that had before been enacted to punish transgressors against the state. This statute must therefore be our guide, in order to examine into the several species of high-treason. And we shall find that it comprehends all kinds of high-treason under seven distinct branches.

“1. When a man doth compass or imagine the death of our lord the king, of our lady his queen, or of their eldest son and heir.” Under this description it is held that a queen-regnant (such as queen Elizabeth and queen Anne) is within the words of the act, being invested with royal power and entitled to the allegiance of her subject: but the husband of such a queen is not comprised within these words; and therefore no treason can be committed against him.

Let us next fee what is a *compassing* or *imagining* the death of the king, &c. These are synonymous terms: the word *compass* signifying the purpose or design of the mind or will; and not, as in common speech, the carrying such design to effect. And therefore an accidental stroke, which may mortally wound the sovereign, *per infortunium*, without any traitorous intent, is no treason: as was the case of Sir Walter Tyrrel, who, by the command of king William Rufus, shooting at a hart, the arrow glanced against a tree, and killed the king upon the spot. But as this compassing or imagination is an act of the mind, it cannot possibly fall under any judicial cognizance, unless it be demonstrated by some open or overt act. And yet the tyrant Dionysius is recorded to have executed a subject barely for dreaming that he had killed him; which was held for a sufficient proof, that he had thought thereof in his waking hours. But such is not the temper of the English law; and therefore in this, and the three next species of treason, it is necessary that there appear an open or overt act of a more full and explicit nature, to convict the traitor upon. The statute expressly requires, that the accused “be thereof upon sufficient proof attained of some open act by men of his own condition.” Thus, to provide weapons or ammunition for the purpose of killing the king, is held to be a palpable overt act of treason in imagining his death. To conspire to imprison the king by force, and move towards it by assembling company, is an overt act of compassing the king’s death; for all force, used to the person of the king, in its consequence may tend to his death, and is a strong presumption of something worse intended than the present force, by such as have so far thrown off their bounden duty to their sovereign: it being an old observation, that there is generally but a short interval between the prisons and the graves of princes.

How far mere words spoken by an individual, and not relative to any treasonable act or design then in agitation, shall amount to treason, has been formerly matter of doubt. We have two instances in the reign of Edward IV. of persons executed for treasonable words: the one a citizen of London, who said he would make his son heir of the crown, being the sign of the house in which he lived; the other a gentleman, whose favourite buck the king killed in hunting, whereupon he wished it, horns and all, in the king’s belly. These were esteemed hard cases: and the chief justice Markham rather chose to leave his place than assent to the latter judgment. But now it seems clearly to be agreed, that

Treason.

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Comment.

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that by the common law and the statute of Edw. III. words spoken amount only to a high misdemeanor, and no treason. For they may be spoken in heat, without any intention; or be mistaken, perverted, or misremembered by the hearers; their meaning depends always on their connection with other words and things; they may signify differently even according to the tone of voice with which they are delivered; and sometimes silence itself is more expressive than any discourse. As therefore there can be nothing more equivocal and ambiguous than words, it would indeed be unreasonable to make them amount to high-treason. And accordingly, in 4 Car. I. on a reference to all the judges, concerning some very atrocious words spoken by one Pyne, they certified to the king, "that though the words were as wicked as might be, yet they were no treason: for unless it be by some particular statute, no words will be treason." If the words be set down in writing, it argues more deliberate intention; and it has been held, that writing is an overt act of treason; for *scribere est agere*. But even in this case the bare words are not the treason, but the deliberate act of writing them. And such writing, though unpublished, has in some arbitrary reigns convicted its author of treason: particularly in the cases of one Peacham a clergyman, for treasonable passages in a sermon never preached; and of Algernon Sidney, for some papers found in his closet: which, had they been plainly relative to any previous formed design of dethroning or murdering the king, might doubtless have been properly read in evidence as overt acts of that treason which was specially laid in the indictment; but being merely speculative, without any intention (so far as appeared) of making any public use of them, the convicting the authors of treason upon such an insufficient foundation has been universally disapproved. Peacham was therefore pardoned: and though Sidney indeed was executed, yet it was to the general discontent of the nation; and his attainder was afterwards reversed by parliament. There was then no manner of doubt, but that the publication of such a treasonable writing was a sufficient overt act of treason at the common law; though of late even that has been questioned.

2. The second species of treason is, "if a man do violate the king's companion, or the king's eldest daughter unmarried, or the wife of the king's eldest son and heir." By the king's companion is meant his wife; and by violation is understood carnal knowledge, as well without force as with it: and this is high-treason in both parties, if both be consenting; as some of the wives of Henry VIII. by fatal experience evinced. The plain intention of this law is to guard the blood-royal from any suspicion of bastardy, whereby the succession to the crown might be rendered dubious: and therefore, when this reason ceases, the law ceases with it; for to violate a queen or princess dowager is held to be no treason: in like manner as, by the feudal law, it was a felony, and attended with a forfeiture of the fief, if the vassal violated the wife or daughter of his lord; but not so if he only violated his widow.

3. The third species of treason is, "if a man do levy war against our lord the king in his realm." And this may be done by taking arms, not only to dethrone the king, but under pretence to reform religion, or the laws, or to remove evil counsellors, or other grievances

whether real or pretended. For the law does not, neither can it permit any private man, or set of men, to interfere forcibly in matters of such high importance; especially as it has established a sufficient power for these purposes in the high court of parliament: neither does the constitution justify any private or particular resistance for private or particular grievances; though, in cases of national oppression, the nation has very justifiably risen as one man, to vindicate the original contract subsisting between the king and his people.

4. "If a man be adherent to the king's enemies in his realm, giving to them aid and comfort in the realm, or elsewhere," he is also declared guilty of high-treason. This must likewise be proved by some overt act; as by giving them intelligence, by sending them provisions, by selling them arms, by treacherously surrendering a fortress, or the like.

5. "If a man counterfeit the king's great or privy seal," this is also high-treason. But if a man takes wax bearing the impression of the great seal off from one patent and fixes it to another, this is held to be only an abuse of the seal, and not a counterfeiting of it: as was the case of a certain chaplain, who in such a manner framed a dispensation for non-residence. But the knavish artifice of a lawyer much exceeded this: the divine. One of the clerks in chancery glued together two pieces of parchment; on the uppermost of which he wrote a patent, to which he regularly obtained the great seal, the label going through both the skins. He then dissolved the cement, and taking off the written patent, on the blank skin wrote a fresh patent of a different import from the former, and published it as true. This was held no counterfeiting of the great seal, but only a great misprison; and Sir Edward Coke mentions it with some indignation, that the party was living at that day.

6. The sixth species of treason under this statute is, "if a man counterfeit the king's money; and if a man bring false money into the realm counterfeit to the money of England, knowing the money to be false, to merchandise and make payment withal." As to the first branch, counterfeiting the king's money; this is treason, whether the false money be uttered in payment or not. Also if the king's own minters alter the standard or alloy established by law, it is treason. But gold and silver money only are held to be within this statute. With regard likewise to the second branch, importing foreign counterfeit money in order to utter it here; it is held that uttering it, without importing it, is not within the statute.

7. The last species of treason ascertained by this statute is, "if a man slay the chancellor, treasurer, or the king's justices of the one bench or the other, justices in eyre, or justices of assize, and all other justices assigned to hear and determine, being in their places doing their offices." These high magistrates, as they represent the king's majesty during the execution of their offices, are therefore for the time equally regarded by the law. But this statute extends only to the actual killing of them; and not to wounding, or a bare attempt to kill them. It extends also only to the officers therein specified; and therefore the barons of the exchequer, as such, are not within the protection of this act: but the lord keeper or commissioners of the great seal now seem to be within it, by virtue

Temporary statutes of late times enacted, have made some other offences treasonable, as relating to Papists and the Protestant succession.

The punishment of high-treason in general is very solemn and terrible. 1. That the offender be drawn to the gallows, and not be carried or walk; though usually (by connivance, at length ripened by humanity into law) a sledge or hurdle is allowed, to preserve the offender from the extreme torment of being dragged on the ground or pavement. 2. That he be hanged by the neck, and then cut down alive. 3. That his entrails be taken out, and burned, while he is yet alive. 4. That his head be cut off. 5. That his body be divided into four parts. 6. That his head and quarters be at the king's disposal.

The king may, and often doth, discharge all the punishment except beheading, especially where any of noble blood are attainted. For beheading being part of the judgment, that may be executed, though all the rest be omitted by the king's command. But where beheading is no part of the judgment, as in murder or other felonies, it hath been said that the king cannot change the judgment, although at the request of the party, from one species of death to another.

In the case of coining, which is a treason of a different complexion from the rest, the punishment is milder for male offenders; being only to be drawn and hanged by the neck till dead. But in treasons of every kind the punishment of women is the same, and different from that of men. For as the natural modesty of the sex forbids the exposing and publicly mangling their bodies, their sentence (which is to the full as terrible to sense as the other) is to be drawn to the gallows, and there to be burned alive.

For the consequences of this judgment, see ATTAINDER, FORFEITURE, and CORRUPTION of Blood.

Petit TREASON, according to the statute 25 Edward III. c. 2. may happen three ways: by a servant killing his master, a wife her husband, or an ecclesiastical person (either secular or regular) his superior, to whom he owes faith and obedience. See TREASON. A servant who kills his master whom he has left, upon a grudge conceived against him during his service, is guilty of *petit treason*: for the traitorous intention was hatched while the relation subsisted between them, and this is only an execution of that intention. So if a wife be divorced *a mensa et thoro*, still the vinculum matrimonii subsists; and if she kills such divorced husband, she is a traitress. And a clergyman is understood to owe canonical obedience to the bishop who ordained him, to him in whose diocese he is beneficed, and also to the metropolitan of such suffragan or diocesan bishop; and therefore to kill any of these is *petit treason*. As to the rest, whatever has been said with respect to wilful MURDER, is also applicable to the crime of *petit treason*, which is no other than murder in its most odious degree; except that the trial shall be as in cases of high-treason, before the improvements therein made by the statutes of William III. But a person indicted of *petit treason* may be acquitted thereof, and found guilty of manslaughter or murder: and in such case it should seem that two witnesses are not necessary, as in case of

petit treason they are. Which crime is also distinguish- ed from murder in its punishment.

The punishment of *petit treason* in a man, is to be drawn and hanged, and in a woman to be drawn and burned: the idea of which latter punishment seems to have been handed down to us from the laws of the ancient Druids, which condemned a woman to be burned for murdering her husband; and it is now the usual punishment for all sorts of treasons committed by those of the female sex. Persons guilty of *petit treason* were first debarred the benefit of clergy by statute 12 Henry VII. c. 7. which has since been extended to their aiders, abettors, and counsellors, by statutes 23 Henry VIII. c. 1. and 4 & 5 P. and M. c. 4.

TREASURE, in general, denotes a store or stock of money in reserve.

TREASURE-Trove, in law, derived from the French word *trouver*, "to find," called in Latin *thesaurus inventus*, is where any money or coin, gold, silver, plate, or bullion, is found hidden in the earth, or other private place, the owner thereof being unknown; in which case the treasure belongs to the king: but if he that hid it be known, or afterwards found out, the owner and not the king is entitled to it. Also if it be found in the sea, or upon the earth, it doth not belong to the king but the finder, if no owner appears. So that it seems it is the hiding, not the abandoning of it, that gives the king a property: Bracton defining it, in the words of the civilians, to be *vetus depositio pecunie*. This difference clearly arises from the different intentions which the law implies in the owner. A man that hides his treasure in a secret place, evidently does not mean to relinquish his property, but reserves a right of claiming it again when he sees occasion; and if he dies and the secret also dies with him, the law gives it the king in part of his royal revenue. But a man that scatters his treasure into the sea, or upon the public surface of the earth, is construed to have absolutely abandoned his property, and returned it into the common stock, without any intention of reclaiming it: and therefore it belongs, as in a state of nature, to the first occupant or finder; unless the owner appear and assert his right, which then proves that the loss was by accident, and not with an intent to renounce his property.

Formerly all treasure-trove belonged to the finder; as was also the rule of the civil law. Afterwards it was judged expedient for the purposes of the state, and particularly for the coinage, to allow part of what was found to the king, which part was assigned to be all hidden treasure; such as is casually lost and unclaimed, and also such as is designedly abandoned, still remaining the right of the fortunate finder. And that the prince shall be entitled to this hidden treasure is now grown to be, according to Grotius, *jus commune, et quasi gentium*: for it is not only observed, he adds, in England, but in Germany, France, Spain, and Denmark. The finding of deposited treasure was much more frequent, and the treasures themselves more considerable, in the infancy of our constitution than at present. When the Romans, and other inhabitants of the respective countries which composed their empire, were driven out by the northern nations, they concealed their money under ground, with a view of resorting to

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to it again when the heat of the irruption should be over, and the invaders driven back to their desarts. But as this never happened, the treasures were never claimed; and on the death of the owners the secret also died along with them. The conquering generals being aware of the value of these hidden mines, made it highly penal to secrete them from the public service. In England therefore, as among the feudists, the punishment of such as concealed from the king the finding of hidden treasure was formerly no less than death; but now it is only fine and imprisonment.

TREASURER, an officer to whom the treasure of a prince or corporation is committed to be kept and duly disposed of.

The lord high treasurer of Great Britain, or first commissioner of the treasury, when in commission, has under his charge and government all the king's revenue which is kept in the exchequer. He holds his place during the king's pleasure; being instituted by the delivery of a white staff to him. He has the check of all the officers employed in collecting the customs and royal revenues: and in his gift and disposition are all the offices of the customs in the several ports of the kingdom; cheats in every county are nominated by him; he also makes leases of the lands belonging to the crown.

TREASURY, the place wherein the revenues of a prince are received, preserved, and disbursed.

Lords of the TREASURY. In lieu of one single director and administrator of his Majesty's revenues under the title of *lord high treasurer*, it is at present thought proper to put that office in commission, *i. e.* to appoint several persons to discharge it with equal authority, under the title of *lords commissioners of the treasury*.

TREATISE, a set discourse in writing on any subject.

TREATY, a covenant between two or more nations; or the several articles or conditions stipulated and agreed upon between sovereign powers.

TREBLE, in music, the highest or most acute of the four parts in symphony, or that which is heard the clearest and shrillest in a concert.

TREBUCHET, **TREBUCKET**, *Tribuch*, (*Terbuchetum*), a tumbril or cucking stool. Also a great engine to cast stones to batter walls.

TREE, the first and largest of the vegetable kind, consisting of a single trunk, out of which proceed branches and leaves.—Trees are by Linnaeus classed in the seventh family of the vegetable kingdom, and are distinguished from shrubs in that their stems come up with buds on them: but this distinction holds not universally, there being rarely any buds on the large trees in India.

It has been directed by Dr Hales and Mr Evelyn to wash and rub the stems of trees in order to promote their growth; and in the 67th vol. of the Philos. Transact. we have an account of the success of this method. Mr Marsham, in his letter to the lord bishop of Bath and Wells, informs us, that a tree so washed increased fully double the quantity in girth that an unwashed tree did. It was between 13 and 14 feet in height. He washed it from the ground to the beginning of the head, first using water and a stiff shoe-brush until the stem was well cleared from moss

and dirt, and then using only a coarse flannel. The washing was begun as soon as the buds began to swell, and continued three four or five times a-week during all the dry time of the spring and forepart of the summer; but seldom after rains became frequent.—The same gentleman informs us, that a short and spreading tree, having ample room, will increase twice or three times, and perhaps four times, as much as a tall small-headed tree of the same age that stands near other trees.

TREFOIL, in botany. See **TRIFOLIUM**.

TREMELLA, in botany, a genus of aquatic plants of a middle nature between the alga and conserva, being of a pellucid and membranaceous, and frequently gelatinous, nature. There are nine species; the most remarkable of which is the *plicata undulata*, or gelly rain tremella, found in pastures, and by the sides of gravel-walks in gardens after rains; not uncommon in spring, summer, and autumn. It is a membranaceous, pellucid, and gelatinous substance, without any visible root; of a yellowish dull green colour; assuming various forms, either round, angular, plaited or folded together irregularly, like the intestines or a pocket-handkerchief, an inch or two or more in diameter: soft to the touch when moist; but thin, membranaceous, and brittle, when dry; and of a black fuscous colour.—The ancient alchemists called this vegetable the *flowers of heaven*, and imagined that from it they would procure the universal menstruum: but all their researches ended in discovering that by distillation it yielded some phlegm, volatile salt, and empyreumatic oil. It has been extolled in wounds, ulcers, &c. but no regard is ever paid to it by judicious practitioners.

TREMELLIUS (Emmanuel), a Jew by birth, was born at Ferrara in the year 1510. He was so carefully educated as to become a great master of the Hebrew tongue; but was converted to Christianity by the celebrated Peter Martyr. After travelling to Germany and England, he was made professor of the Hebrew tongue, first at Heidelberg, and then at Sedan, where he died in 1580. He translated the Hebrew Bible and Syriac Testament into Latin; in the former he was assisted by Junius, who afterward corrected the second edition in 1587. This work was received by the Protestant churches with great approbation.

TREMOR, an involuntary shaking, chiefly of the hands and head, sometimes of the feet, and sometimes of the tongue and heart.—Tremors arising from a too free use of spirituous liquors require the same treatment as palfies.

TRENCHES, in fortification, are ditches cut by the besiegers, that they may approach the more securely to the place attacked; whence they are also called *lines of approach*.

TRENCHARD (John), an eminent English writer, was descended from an ancient family, and born in the year 1669. He had a liberal education; and was bred to the law, in which he made great progress: but politics, and the place of commissioner of the forfeited estates of Ireland, which he enjoyed in the reign of king William, took him from the bar. He began early to distinguish himself by his writings: for, in 1697, he published, An argument showing that a standing army is inconsistent with a free govern-

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ment, and absolutely destructive to the constitution of the English monarchy; and the year following he published a short history of the standing armies in England: which gave occasion to several answers. In 1720, Mr Trenchard, in conjunction with Mr Thomas Gordon, began to publish in the London, and afterwards in the British Journal, a series of letters, under the name of *Cato*, upon various public and important subjects, which were continued for near three years with great reputation, and afterwards collected and published by Mr Gordon in 4 vols 12mo, under the title of *Cato's Letters*. Mr Trenchard was member of parliament for Taunton in Somersetshire; and died in 1723. Mr Gordon gives him the character of being "one of the worthiest, one of the ablest, one of the most useful men, that ever any country was blessed withal."

TRENT (bifhopric of), a province of Germany, in the circle of Auflria, near the frontiers of Italy, is bounded on the north by Tirol; on the east, by the Feltrino and Bellunese; on the south, by Vicentino, the Veronese, Brefciano, and the lake de Garda; and on the west, by the Brefciano and the lake de Garda. The soil is said to be pretty fruitful, and to abound in wine and oil.

TRENT, a city of Germany, and capital of the bifhopric of that name; is a very ancient place, and stands in a fertile and pleasant plain, in the midst of the high mountains of the Alps. The river Adige washes its walls, and, creeping for some time among the hills, runs swiftly into Italy. Trent has three considerable churches, the principal of which is the cathedral: this is a very regular piece of architecture. The church of St Maria Major, is all of red and white marble; and is remarkable for being the place where the famous council of Trent was held, whose decisions are now the standing rule of the Romish church. E. Long. 11. 5. N. Lat. 46. 10.

TRENT, one of the largest rivers in Egglund, which rises in the Moorland of Staffordshire, and runs south-west by Newcastle-under-Line; and afterwards dividing the county in two parts, runs to Burton, then to Nottingham and Newark; and so continuing its course due north to Gainfborough on the confines of Lincolnshire, it joins several rivers, and falls into the Humber.

TREPANNING, in surgery. See there, n^o 511. et seq.

TRES TAVERNÆ, (anc. geog.) a place in Latium, lying on the Via Appia, on the left or south side of the river Astura, to the north of the Paludes Pompinæ. Its ruins now seen near Cisterna, a village in the Campagna di Roma, twenty-one miles from Rome, whence the Christians went out to meet St Paul.

TRESPASS, in law, signifies any transgression of the law, under treason, felony, or misprison of either: but it is commonly used for any wrong or damage that is done by one private person to another, or to the king in his forest.

TRESSLE-TREES, in ship-building, two strong bars of timber fixed horizontally on the opposite sides of the lower mast-head, to support the frame of the top and the weight of the top-mast.

TRESSURE, in heraldry, a diminutive of an orle, usually held to be half the breadth thereof.

TRET, in commerce, an allowance made for the

waste or the dirt that may be mixed with any commodity; which is always four pounds in every 104 pounds weight.

TREVERI, or TREVIRI, (anc. geog.) an ancient and a powerful people both in horse and foot, according to Cæsar; extending far and wide between the Meuse and the Rhine. In the lower age their capital, called *Augusta Trevirorum*, assumed, after the manner of those times, the name of the people, *Treviri*. Now *Triers* or *Treves*, capital of the electorate of that name, situate on the Moselle. E. Long. 6. 10. Lat. 49. 55.

TREVES, an archbifhopric of Germany; lies between Cologne, Berg, and Juliers on the north, Lorrain and the Palatinate on the south, Luxemburg on the west, and the Wetterau on the east. Its extent from south to north is about 80 miles; but its breadth is very unequal. On the banks of the Rhine and Moselle, the country is populous, and fruitful in corn and wine; but elsewhere mountainous and woody, yet abounding in game, and in metals and minerals of various kinds. It is watered not only by the Rhine and Moselle, but also by the Saar and Kyll, and contains 28 towns. The states consist of the prelates or abbots, with the representatives of the clergy, and of certain towns. The inhabitants are all Papists, except in such places as the elector possesses in common with other princes, where there are some Protestants. Under the archbifhop are five archdeacons, and, subordinate to these, 20 provincial deans. The church of Treves, is commonly accounted the most ancient of Germany. The chapter which elects the archbifhop from among themselves, and makes him swear to a capitulation, consists of 16 capitulary canons, who are all of noble extraction, besides 24 others, who are domiciled. At every new election, the pope receives large sums for confirmation, the pallium, and for annats. The archiepiscopal title is, By the grace of God, archbifhop of Treves, of the holy Roman empire throughout Gaul and the kingdom of Arles, arch-chancellor and elector, and also administrator of Prum. He is the second elector in rank, and at the election of an emperor has the first voice. His matricular assessment is 26 horse and two-thirds, and 122 foot two-thirds, or 806 florins 40 kruitzers. In the diets of the circle he has the second place, and nominates one assessor of the chamber judicatory, towards the maintenance of which he contributes, each term, 811 rix-dollars 58 kruitzers. The tolls on the Moselle and Rhine, his demefnes, and his office of noble guardian of the minors, with the taxes he lays on his subjects, are supposed to bring him in about 70,000 *per annum*. For the government of this electorate and the administration of justice, besides the regency and revision-court, there are the two anlic judicatories, to which appeals lie from the inferior courts. There are also two spiritual high-courts. The hereditary officers are the marshal, the chamberlain, the sewer, and cupbearer. Among other prerogatives, this elector has power to banish excommunicated persons out of the empire if they do not reconcile themselves to the church within a-year, and to take possession of the estates of minors till they are of age. He has also a right to reunite all the fiefs of his diocese, upon failure of heirs, to the domains of his church. His

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subjects may appeal to the chamber of the empire in all causes above a thousand florins. The regular troops he maintains, besides a militia, amount to between 1100 and 1200, besides a life-guard of 40 men.

TREVES or Trier, in Latin *Trevere, Trevers, Treviris*, or *Augusta Trevirorum*, the capital of a German archbishopric of the same name; it stands 60 miles west of Mentz, 52 south of Cologne, and 82 north of Strasburg. This city vies with most in Europe for antiquity, having been a large and noted town before Augustus settled a colony in it. It was free and imperial till the year 1560, when it was surprised and subjected by its archbishop James III. It stands on the Moselle, over which it has a fair stone bridge. The cathedral is a large building; and near it stands the elector's palace, which not long ago was rebuilt. Here are three collegiate and five parish-churches, three colleges of Jesuits, thirteen monasteries and nunneries, an university founded in 1472, a house of the Teutonic order, and another of that of Malta, with some remains of the ancient Roman theatre. Roman coins and medals are often found in the ruins of the old city. In the cathedral they pretend to have our Saviour's coat and St Peter's staff, to which they ascribe miracles. The private houses here are mean; and the city is neither well fortified, nor inhabited. E. Long. 6. 10. N. Lat. 49. 58.

TRIAL, in law, the examination of a cause according to the laws of the land before a proper judge; or it is the manner and order observed in the hearing and determining of causes. See SUIT, WRIT, PROCESS, PLEADINGS, ISSUE (in APPENDIX), PROSECUTION, ARRAIGNMENT, and PLEA.

Trials are either civil or criminal.

I. *Civil TRIALS*. The species of trials in civil cases are seven: By record; by inspection, or examination; by certificate; by witnesses; by wager of battle; by wager of law; and by jury. The first fix are only had in certain special or exceptional cases, where the trial by jury would not be so proper or effectual: See them explained under their respective titles. The nature of the last, that principal criterion of truth in the law of England, shall be explained in this article.

The method of trial by jury, called also the trial *per pais*, or *by the country*, hath been used time out of mind in this nation, and seems to have been coeval with the first civil government thereof. Its use, though for a time greatly impaired and shaken by the introduction of the Norman trial by battle, was always so highly esteemed and valued by the people, that no conquest, no change of government, could ever prevail to abolish it: and in *magna charta* it is more than once insisted on as the principal bulwark of our liberties.

Trials by jury in civil causes are of two kinds; *extraordinary* and *ordinary*.

1. The first species of *extraordinary* trial by jury is that of the grand assize, which was instituted by king Henry II. in parliament, by way of alternative offered to the choice of the tenant or defendant in a writ of right, instead of the barbarous and unchristian custom of duelling. For this purpose a *writ de magna assisa eligenda* is directed to the sheriff, to return four knights, who are to elect and choose 12 others to be joined with them; and these all together form the grand assize,

or great jury, which is to try the matter of right, and mult now consist of 16 jurors. Another species of extraordinary juries, is the jury to try an attain; which is a process commenced against a former jury for bringing a false verdict. See the article ATTAIN.

2. With regard to the ordinary trial by jury in civil cases, the most clear and perspicuous way of treating it will be by following the order and course of the proceedings themselves.

When therefore an issue is joined by these words, "And this the said A prays may be inquired of by the country;" or, "And of this he puts himself upon the country, and the said B does the like;" the court awards a writ of *venire facias* upon the roll or record, commanding the sheriff "that he cause to come here, on such a day, twelve free and lawful men, *liberes et legales homines*, of the body of his county, by whom the truth of the matter may be better known, and who are neither of kin to the aforesaid A nor the aforesaid B, to recognize the truth of the issue between the said parties." And such writ is accordingly issued to the sheriff. It is made returnable on the last return of the same term wherein issue is joined, *viz.* hilyary or trinity terms; which, from the making up the issues therein, are usually called *issuable terms*. And he returns the names of the jurors in a panel (a little pane or oblong piece of parchment) annexed to the writ. This jury is not summoned, and therefore not appearing at the day mult unavoidably make default. For which reason a compulsive process is now awarded against the jurors, called in the common pleas a writ of *habeas corpus juratorum*, and in the king's bench *distingas*, commanding the sheriff to have their bodies, or to detain them by their lands and goods, that they may appear upon the day appointed. The entry therefore on the roll of record is, "That the jury is respited, thro' defect of the jurors, till the first day of the next term, to appear at Westminter; unless before that time, *viz.* on Wednesday the fourth of March, the justices of our lord the king appointed to take assizes in that county, shall have come to Oxford, that is, to the place assigned for holding the assize. Therefore the sheriff is commanded to have their bodies at Westminter on the said first day of next term, or before the said justices of assize, if before that time they come to Oxford, *viz.* on the fourth of March aforesaid." And as the judges are sure to come and open the circuit-commissions on the day mentioned in the writ, the sheriff returns and summons this jury to appear at the assizes; and there the trial is had before the justices of assize and *nisi prius*: among whom (as hath been said *), are usually two of the judges of the courts at Westminter, the whole kingdom being divided into six circuits for this purpose. And thus we may observe, that the trial of common issues at *nisi prius*, was in its original only a collateral incident to the original business of the justices of assize; though now, by the various revolutions of practice, it is become their principal civil employment; hardly any thing remaining in use of the real assizes but the name.

If the sheriff be not an indifferent person, as if he be a party in the suit, or be related by either blood or affinity to either of the parties, he is not then trusted to return the jury; but the *venire* shall be directed to the coroners, who in this, as in many other instances,

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are the substitutes of the sheriff to execute process when he is deemed an improper person. If any exception lies to the coroners, the *venire* shall be directed to two clerks of the court, or two persons of the county named by the court, and sworn. And these two, who are called *clerks*, or electors, shall indifferently name the jury, and their return is final; no challenge being allowed to their array.

When the general day of trial is fixed, the plaintiff or his attorney must bring down the record to the assizes, and enter it with the proper officer in order to its being called on in court.

These steps being taken, and the cause called on in court, the record is then handed to the judge, to peruse and observe the pleadings, and what issues the parties are to maintain and prove, while the jury is called and sworn. To this end the sheriff returns his compulsive process, the writ of *habeas corpora*, or *disfringas*, with the panel of jurors annexed, to the judge's officer in court.

As the jurors appear when called, they shall be sworn, unless challenged by either party. See the article CHALLENGE.

If by means of challenges, or other cause, a sufficient number of unexceptionable jurors doth not appear at the trial, either party may pray a tales. See the article TALES.

When a sufficient number of persons impanelled, or tales-men appear, they are then separately sworn, well and truly to try the issue between the parties, and a true verdict to give according to the evidence; and hence they are denominated "the jury," *jurata*, and "jurors," *sc. juratores*.

The jury are now ready to hear the merits; and to fix their attention the closer to the facts which they are impanelled and sworn to try, the pleadings are opened to them by counsel on that side which holds the affirmative of the question in issue. For the issue is said to lie, and proof is always first required, upon that side which affirms the matter in question: in which our law agrees with the civil, *ei incumbit probatio qui dicit, non qui negat; cum per rerum naturam factum negantis probatio nulla sit*. The opening counsel briefly informs them what has been transacted in the court above; the parties, the nature of the action, the declaration, the plea, replication, and other proceedings; and lastly, upon what point the issue is joined, which is there sent down to be determined. Instead of which, formerly the whole record and process of the pleadings were read to them in English by the court, and the matter of issue clearly explained to their capacities. The nature of the case, and the evidence intended to be produced, are next laid before them by counsel also on the same side; and when their evidence is gone through, the advocate on the other side opens the adverse case, and supports it by evidence; and then the party which began is heard by way of reply.

When the evidence is gone through on both sides, the judge, in the presence of the parties, the counsel, and all others, sums up the whole to the jury; omitting all superfluous circumstances, observing wherein the main question and principal issue lies, stating what evidence has been given to support it, with such remarks as he thinks necessary for their direction, and

giving them his opinion in matters of law arising upon that evidence.

The jury, after the proofs are summed up, unless the case be very clear, withdraw from the bar to consider of their verdict; and in order to avoid intemperance and causeless delay, are to be kept without meat, drink, fire, or candle, unless by permission of the judge, till they are all unanimously agreed. A method of accelerating unanimity not wholly unknown in other constitutions of Europe, and in matters of greater concern. For by the golden bull of the empire, if, after the congress is opened, the electors delay the election of a king of the Romans for 30 days, they shall be fed only with bread and water till the same is accomplished. But if our juries eat or drink at all, or have any eatables about them, without consent of the court, and before verdict, it is fineable; and if they do so at his charge for whom they afterwards find, it will set aside the verdict. Also if they speak with either of the parties or their agents after they are gone from the bar, or if they receive any fresh evidence in private, or if to prevent disputes they cast lots for whom they shall find, any of these circumstances will entirely vitiate the verdict. And it has been held, that if the jurors do not agree in their verdict before the judges are about to leave the town, though they are not to be threatened or imprisoned, the judges are not bound to wait for them, but may carry them round the circuit from town to town in a cart. This necessity of a total unanimity seems to be peculiar to our own constitution; or at least, in the *membra* or jury of the ancient Goths, there was required (even in criminal cases) only the consent of the major part; and in case of an equality, the defendant was held to be acquitted.

When they are all unanimously agreed, the jury return back to the bar; and before they deliver their verdict, the plaintiff is bound to appear in court, by himself, attorney, or counsel, in order to answer the amendment to which by the old law he is liable, in case he fails in his suit, as a punishment for his false claim. To be amerced, or a *mercie*, is to be at the king's mercy with regard to the fine to be imposed; *in misericordia domini regis pro falso clamore suo*. The amendment is disused, but the form still continues; and if the plaintiff does not appear non verdict can be given; but the plaintiff is said to be nonsuited, *non sequitur clamorem suum*. Therefore it is usual for a plaintiff, when he or his counsel perceives that he has not given evidence sufficient to maintain his issue, to be voluntarily nonsuited, or withdraw himself: whereupon the crier is ordered to call the plaintiff; and if neither he, nor any body for him appears, he is nonsuited, the jurors are discharged, the action is at an end, and the defendant shall recover his costs. The reason of this practice is, that a nonsuit is more eligible for the plaintiff than a verdict against him: for after a nonsuit, which is only a default, he may commence the same suit again for the same cause of action; but after a verdict had, and judgment consequent thereupon, he is for ever barred from attacking the defendant upon the same ground of complaint. But in case the plaintiff appears, the jury by their foreman deliver in their verdict. See the article VERDICT.

When the jury have delivered in their verdict, and

Trial.

it is recorded in court, they are then discharged; and so ends the trial by jury: a trial which ever has been, and it is hoped ever will be, looked upon as the glory of the English law. It is certainly the most transcendent privilege which any subject can enjoy or wish for, that he cannot be affected either in his property, his liberty, or his person, but by the unanimous consent of 12 of his neighbours and equals.

The impartial administration of justice, which secures both our persons and our properties, is the great end of civil society. But if that be entirely intrusted to the magistracy, a select body of men, and those generally selected by the prince or such as enjoy the highest offices in the state, their decisions, in spite of their own natural integrity, will have frequently an involuntary bias towards those of their own rank and dignity: it is not to be expected from human nature, that the few should be always attentive to the interests and good of the many. On the other hand, if the power of judicature were placed at random in the hands of the multitude, their decisions would be wild and capricious, and a new rule of action would be every day established in our courts. It is wisely therefore ordered, that the principles and axioms of law, which are general propositions flowing from abstracted reason, and not accommodated to times or to men, should be deposited in the breasts of the judges, to be occasionally applied to such facts as come properly ascertained before them. For here partiality can have little scope; the law is well known, and is the same for all ranks and degrees: it follows as a regular conclusion from the premises of fact pre-established. But in settling and adjusting a question of fact, when intrusted to any single magistrate, partiality and injustice have an ample field to range in; either by boldly asserting that to be proved which is not so, or more artfully by suppressing some circumstances, stretching and warping others, and distinguishing away the remainder. Here therefore a competent number of sensible and upright jurymen, chosen by lot from among those of the middle rank, will be found the best investigators of truth, and the surest guardians of public justice. For the most powerful individual in the state will be cautious of committing any flagrant invasion of another's right, when he knows that the fact of his oppression must be examined and decided by 12 indifferent men not appointed till the hour of trial; and that when once the fact is ascertained, the law must of course redress it. This therefore preserves in the hands of the people that share which they ought to have in the administration of public justice, and prevents the encroachments of the more powerful and wealthy citizens.

II. *Criminal Trials.* The several methods of trial and conviction of offenders, established by the laws of England, were formerly more numerous than at present, through the superition of our Saxon ancestors; who, like other northern nations, were extremely addicted to divination: a character which Tacitus observes of the ancient Germans. They therefore invented a considerable number of methods of purgation or trial, to preserve innocence from the danger of false witnesses, and in consequence of a notion that God would always interpolate miraculously to vindicate the guiltless: as, 1. By ordeal; 2. By corsued; 3. By battel. See these articles.

4. A fourth method is that by the *peers of Great Britain, in the Court of PARLIAMENT*; or the *Court of the Lord High STEWARD*, when a peer is capitally indicted; for in case of an appeal, a peer shall be tried by jury. This differs little from the trial *per patriam*, or by jury; except that the peers need not all agree in their verdict; and except also, that no special verdict can be given in the trial of a peer: because the lords of parliament, or the lord high steward (if the trial be had in his court) are judges sufficiently competent of the law that may arise from the fact: but the greater number, consisting of 12 at the least, will conclude, and bind the minority.

The trial by jury, or the country, *per patriam*, is also that trial by the peers of every Briton, which, as the great bulwark of his liberties, is secured to him by the great charter: *nullus liber homo capitatur, vel imprisonetur, aut exulet, aut aliquo alio modo destruatur, nisi per legale iudicium parium suorum, vel per legem terre.*

When therefore a prisoner on his *ARRAIGNMENT* has pleaded not guilty, and for his trial hath put himself upon the country, which country the jury are, the sheriff of the county must return a panel of jurors, *liberos et legales homines, de vicineto*; that is, freeholders without just exception, and of the *visne* or neighbourhood; which is interpreted to be of the county where the fact is committed. If the proceedings are before the court of king's bench, there is time allowed between the arraignment and the trial, for a jury to be impanelled by writ of *venire facias* to the sheriff, as in civil causes: and the trial in case of a misdemeanor is had at *nisi prius*, unless it be of such consequence as to merit a trial at bar; which is always invariably had when the prisoner is tried for any capital offence. But, before commissioners of oyer terminer and goal-delivery, the sheriff, by virtue of a general precept directed to him beforehand, returns to the court a panel of 48 jurors, to try all felons that may be called upon their trial at that session; and therefore it is there usual to try all felons immediately or soon after their arraignment.

But it is not customary, nor agreeable to the general course of proceedings, unless by consent of parties, to try persons indicted of smaller misdemeanors at the same court in which they have pleaded not guilty, or traversed the indictment. But they usually give security to the court to appear at the next assizes or session, and then and there to try the traverser, giving notice to the prosecutor of the same.

In cases of high-treason, whereby corruption of blood may ensue (except treason in counterfeiting the king's coin or seals) or misprison of such treason, it is enacted by statute 7 W. III. c. 3. first, that no person shall be tried for any such treason, except an attempt to assassinate the king, unless the indictment be found within three years after the offence committed: next, that the prisoner shall have a copy of the indictment, (which includes the caption) but not the names of the witnesses, five days at least before the trial, that is, upon the true construction of the act, before his arraignment; for then is his time to take any exceptions thereto, by way of plea or demurrer: thirdly, that he shall also have a copy of the panel of jurors two days before his trial: and, lastly, that he shall have the same compulsive process to bring in his witnesses for

him, as was usual to compel their appearance against him. And by statute 7 Ann. c. 21. (which did not take place till after the decease of the late pretender) all persons indicted for high-treason, or misprision thereof, shall have not only a copy of the indictment, but a list of all the witnesses to be produced, and of the jurors impanelled, with their professions and places of abode, delivered to him ten days before the trial, and in the presence of two witnesses, the better to prepare him to make his challenges and defence. And no person indicted for felony is, or (as the law stands) ever can be, entitled to such copies before the time of his trial.

When the trial is called on, the jurors are to be sworn as they appear, to the number of 12, unless they are challenged by the party. See the article CHALLENGE.

If by reason of challenges or the default of the jurors, a sufficient number cannot be had of the original panel, a tales may be awarded as in civil causes, till the number of 12 is sworn, "well and truly to try, and true deliverance make, between our sovereign lord the king and the prisoner whom they have in charge; and a true verdict to give, according to their evidence." See TABLES.

When the jury is sworn, if it be a cause of any consequence, the INDICTMENT is usually opened, and the evidence marshalled, examined, and enforced by the counsel for the crown, or prosecution. But it is a settled rule at common law, that no counsel shall be allowed a prisoner upon his trial upon the general issue, in any capital crime, unless some point of law shall arise proper to be debated. A rule, which (however it may be palliated under cover of that noble declaration of the law, when rightly understood, that the judge shall be counsel for the prisoner; that is, shall see that the proceedings against him are legal and strictly regular) seems to be not at all of a piece with the rest of the humane treatment of prisoners by the English law. For upon what face of reason can that assistance be denied to save the life a man, which yet is allowed him in prosecutions for every petty trespass? Nor indeed is it, strictly speaking, a part of our ancient law: for the Mirror, having observed the necessity of counsel in civil suits, "who know how to forward and defend the cause by the rules of law and customs of the realm;" immediately afterwards subjoins, "and more necessary are they for defence upon indictments and appeals of felony, than upon other venial causes." And, to say the truth, the judges themselves are so sensible of this defect in our modern practice, that they seldom scruple to allow a prisoner counsel to stand by him at the bar, and to instruct him what questions to ask, or even to ask questions for him, with regard to matters of fact; for as to matters of law arising on the trial, they are entitled to the assistance of counsel. But still this is a matter of too much importance to be left to the good pleasure of any judge, and is worthy the interpolation of the legislature; which has shown its inclination to indulge prisoners with this reasonable assistance, by enacting, in statute 7 W. III. c. 3. that persons indicted for such high-treason as works a corruption of the blood or misprision thereof, (except treason in counterfeiting the king's coins or seals,) may make their

full defence by counsel, not exceeding two, to be named by the prisoner and assigned by the court or judge; and this indulgence, by statute 20 Geo. II. c. 30. is extended to parliamentary impeachments for high-treason, which were excepted in the former act.

When the evidence on both sides is closed, the jury cannot be discharged till they have given in their VERDICT. If they find the prisoner not guilty, he is then for ever quit and discharged of the accusation; except he be appealed of felony within the time limited by law. And upon such his acquittal, or discharge for want of prosecution, he shall be immediately set at large without payment of any fee to the goaler. But if the jury find him guilty, he is then said to be convicted of the crime whereof he stands indicted. See the article CONVICTION; and, subsequent thereto, the articles JUDGMENT, ATTAINDER, FORFEITURE, EXECUTION, also *Benefit of CLERGY, REPRIEVE, PARDON.*

TRIANDRIA (from *τρεῖς* "three," and *ἀνρ* "a man or husband"), the name of the third class in Linnaeus's sexual system, consisting of plants with hermaphrodite flowers, which have three stamina or male organs.

TRIANGLE, in geometry, a figure of three sides and three angles.

TRIBE, in antiquity, a certain quantity, or number of persons, when a division was made of a city or people into quarters or districts.

TRIBRACHYS, in ancient poetry, a foot consisting of three syllables, and these all short; as, *melior*.

TRIBUNAL, in general, denotes the seat of a judge, called in our courts *bench*.

TRIBUNAL, among the ancient Romans, a magistrate chosen out of the commons, to protect them against the oppressions of the great, and to defend the liberty of the people against the attempts of the senate and consuls.

The tribunals of the people were first established in the year of Rome 259. The first design of the creation was to shelter the people from the cruelty of usurers, and to engage them to quit the Aventine mount, whither they had retired in displeasure.

Their number at first was but two; but the next year, under the consulate of A. Posthumus Aruncius and Cassius V. Sestilius, there were three more added; and this number of five was afterwards increased by L. Trebonius to ten.

Military TRIBUNE, an officer in the Roman army, commanded in chief over a body of forces, particularly the division of a legion; much the same with our colonel, or the French *maitre de camp*.

TRIBUTARY, one who pays tribute to another, in order to live in peace with him or share in his protection.

TRIBUTE, a tax or impost which one prince or state is obliged to pay to another as a token of dependence, or in virtue of a treaty, and as a purchase of peace.

TRICEPS, in anatomy. See there, *Table of the Muscles*.

TRICHECUS, the walrus; a genus of quadrupeds, belonging to the order of bruta. The characters are these. Two great tusks in the upper jaw, point.

1. The rosmarinus, morfe, or sea-horse, has a round head; small mouth; very thick lips, covered above and below with pellicid bristles as thick as a straw; small fiery eyes; two small orifices instead of ears; short neck; body thick in the middle, tapering towards the tail; skin thick, wrinkled, with short brownish hairs thinly dispersed: legs short; five toes on each, all connected by webs, and small nails on each: the hind feet are very broad; each leg loosely articulated; the hind legs generally extended on a line with the body: the tail is very short; penis long: length of the animal, from nose to tail, sometimes eighteen feet, and ten or twelve round in the thickest part: the teeth have been sometimes found of the weight of 20 lb. each. Teeth of this size are only found on the coast of the Icy Sea, where the animals are seldom molested, and have time to attain their full growth.

They inhabit the coast of Spitzbergen, Nova Zembla, Hudson's Bay, and the gulph of St Laurence; and the Icy Sea, as far as Cape Tchuktshi. They are gregarious; in some places appearing in herds of hundreds. They are shy animals, and avoid places which are much haunted by mankind; but are very fierce. If wounded in the water, they attempt to sink the boat, either by rising under it, or by striking their great teeth into the sides; they roar very loud, and will follow the boat till it gets out of sight. Numbers of them are often seen sleeping on an island of ice; if awoke, they fling themselves with great impetuosity into the sea; at which time it is dangerous to approach the ice, lest they should tumble into the boat and overset it. They do not go upon the land till the coast is clear of ice. At particular times, they land in amazing numbers: the moment the first gets on shore, so as to lie dry, it will not stir till another comes and forces it forward by beating it with its great teeth; this is served in the same manner by the next; and so in succession till the whole is landed, continuing tumbling over one another, and forcing the foremost, for the sake of quiet, to remove further up. The method of killing them on the Magdalene isles, in the gulph of St Laurence, according to Mr Pennant, is thus: The hunters watch their landing; and as soon as they find a sufficient number for what they call a *cut*, they go on shore, each armed with a spear sharp on one side like a knife, with which they cut their throats. Great care must be taken not to stand in the way of those which attempt to get again to sea, which they do with great agility by tumbling headlong; for they would crush any body to death by their vast weight. They are killed for the sake of their oil, one walrus producing about half a tun. The knowledge of this chase is of great antiquity; Other the Norwegian, about the year 890, made a report of it to king Alfred, having, as he says, made the voyage beyond Norway, for the more commoditie of fishing of horse-whales, which have in their teeth bones of great price and excellency, whereof he brought some at his return unto the king. In fact, it was, in the northern world, in early times, the substitute to ivory, being very white and very hard. Their skins, Other says, were good to cut into cables. M. de Buffon says, he

has seen braces for coaches made of the skin, which were both strong and elastic.

They bring one, or at most two young at a time: they feed on sea herbs and fish; also on shells, which they dig out of the sand with their teeth: they are said also to make use of their teeth to ascend rocks or pieces of ice, fastening them to the cracks, and drawing their bodies up by that means. Besides mauling, they seem to have no other enemy than the white bear, with whom they have terrible combats; but generally come off victorious, by means of their great teeth.

2. The manatus, manati, or sea-cow. This animal, in nature, so nearly approaches the cetaceous tribe, that it scarce deserves the name of a biped: what are called feet are little more than pectoral fins; they serve only for swimming: they are never used to assist the animal in walking or landing; for it never goes ashore, nor ever attempts to climb the rocks, like the sea-horse and seal. It brings forth in the water, and like the whale, suckles its young in that element: like the whale, it has no voice; and like that animal, has an horizontal broad tail, without even the rudiments of hind feet. It inhabits the shores of Kamtschaika, those of the opposite coast of America, and of the intervening islands. It is found again on that of Mindanao, one of the Philippine islands, and on the coast of New Holland; on that of the isle of France, and on that of Senegal; on the Mosquito shore, in the river Oronoque, and the lakes formed by it; and lastly, in the river of Amazons; but in no other part of the Atlantic Ocean.

They live perpetually in the water, and frequent the edges of the shores; and in calm weather swim in great groves near the mouths of rivers: in the time of flood they come so near the land, that a person may stroke them with his hand: if hurt, they swim out to sea; but presently return again. They live in families, one near another; each consists of a male, a female, a half-grown young one, and a very small one. The females oblige the young to swim before them, while the other old ones surround and as it were guard them on all sides. The affection between the male and female is very great: for if the male is attacked, he will defend her to the utmost; and if she is killed, will follow her corpse to the very shore, and swim for some days near the place it has been landed at. They copulate in the spring, in the same manner as the human kind, especially in calm weather, towards the evening. The female swims gently about; the male pursues; till tired with wantoning she flings herself on her back, and admits his embraces. Steller thinks they go with young about a year: it is certain that they bring but one young at a time, which they suckle by two teats placed between the breasts. They are vastly voracious and gluttonous; and feed not only on the fuci that grow in the sea, but such as are hung on the edges of the shore. When they are filled, they fall asleep on their backs. During their meals, they are so intent on their food, that any one may go among them and choose which he likes best. Peter Martyr gives an instance of one that lived in a lake of Hispaniola for 25 years, and was so tame as to come to the edge of the shore on being called; and would even perform the part of a ferry, and carry several people at a time on its back to the opposite shore.—Their back and their

Tricheus. their sides are generally above water; and as their skin is filled with a species of loose peculiar to them, numbers of gulls are continually perching on their backs and picking out the insects.

They continue in the Kamtschatka and American seas the whole year; but in winter are very lean, so that you may count their ribs. They are taken by harpoons fastened to a strong cord; and after they are struck, it requires the united force of thirty men to draw them on shore. Sometimes when they are transfixed, they will lay hold of the rocks with their paws, and flick so fast as to leave the skin behind before they can be forced off. When a manati is struck, its companions swim to its assistance; some will attempt to overturn the boat by getting under it; others will press down the rope, in order to break it; and others will strike at the harpoon with their tails, with a view of getting it out, in which they often succeed. They have not any voice; but make a noise by hard breathing, like the snorting of a horse.

They are of an enormous size; some are 28 feet long, and 8000lb. in weight. Those of the West Indies and other hot climates do not exceed 1200lb. in weight, and few arrive at that size. Probably they are not suffered to live their full time in those countries, being perpetually persecuted by the Mosquito and other Indians, who are very dexterous in striking them. The head, in proportion to the bulk of the animal, is small, oblong, and almost square: the nostrils are filled with short bristles: the gape, or rictus, is small: the lips are double: near the junction of the two jaws the mouth is full of white tubular bristles, which serve the same use as the lamina in whales, to prevent the food running out with the water: the lips are also full of bristles, which serve instead of teeth to cut the strong roots of the sea-plants, which floating ashore are a sign of the vicinity of these animals. In the mouth are no teeth, only two flat white bones, one in each jaw; one above, another below, with undulated surfaces, which serve instead of grinders.

The eyes are extremely small, not larger than those of a sheep: the iris is black. The animal is destitute of ears, having only two orifices, so small that a quill will scarce enter them: the tongue is pointed, and but small: the neck is thick, and its junction with the head scarce distinguishable; and the last always hangs down: the circumference of the body near the shoulders is twelve feet, about the belly twenty, near the tail only four feet eight; the head thirty-one inches the neck near seven feet: and from these measurements may be collected the deformity of this animal. Near the shoulders are two feet, or rather fins, which are only two feet two inches long, and have neither fingers nor nails; beneath they are concave, and covered with hard bristles: the tail is thick, strong, and horizontal, ending in a stiff black fin, and like the substance of whalebone, and much split in the forepart; the end slightly divided. The females have, between the pectoral fins, two large round and fair breasts; and both sexes have the parts of generation, and the navel, perfectly resembling those of the human species: there is no doubt, Mr Pennant thinks, but all the fables concerning mermaids, mermen, and syrens, took their rise from an imperfect view of this animal.

The skin is very thick, black, and full of inequalities, like the bark of oak, and so hard as scarce to be cut with an ax, and has no hair on it: beneath the skin is a thick blubber, which tastes like oil of almonds. The flesh is coarser than beef, and will not soon putrify. The young ones taste like veal. The skin is used for shoes, and for covering the sides of boats.

TRICOCCEÆ, (*τρις* "three," and *κακκς* "a grain"), the name of the thirty-eighth order in Linneus's Fragments of a Natural Method, consisting of plants with a single three-cornered capsule, having three cells, or internal divisions, each containing a single seed. See BOTANY, p. 1313.

TRIDENT, an attribute of Neptune, being a kind of sceptre which the painters and poets put into the hands of that god, in form of a spear or fork with three teeth; whence the word.

TRIENNIAL, an epithet applied chiefly to officers or employments which last for three years.

TRIENNIAL Elections. The utmost extent of time that the same parliament was allowed to sit, by the stat. 6 W. & M. c. 2. was three years; after the expiration of which, reckoning from the return of the first summons, the parliament was to have no longer continuance. But by the stat. 1 Geo. I. st. 2. c. 38. this term was prolonged to seven years.

TRIENS, in antiquity, a copper money of the value of one third of an *as*, which on one side bore a Janus's head, and on the other a water rat.

TRIERS, or **TREVES**. See **TREVES**.

TRIESTE, a sea-port town of Istria, seated on the gulph of Venice, and belonging to the house of Austria. It was formerly a free city, and is situated on the declivity of a rock, eight miles north of Capo d'Istria, and seventy-two miles north-east of Venice. E. Long. 14. 12. N. Lat. 46. 10.

TRIFOLIUM, **TREFOIL**; a genus of the decandria order, belonging to the diadelphia class of plants. There are 43 species; of which the most remarkable are, 1. The *melilotis officinalis*, or *melilot*, is a native of Britain, growing in corn-fields and by the waysides, but not common. The stalk is erect, firm, striated, branched, and two or three feet high: the leaves ternate, smooth, obtusely oval, and serrated: the flowers are small, yellow, pendulous, and grow in long close spikes at the tops of the branches: the pod is very short, turgid, transversely wrinkled, pendulous, and contains either one or two seeds. The plant has a very peculiar strong scent, and disagreeable bitter acid taste, but such, however, as is not displeasing to cattle. The flowers are sweet-scented. It has generally been esteemed emollient and digestive, and been used in fomentations and cataplasms, particularly in the plaster employed in dressing blisters; but is now laid aside, as its quality is found to be rather acid and irritating than emollient or resolvent. It communicates a most loathsome flavour to wheat and other grain, so as to render it unfit for making bread.

2. The *repens*, white creeping trefoil, or Dutch trefoil, is common in meadows and pastures. It is well known to be an excellent fodder for cattle; and the leaves are a good rustic hygrometer, as they are always relaxed and flaccid in dry weather, but erect in moist or rainy.

Triga
Trigonella.

3. The pratense, purple trefoil or clover, frequent in meadows and pastures. It affords a very plentiful fodder to horses and other cattle; but when they feed too greedily on the fresh herb, it blows them up in such a manner with wind, that unless they are speedily relieved, by tapping them in the belly or some other similar operation, they soon perish. In Ireland the poor people, in a scarcity of corn, make a kind of bread of the dried flowers of this and the preceding plant reduced to powder. They call the plant *chavibrooch*, and esteem the bread made of it to be very wholesome and nutritive.

TRIGA, in antiquity, denotes a kind of carr or chariot drawn by three horses; whence the name.

TRIGLA, in ichthyology, a genus of fishes, belonging to the order of thoraciceæ. The head is loricated with rough lines, and there are seven rays in the membranes of the gills. There are nine species; of which the principal are the gurnardus, or grey gurnard; the cuculus, or red gurnard; the lyra, or piper; and the bimudo, or sapphirine gurnard.

TRIGLYPHS, in architecture, a sort of ornaments, repeated at equal intervals, in the Doric frieze.

TRIGONELLA, FENUGREEK; a genus of the

decandria order, belonging to the diadelphica class of Trigonella plants. There are 10 species; of which the most remarkable is the *fœnum præticum*, or common fenugreek, whose seeds are used in medicine. Where this plant grows naturally is uncertain; but it is cultivated in the fields in the south of France, and in Germany, from whence great quantities of the seeds are annually imported here for use. It is also much cultivated in India. It is an annual plant, which rises with a hollow, branching, herbaceous stalk a foot and a half high, garnished with trifoliate leaves, placed alternately, whose lobes are oblong, oval, indented on their edges, and have broad furrowed footstalks. The flowers come out singly at each joint from the wings of the stalk; they are white, of the butterfly kind, and sit very close to the stalk: these are succeeded by long compressed pods, shaped somewhat like a broad sword, ending in long points, having a broad membrane on one edge, filled with square yellow seeds, indented on one side like a kidney. The whole plant has a very strong odour.

The chief use of fenugreek seeds is as an ingredient in cataplasms, fomentations, emollient glysters, and in powders for horses, &c.

T R I G O N O M E T R Y,

Plane.

IS that part of geometry which teaches how to measure the sides and angles of triangles.

Trigonometry is either plane or spherical, according as the triangles are PLANE or SPHERICAL; of each whereof we shall treat in order.

PLANE TRIGONOMETRY.

PLANE TRIGONOMETRY, or that which teaches the mensuration of plane triangles, is commonly divided into *rectangular* and *oblique-angular*.

Of RECTANGULAR PLANE TRIGONOMETRY.

IF in any right-angled triangle, ABC, (Plate CCLXXXVII. fig. 1. n° 1.) the hypothenuse be made the radius, and with that a circle be described on the one end, A, as a centre; then it is plain that BC will be the sine of the angle BAC; and if with the same distance, and on the end B as a centre, a circle be described, it is plain that AC will be the sine of the angle ABC: therefore, in general, if the hypothenuse of a right-angled triangle be made the radius, the two legs will be the sines of their opposite angles.

Again, if in a right-angled triangle DEF (*ibid.* n° 2.) one of the legs, as DF, be made the radius, and on the extremity D (at one of the oblique angles, *viz.* that which is formed by the hypothenuse and the leg made radius) as a centre, a circle be described; it is plain that the other leg, EF, will be the tangent of the angle at D, and the hypothenuse DE will be the secant of the same angle. The same way, making the leg EF the radius, and on the centre E describing a circle, the other leg DF will become the tangent of the angle at E, and the hypothenuse DE the secant of the same.

The chord, sine, tangent, &c. of any arch or angle, in one circle, is proportionable to the chord, sine, tangent, &c. of the same arch in any other circle: from which, and what has been said above, the solutions of

the several cases of rectangular trigonometry naturally follow.

Since trigonometry consists in determining angles and sides from others given, there arise various cases; which being seven in rectangular trigonometry, are as follow.

CASE I. The angles, and one of the legs, of a right-angled triangle being given, to find the other leg.

EXAMPLE. In the triangle ABC (*ibid.* n° 3.) right-angled at B, suppose the leg AB=86 equal parts, as feet, yards, miles, &c. and the angle A=33° 40'; required the other leg BC, in the same parts with AB.

I. *Geometrically*: Draw AB=86, from any line of equal parts; upon the point B, erect the perpendicular BC; and, lastly, from the point A, draw the line AC, making with AB an angle of 33° 40'; and that line produced will meet BC in C, and so constitute the triangle. The length of BC may be found by taking it in your compasses, and applying it to the same line of equal parts that AB was taken from.

II. *By calculation*: First, by making the hypothenuse AC radius, the other two legs will be the sines of their opposite angles, *viz.* AB the sine of C, and CB the sine of A. Now since the sine, tangent, &c. of any arch in one circle is proportionable to the sine, tangent, &c. of the same arch in any other circle, it is plain the sines of the angles A and C in the circle described by the radius AC, must be proportional to the sine of the same arches or angles, in the circle, that the table of artificial lines, &c. was calculated for; so the proportion for finding BC will be

$$S, C : AB :: S, A : BC.$$

i. e. as the sine of the angle C in the tables is to the length of AB (or sine of C in the circle whose radius is AC), so is the sine of the Angle A in the tables, to the length of BC (or sine of the same angle in the circle whose radius is AC). Now the angle A being 33° 40', the angle C must be 56° 20'; therefore looking in the

Plane. table of artificial fines, &c. for the fines of the two angles, and in the table of logarithms for the logarithm of 86 the given leg, we shall find, by proceeding according to the foregoing proportion, that the required leg, BC, is 57.28; and the operation will stand as follows:

$$\begin{array}{l} 1.93450 \text{ AB } 86 \\ 9.74380 \text{ S, A } 33^\circ 40' \end{array}$$

$$\begin{array}{l} 11.67830 \\ 9.92027 \text{ S, C } 56^\circ 20' \end{array}$$

$$1.75803 \text{ BC } 57.28$$

Secondly, making AB the radius, it is plain BC, the leg required, will be the tangent of the given angle A; and so the proportion for finding BC, when AB is made the radius, will be:

$$R : T, A :: AB : BC.$$

i. e. as the radius in the tables is to the tangent of the angle A in the same; so the length of BA, or radius in the scheme, to the length of BC or tangent of A in the scheme: therefore looking in the tables for the parts given in the foregoing proportion, and proceeding with them according to that rule, we shall find BC to be 57.28 as before, and the operation will be as follows:

$$\begin{array}{l} 9.82352 \text{ T, A } 33^\circ 40' \\ 1.93450 \text{ AB } 86 \end{array}$$

$$\begin{array}{l} 11.75802 \\ 10.00000 \text{ Rad. } 90^\circ \end{array}$$

$$175802 \text{ BC } 57.28$$

Lastly, by making BC, the leg required, the radius, it is plain that AB will be the tangent of C; and the proportion for finding BC will be as follows:

$$T, C : R :: AB : BC.$$

i. e. as the tangent of C $56^\circ 20'$ 10.17648
is to radius 90° 10.00000
so is the length of AB 86 1.93450

$$\begin{array}{l} 11.93450 \\ 10.17648 \end{array}$$

to the length of BC 57.28 1.75802

CASE II. The angles and one of the legs given, to find the hypotenuse.

EXAMPLE: In the triangle ABC, (*ibid.* n° 4.) suppose AB 124, and the angle A $34^\circ 20'$; consequently the angle C $55^\circ 40'$, required the hypotenuse AC, in the same parts with AB.

I. *Geometrically*: This case is constructed after the same manner with the former; and the hypotenuse, AC, is found by taking its length in your compasses, and applying that to the same line of equal parts from which AB was taken.

II. *By calculation*: First, making AC the radius, we shall have the following proportion for finding AC, viz.

$$S, C : R :: AB : AC.$$

i. e. As the sine of C $55^\circ 40'$ 9.91686
is to radius 90° 10.00000
so is AB 124 2.09342
to AC 150.2 2.17656

Secondly, making AB the radius, we have this proportion, viz.

R : sec. A :: AB : AC.
i. e. as the radius 90° 10.00000
as the secant of A $34^\circ 20'$ 10.08314
so is AB 124 2.09342
to AC 150.2 2.17656

This may also be done without the help of the secants: for since R : sec. :: Co-S. : R; therefore the former proportion will become,

$$\text{Co-S, A : R :: AB : AC.}$$

i. e. as the co-sine of A $34^\circ 20'$ 9.91686
is to the radius 90° 10.00000
so is AB 124 2.09342
to AC 150.2 2.17656

Thirdly, making BC the radius, we have the following proportion, viz.

$$T, C : \text{sec. C} :: AB : AC.$$

i. e. as the tangent of C $55^\circ 40'$ 10.16558
is to sec. C $55^\circ 40'$ 10.24872
so is AB 124 2.09342
to AC 150.2 2.17656

This likewise may be done without the help of secants; for since T : Sec. :: S : R; therefore the former analogy will be reduced to this, viz.

$$S, C : R :: AB : AC.$$

where no secants do appear; and it coincides with that in the first supposition of this case, so we shall not repeat the operation.

CASE III. The angles and hypotenuse given, to find either of the legs.

EXAMPLE. In the triangle ABC, (*ibid.* n° 4.) suppose the hypotenuse AC=146, and the angle A= $36^\circ 25'$; consequently the angle C= $53^\circ 35'$; required the leg, AB.

I. *Geometrically*: Draw the line AB at pleasure, and make the angle BAC equal to $36^\circ 25'$; then take AC equal to 146 from any line of equal parts; lastly, from the point C, let fall the perpendicular CB, on the line AB. So the triangle is constructed, and AB may be measured from the line of equal parts.

II. *By calculation*: First, making AC the radius, we shall have the following proportion, viz.

$$R : S, C :: AC : AB.$$

i. e. as radius 90° 10.00000
to the sine of C $53^\circ 35'$ 9.90565
so is AC 146 2.16435
to AB 117.5 2.07000

Secondly, making AB the radius, we have the following analogy, viz.

$$\text{Sec. A : R :: AC : AB.}$$

i. e. as the secant of A $36^\circ 25'$ 10.09435
is to radius 90° 10.00000
so is AC 146 2.16435
to AB 117.5 2.07000

This may also be done without the help of secants; for since sec. : R :: R : Co-S, the former proportion may be reduced to this, viz.

$$R : \text{Co-S, A} :: AC : AB,$$

which is the same with the proportion in the first supposition.

Thirdly, by supposing BC the radius, we have the following proportion, viz.

$$\text{Sec. C : T, C} :: AC : AB,$$

i. e. as the secant of C $53^\circ 35'$ 10.22647
is to the tangent of C $53^\circ 35'$ 10.13214
so is AC 146 2.16435
to AB 117.5 2.07000

CASE

Plane.

Plane.

CASE IV. The two legs being given, to find the angles.

EXAMPLE. In the triangle ABC, (*ibid.* n° 5.) suppose AB 94, and BC 56, required the angles A and C.

I. *Geometrically*: Draw AB equal to 94, from any line of equal parts; then from the point B raise BC perpendicular to AB, and take BC from the former line of equal parts equal to 56; lastly, join the points A and C with the straight line AC: so the triangle is constructed, and the angles may be measured by a line of chords.

II. *By calculation*: First, supposing AB the radius, we have this analogy, *viz.*

$$AB : BC :: R : T, A.$$

i. e. as AB	94	1.97313
is to BC	56	1.74819
so is the radius	90°	10.00000
to the tangent of A	30° 47'	9.77506

Secondly, making BC the radius, we have this proportion, *viz.*

$$BC : BA :: RT, B.$$

i. e. as BC	56	1.74819
is to AB	94	1.97313
so is the radius	90°	10.00000
to the tangent of C	59° 13'	10.22494

CASE V. The hypotenuse and one of the legs given, to find the angles.

EXAMPLE. In the triangle DEF, (*ibid.* n° 6.) suppose the leg DE=83, and the hypotenuse DF=126; required the angles D and F.

I. *Geometrically*: Draw the line DE=83 from any line of equal parts; and from the point E raise the perpendicular EF: then take the length of DF=126, from the same line of equal parts; and setting one foot of your compasses in D, with the other cross the perpendicular EF in E; lastly, join D and F, and the triangle being thus constructed, the angles may be measured by a line of chords.

II. *By calculation*: First, making DF the radius, we shall have this proportion, *viz.*

$$DF : DE :: R : S, F.$$

i. e. as DF	126	2.10037
is to DE	83	1.91908
so is radius	90°	10.00000
to the sine of F	41° 12'	9.81871

Secondly, by supposing DE the radius, we have the following analogy, *viz.*

$$DE : DF :: R : \text{Sec. D.}$$

i. e. as DE	83	1.91908
is to DF	126	2.10037
so is radius	90°	10.00000
to the secant of D	48° 48'	10.18129

This may be done without the help of secants; for since R : sec. :: Co-S, : R, the foregoing analogy will become this, *viz.*

$$DF : DE :: R : \text{Co-S, D.}$$

which gives the same answer with that deduced from the first supposition.

CASE VI. The two legs being given, to find the hypotenuse.

EXAMPLE. In the triangle ABD, (*ibid.* n° 7.) suppose the leg AB=64, and BD=56: required the hypotenuse.

I. *Geometrically*: The construction of this case is performed the same way as in the fourth case; and the length of the hypotenuse is found by taking it in your

compasses, and applying it to the same line of equal parts that the two legs were taken from.

II. *By calculation*: This case being a compound of the fourth and second cases, we must first find the angles by the fourth, thus:

$$AB : DB :: R : T, A.$$

i. e. as the leg AB	64	1.80618
is to the leg DB	56	1.74819
so is the radius	90	10.00000
to the tangent of A	41° 11'	9.54201

Then by the second case we find the hypotenuse required, thus:

$$S, A : R :: BD : AD.$$

i. e. as the sine of A	41° 11'	9.81854
is to the radius	90°	10.00000
so is the leg BD	56	1.74819
to the hypoth. AD	85.05	1.92965

This case may also be solved after the following manner, *viz.*

From twice the logarithm of the greater

side AB	3.61236
subtract the logarithm of the lesser	
side BD	1.74819

and there remains
the logarithm of 73.15; to which adding the lesser side BD, we shall have 189.15, whose logarithm is 2.11093

to which add the logarithm of the lesser	
side BD	1.74819

and the sum will be
the half of which is
the logarithm of the hypotenuse required.

Or it may be done by adding the square of the two sides together, and taking the logarithm of that sum, the half of which is the logarithm of the hypotenuse required: thus, in the present case, the square of AB (64) is 4096 the square of BD (56) is 3136

the sum of these squares is 7232
the logarithm of which is 3.85926
the half of which is 1.92962=
to the logarithm of 85.05, the length of the hypotenuse required.

CASE VII. The hypotenuse and one of the legs being given, to find the other leg.

EXAMPLE. In the triangle BGD, (*ibid.* n° 8.) suppose the leg BG=87, and the hypotenuse BD=142; required the leg DG.

I. *Geometrically*: The construction here is the same as in case V. the same things being given; and the leg DG is found by taking its length in your compasses, and applying that to the same line of equal parts the others were taken from.

II. *By calculation*: The solution of the case depends upon the 1st and 5th; and first we must find the oblique angles by case 5th, thus:

$$BD : BG :: R : S, D.$$

i. e. as the hypoth. DB	142	2.15229
is to the leg BG	87	1.93952
so is radius	90°	10.00000
to the sine of D	37° 47'	97.8723

Then, by case 1st, we find the leg DG required, thus:

$$R : S, B :: BD : DG.$$

i. e. as radius	90°	10.00000
	43 L 2	18

Plane. is to the sine of B $52^{\circ} 13'$ 9.89781
 so is the hypoth. DB 142 2.15229
 to the leg DG 112.2 2.05010

The leg DG may also be found in the following manner, viz.

To the log. of the sum of the hypotenuse } 2.35984
 and given leg. viz. 229 - - - }
 add the logarithm of their difference, viz. 55 1.74036

and their sum 4.10020
 the half of that is 2.05010
 the log. of 112.2 the leg required

Or it may be done by taking the square of the given leg from the square of the hypotenuse, and the square root of the remainder is the leg required: thus, in the present case,

The square of the hypotenuse (142) is 20164
 The square of the leg BG (87) is 7569

Their difference is 12595
 Whole logarithm is 4.10020
 The half of which is 2.05010

which answers to the natural number 112.2, the leg required.

Thus we have gone through the seven cases of right-angled plane trigonometry; from which we may observe, 1. That to find a side, when the angles are given, any side may be made the radius. 2. To find an angle, one of the given sides must of necessity be made the radius.

OF OBLIQUE-ANGLED PLANE TRIGONOMETRY.

In oblique-angled plane trigonometry there are six cases; but before we show their solution, it will be proper to premise the following theorems.

THEOREM I. In any triangle ABC, (*ibid.* fig. 2. n^o 2.) the sides are proportional to the sines of the opposite angles: thus, in the triangle ABC, AB : BC :: S : C, S, A, and AB : AC :: S, C : S, B : also AC : BC :: S, B : S, A.

Demonstration. Let the triangle ABC be inscribed in a circle; then it is plain (from the property of the circle) that the half of each side is the sine of its opposite angle: but the sines of these angles, in tabular parts, are proportional to the sines of the same in any other measure; therefore, in the triangle ABC, the sines of the angles will be as the halves of their opposite sides; and since the halves are as the wholes, it follows, that the sines of the angles are as their opposite sides; *i. e.* S, C : S, A :: AB : BC, &c.

THEOR. II. In any plane triangle, as ABC, (*ibid.* n^o 2.) the sum of the sides AB and BC, is to the difference of these sides, as the tangent of half the sum of the angles BAC, ABC, at the base, is to the tangent of half the difference of these angles.

Demon. Produce AB; and make BH equal to BC; join HC, and from B let fall the perpendicular BE; through B draw BD parallel to AC, and make HF equal to CD, and join BF; also take BI equal to BA, and draw IG parallel to BD or AC.

Then it is plain that AH will be the sum, and HI the difference of the sides AB and BC; and since HB is equal to BC, and BE perpendicular to HC, therefore HE is equal to EC; and BD being parallel to AC and IG, and AB equal to BI, therefore CD or HF is equal to GD, and consequently HG is equal to

FD, and half HG is equal to half FD or ED. Again, since HB is equal to BC, and BE perpendicular to HC, therefore the angle EBC is half the angle HBC; but the angle HBC is equal to the sum of the angles A and C, consequently the angle EBC is equal to half the sum of the angles A and C. Also, since HB is equal to BC, and HF equal to CD, and the included angles BHF BCD equal, it follows that the angle HBF is equal to the angle DBC, which is equal to BCA; and since HBD is equal to the angle A, and HBF equal to BCA, therefore FBD is the difference, and EBD half the difference of the two angles A and BCA: so making EB the radius, it is plain EC is the tangent of half the sum, and ED the tangent of half the difference of the two angles at the base. Now IG being parallel to AC, the triangles HIG and HAC will be equiangular; consequently AH : IH :: CH : GH; but the wholes are as their halves, therefore AH : IH :: $\frac{1}{2}$ CH : $\frac{1}{2}$ GH; and since $\frac{1}{2}$ CH is equal to EC, and $\frac{1}{2}$ GH equal to $\frac{1}{2}$ FD=ED, therefore AH : IH :: EC : ED. Now AH is the sum and IH the difference of the sides; also EC is the tangent of half the sum, and ED the tangent of half the difference of the two angles at the base; consequently, in any triangle, as the sum of the sides is to their difference, so is the tangent of half the sum of the angles at the base to the tangent of half their difference.

THEOREM III. If to half the sum of two quantities be added half their difference, the sum will be the greater of them; and if from half their sum be subtracted half their difference, the remainder will be the least of them. Suppose the greater quantity to be $x=8$, and the lesser $z=6$; then is their sum 14, and difference 2 :

wherefore, adding $\frac{14}{2}=7$ to $\frac{2}{2}=1$, we

get 8 the greatest of the two quantities :

and, in the same manner, $\frac{14}{2}-\frac{2}{2}=7-1=$

6 , the least of the two quantities.

THEOREM IV. In any right-lined triangle, ABD (*ibid.* n^o 3.) the base AD is to the sum of the sides AB and BD, as the difference of the sides is to the difference of the segments of the base made by the perpendicular BE, viz. the difference between AE and ED.

Demon. Produce DB till BG be equal to BA the lesser leg; and on B as a centre, with the distance BA or BG, describe the circle AGHF, which will cut BD and AD in the points H and F: then it is plain GD is the sum, and HD the difference of the sides; also since AD is equal to EF, therefore FD is the difference of the segments of the base; but AD : GD :: HD : FD; therefore the base is to the sum of the sides, &c. as was to be proved.

Having established these preliminary theorems, we shall now proceed to the solution of the six cases of oblique-angled plane trigonometry.

CASE I. In any oblique-angled plane triangle, two sides and an angle opposite to one of them being given, to find the angle opposite to the other.

EXAMPLE. In the triangle ABC, (*ibid.* n^o 4.) suppose AB=16, BC=84, and the angle C (opposite to AB)= $56^{\circ} 30'$; required the angle A, opposite to BC.

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2. *Geometrically*: Draw the line AC, and at any point of it, suppose C, make the angle $C=60^{\circ} 30'$; then take $CB=84$, and with the length of $156=AB$ taken in your compasses from the same scale of equal parts, fixing one point in B, with the other cross AC in A. Lastly, join A and B; so the triangle is constructed, and the required angle A may be measured by a line of chords.

2. *By calculation*: We have, by theor. 1. the following proportion for finding the angle A, viz.

$$AB : BC :: S, C : S, A.$$

i. e. as AB	156	2.19312
to BC	84	1.92428
so is S, C	$56^{\circ} 30'$	9.92111
to S, A	$26^{\circ} 41'$	9.65227

CASE II. The angles, and a side opposite to one of them, being given, to find a side opposite to another.

EXAMPLE. In the triangle HBG (*ibid.* n^o 5.) suppose the angle H $46^{\circ} 15'$, and the angle B $54^{\circ} 22'$, consequently the angle G $79^{\circ} 23'$, and the leg HB 125, required HG.

Geometrically: Draw HB 125, from any line of equal parts, and make the angle H $46^{\circ} 15'$, and B $54^{\circ} 22'$, then produce the lines HG and BG till they meet one another in the point G: so the triangle is constructed, and HG is measured by taking its length in your compasses, and applying it to the same line of equal parts that HB was taken from.

2. *By calculation*: By the first of the preceding theorems, we have this analogy for finding HG, viz.

$$S, G : HB :: S, B : HG.$$

i. e. as the sine of G	$79^{\circ} 23'$	9.99250
is to the leg HB	125	2.09691
so is the sine of B	$54^{\circ} 22'$	9.90996
to the leg HG	103.4	2.01437

CASE III. Two sides and an angle opposite to one of them given, to find the third side.

EXAMPLE. In the triangle KLM (*ibid.* n^o 6.) suppose the side CL 126 equal parts, and KM 130 of these parts, and the angle L (opposite to KM) $63^{\circ} 20'$, required the side ML.

1. *Geometrically*: The construction of this case is the same with that in Case I. (there being the same things given in both), and the leg ML may be measured by applying it to the same line of equal parts that the other two were taken from.

2. *By calculation*: The solution of this case depends upon the two preceding ones; and, first, we must find the other two angles by Case I. thus:

$$MK : S, L :: KL : S, M.$$

i. e. as the side MK	130	2.11394
to the sine of L	$63^{\circ} 20'$	9.95116
so is the side KL	126	2.10037
to the sine of M	$60^{\circ} 1'$	9.93759

Then by Case II. we have the required leg ML, thus:

$$S, L : S, K :: MK : ML.$$

i. e. as the sine of L	$63^{\circ} 20'$	9.95116
to the sine of K	$53^{\circ} 39'$	9.90602
so is KM	130	2.11394
to ML	117.2	2.06850

CASE IV. Two sides and the contained angle being given, to find the other two angles.

EXAMPLE. In the triangle ACD (*ibid.* n^o 7.) suppose AC=103, AD=126, and the angle A= $54^{\circ} 30'$; required the angles C and D.

1. *Geometrically*: Draw AD=126, and make the angle A= $54^{\circ} 30'$; then set off 103 equal parts from A to C: lastly, join C and D; and so the triangle is constructed, and the angles C and D may be measured by a line of chords.

2. *By calculation*: The solution of this case depends upon the second and third of the preceding theorems; and first we must find the sum and difference of the sides, and half the sum of the unknown angles, thus:

The leg AD is	126
The leg AC is	103

Their sum is	229
And their difference is	23
The sum of the three angles A, D, and C, is	180°
The angle A is	$54^{\circ} 30'$

So the sum of the angles C and D will be $125^{\circ} 30'$
And half their sum is $62^{\circ} 45'$

Then by theor. 2. we have the following proportion, viz.

As the sum of the sides AD and AC=229	2.35984
To their difference	23
So is the tangent of half the sum of the unknown angles C and D.	$62^{\circ} 45'$ 10.28816

To tang. of half their difference $11^{\circ} 2'$ 9.29005

Now having half the sum and half the difference of the two unknown angles C and D, we find the quantity of each of them by theorem 3. thus:

To half the sum of the angles C and D, viz.	$62^{\circ} 45'$
Add half their difference, viz.	$11^{\circ} 02'$

And the sum of the greater angle C $73^{\circ} 47'$

Again from half their sum, viz. $62^{\circ} 45'$
Take half their difference, viz. $11^{\circ} 02'$

And there will remain the lesser angle D $=51^{\circ} 43'$

N. B. The greater angle is always that subtended by the greater side: thus, in the present case, the greater angle C is subtended by the greater side AD; and the lesser angle D is subtended by the lesser side AC.

CASE V. Two sides and the contained angle being given, to find the third side.

EXAMPLE. In the triangle BCD (*ibid.* n^o 8.) suppose BC=154, BD=133, and the angle B= $56^{\circ} 03'$; required the side CD.

1. *Geometrically*: The construction of the case is the same with that of the last, and the length of DC is found by taking its length in your compasses, and applying it to the same line of equal parts that the two legs were taken from.

2. *By calculation*: The solution of this case depends upon the second and fourth; and first we must find the angles by the last case; thus:

As the sum of the sides BD and BC 287	2.45788
Is to their difference 21	1.32222

So is the tangent of half the sum of the angles D and C $61^{\circ} 58'$ 10.27372

To the tangent of half their difference $7^{\circ} 50'$ 9.13806

So by theorem 3. we have the angles D and C thus:

To half the sum of the angles D and C	$61^{\circ} 58'$
Add half their difference	$7^{\circ} 50'$

And

Plane.	And the sum is the greater angle D	69° 48'	The sum of all the three angles is 180°	
	Also, from half the sum	61° 58'	The sum of A and C is	83° 10'
	Take half the difference	7° 50'		

And there remains the lesser angle C 54° 08'

Then by Case II. we have the following analogy for finding DC, the leg required, viz.

S, C : BD :: S, B : DC.

i. e. as the sine of C	54° 08'	9.90869
to BD	133	2.12385
so is the sine of B	56° 03'	9.91883
to DC	136.2	2.13399

CASE VI. Three sides being given, to find the angles.

EXAMPLE. In the triangle ABC, (*ibid.* n° 9.) suppose AB=156, AC=185.7, and BC=84; required the angles A, B, and C.

I. *Geometrically*: Make AC=185.7 from any line of equal parts; and from the same line taking 156=AB in your compasses, fix one foot of them in A, and with another sweep an arch; then take 84=BC in your compasses, and fixing one foot in C, with the other sweep an arch, which will cross the former in B: lastly, join the points B and A, and B and C; so the triangle will be constructed, and the angles may be measured by a line of chords.

II. *By calculation*: Let fall the perpendicular, BD, from the vertex B, upon the base AC; which will divide the base into two segments AD and DC, the lengths whereof may be found by theorem 4. thus:

As the base AC	185.7	2.26893
To the sum of the sides AB and BC	240	2.38031
So is the difference of the sides	72	1.85733

To the diff. of the segments of the base 93 1.96871

And having the sum of the segments, viz. the whole base, and their difference, we find the segments themselves, by theorem 3. thus:

To half the sum of the segments	92.8
And half their difference	46.5

And the sum is the greater segment AD	139.3
Also from half the sum of the segment	92.8
Take half their difference	46.5

The remainder is the lesser segment DC 46.3

Now the triangle ABC is divided, by the perpendicular BD, into two right-angled triangles, ADB and DBC; in the first of which are given the hypotenuse AB=156, and the base AD=139.3, to find the oblique angles, for which we have (by Case V. of rectangular trigonometry) the following analogy, viz.

as AB	156	2.19312
to AD	139.3	2.14395
so is the radius	90°	10.00000

to the co-sine of the angle A 26° 40' 9.95083

Also the angle C is found by the same case, thus:

as BC	84	1.92428
to CD	46.3	1.66558
so is the radius	90°	10.00000

to the co-sine of C 56° 30' 9.74130

Having found the two angles A and C, we have the third, B, by taking the sum of the other two from 180, thus:

The angle B is 96° 50'

All the proportions used for the solutions of the several cases in plane trigonometry may be performed by the scale and compass. On the scale there are several logarithmic lines, viz. one of numbers, another of sines, and one of tangents, &c.

And the way of working a proportion by these is this, viz. extend your compasses from the first term of your proportion, found on the scale, to the second; and with that extent, fixing one foot in the third term, the other will reach the fourth term required.

SPHERICAL TRIGONOMETRY.

SPHERICAL TRIGONOMETRY is the art whereby, from three given parts of a spherical triangle, we discover the rest; and, like plane trigonometry, is either right-angled or oblique angled. But before we give the analogies for the solution of the several cases in either, it will be proper to premise the following theorems:

THEOREM I. In all right-angled spherical triangles, the sign of the hypotenuse : radius :: sine of a leg : sine of its opposite angle. And the sine of a leg : radius :: tangent of the other leg : tangent of its opposite angle.

Demonstration. Let EDAFG, (*ibid.* fig. 3.) represent the eighth part of a sphere, where the quadrantal planes EDFG, EDBC, are both perpendicular to the quadrantal plane ADFB; and the quadrantal plane ADGC is perpendicular to the plane EDFG; and the spherical triangle ABC is right-angled at B, where CA is the hypotenuse, and BA, BC, are the legs.

To the arches GF, CB, draw the tangents HF, OB, and the sines GM, CI, on the radii DF, DB; also draw BL the sine of the arch AB, and CK the sine of AC; and then join IK and OL. Now HF, OB, GM, CI, are all perpendicular to the plane ADFB. And HD, GK, OL, lie all in the same plane ADGC. Also FD, IK, BL, lie all in the same plane ADGC. Therefore, the right-angled triangles HFD, CIK, ODL, having the equal angles HDF, CKI, OLB, are similar. And CK : DG :: CI : GM; that is, as the sine of the hypotenuse : rad. :: sine of a leg : sine of its opposite angle. For GM is the sine of the arc GF, which measures the angle CAB. Also, LB : DF :: BO : FH; that is, as the sine of a leg : radius :: tangent of the other leg : tangent of its opposite angle. Q. E. D.

Hence it follows, that the sines of the angles of any oblique spherical triangle ACD (*ibid.* n° 2.) are to one another, directly, as the sines of the opposite sides. Hence it also follows, that, in right-angled spherical triangles, having the same perpendicular, the sines of the bases will be to each other, inversely, as the tangents of the angles at the bases.

THEOREM II. In any right-angled spherical triangle ABC (*ibid.* n° 3.) it will be, As radius is to the co-sine of one leg, so is the co-sine of the other leg to the co-sine of the hypotenuse.

Hence, if two right-angled spherical triangles ABC, CBD (*ibid.* n° 2.) have the same perpendicular BC, the co-sines of their hypotenuses will be to each other, directly, as the co-sines of their bases.

Spherical. THEOREM III. In any spherical triangle it will be, As radius is to the sine of either angle, so is the co-sine of the adjacent leg to the co-sine of the opposite angle.

Hence, in right-angled spherical triangles, having the same perpendicular, the co-sines of the angles at the base will be to each other, directly, as the sines of the vertical angles.

THEOREM IV. In any right-angled spherical triangle it will be, As radius is to the co-sine of the hypotenuse, so is the tangent of either angle to the co-tangent of the other angle.

As the sum of the sines of two unequal arches is to their difference, so is the tangent of half the sum of those arches to the tangent of half their difference: and as the sum of the co-sines is to their difference, so is the co-tangent of half the sum of the arches to the tangent of half the difference of the same arches.

THEOREM V. In any spherical triangle ABC (*ibid.* n° 4. and 5.) it will be, As the co-tangent of half the sum of half their difference, so is the co-tangent of

half the base to the tangent of the distance (DE) of the perpendicular from the middle of the base.

Since the last proportion, by permutation, becomes

$$\frac{\text{co-tang. } \frac{AC+BC}{2}}{\text{co-tang. } AE} :: \frac{\text{tang. } \frac{AC-BC}{2}}{\text{tang. } DE}$$

and as the tangents of any two arches are, inversely, as their co-tangents; it follows, therefore, that

$$\text{tang. } AE :: \text{tang. } \frac{AC+BC}{2} :: \text{tang. } \frac{AC-BC}{2} :$$

or, that the tangent of half the base is to the tangent of half the sum of the sides, as the tangent of half the difference of the sides to the tangent of the distance of the perpendicular from the middle of the base.

THEOREM VI. In any spherical triangle ABC (*ibid.* n° 4.) it will be, As the co-tangent of half the sum of the angles at the base is to the tangent of half their difference, so is the tangent of half the vertical angle to the tangent of the angle which the perpendicular CD makes with the line CF bisecting the vertical angle.

The Solution of the Cases of right-angled spherical Triangles, (*ibid.* n° 3.)

Case	Given	Sought	Solution
1	The hyp. AC and one angle A	The opposite leg BC	As radius : sine hyp. AC :: sine A : sine BC (by the former part of theor. 1.)
2	The hyp. AC and one angle A	The adjacent leg AB	As radius : co-sine of A :: tang. AC : tang. AB (by the latter part of theor. 1.)
3	The hyp. AC and one angle A	The other angle C	As radius : co-sine of AC :: tang. A : co-tang. C (by theorem 4.)
4	The hyp. AC and one leg AB	The other leg BC	As co-sine AB : radius :: co-sine AC : co-sine BC (by theorem 2.)
5	The hyp. AC and one leg AB	The opposite angle C	As sine AC : radius :: sine AB : sine C (by the former part of theorem 1.)
6	The hyp. AC and one leg AB	The adjacent angle A	As tang. AC : tang. AB :: radius : co-sine A (by theorem 1.)
7	One leg AB and the adjacent angle A	The other leg BC	As radius : sine AB :: tangent A : tangent BC (by theorem 4.)
8	One leg AB and the adjacent angle A	The opposite angle C	As radius : sine A :: co-sine of AB : co-sine of C (by theorem 3.)
9	One leg AB and the adjacent angle A	The hyp. AC	As co-sine of A : radius :: tang. AB : tang. AC (by theorem 1.)
10	One leg BC and the opposite angle A	The other leg AB	As tang. A : tang. BC :: radius : sine AB (by theorem 4.)
11	One leg BC and the opposite angle A	The adjacent angle C	As co-sine BC : radius :: co-sine of A : sine C (by theorem 3.)
12	One leg BC and the opposite angle A	The hyp. AC	As sine A : sine BC :: radius : sine AC (by theorem 1.)
13	Both legs AB and BC	The hyp. AC	As radius : co-sine AB :: co-sine BC : co-sine AC (by theorem 2.)
14	Both legs AB and BC	An angle, suppose A	As sine AB : radius :: tang. BC : tang. A (by theorem 4.)
15	Both angles A and C	A leg, suppose AB	As sine A : co-sine C :: radius : co-sine AB (by theorem 3.)
16	Both angles A and C	The hyp. AC	As tang. A : co-tang. C :: radius : co-sine AC (by theorem 4.)

Note, The 10th, 11th, and 12th cases are ambiguous; since it cannot be determined by the data, whether A, B, C, and AC, be greater or less than 90 degrees each.

Case	Given	Sought	Solution
1	Two sides AC, BC, and an angle A opposite to one of them	The angle B opposite to the other	As sine BC : sine A :: sine AC : sine B (by theorem 1.) Note, this case is ambiguous when BC is less than AC; since it cannot be determined from the data whether B be acute or obtuse.
2	Two sides AC, BC, and an angle A opposite to one of them	The included angle ACB	Upon AB produced (if need be) let fall the perpendicular CD : then (by theorem 4.) rad. : co-sine AC :: tang. A : co-tang. ACD; but (by theorem 1.) as tang. BC : tang. AC :: co-sine ACD : co-sine BCD. Whence ACB = ACD \pm BCD is known.
3	Two sides AC, BC, and an angle opposite to one of them	The other side AB	As rad. : co-sine A :: tang. AC : tang. AD (by theor. 1.) and (by theor. 2.) as co-sine AC : co-sine BC :: co-sine AD : co-sine BD. Note, this and the last case are both ambiguous when the first is so.
4	Two sides AC, AB, and the included angle A	The other side BC	As rad. : co-sine A :: tang. AC : tang. AB (by theor. 1.) whence AD is also known : then (by theor. 2.) as co-sine AD : co-sine BD :: co-sine AC : co-sine BC.
5	Two sides AC, AB, and the included angle A	Either of the other angles, suppose B	As rad. : co-sine A :: tang. AC : tang. AD (by theor. 1.) whence BD is known : then (by theor. 4.) is sine BD : sine AD :: tang. A : tang. B.
6	Two angles A, ACB, and the side AC betwixt them	The other angle B	As rad. : co-sine AB :: tang. A : co-tang. ACD (by theorem 4.) whence BCD is also known : then (by theor. 3.) as sine ACD : sine BCD :: co-sine A : co-sine B.
7	Two angles A, ACB, and the side AC betwixt them	Either of the other sides, suppose BC	As rad. : co-sine AC : tang. A : co-tang. ACD (by theorem 4.) whence BCD is also known : then, as co-sine BCD : co-sine ACD :: tang. AC : tang. BC (by theor. 1.)
8	Two angles A, B, and a side AC opposite to one of them	The side BC opposite the other	As sine B : sine AC :: sine A : sine BC (by theorem 1.)
9	Two angles A, B, and a side AC opposite to one of them	The side AB betwixt them	As rad. : co-sine A :: tang. AC : tang. AD (by theor. 1.) and as tang. B : tang. A :: sine AD : sine BD (by theorem 4.) whence AB is also known.
10	Two angles A, B, and a side AC opposite to one of them	The other angle ACB	As rad. : co-sine AC :: tang. A : co-tang. ACD (by theorem 4.) and as co-sine A : co-sine B :: sine ACD : sine BCD (by theor. 3.) whence ACB is also known.
11	All the three sides AB, AC, and BC	An angle, suppose A	As tang. $\frac{AC+BC}{2}$:: tang. $\frac{AC-BC}{2}$: tang. DE, the distance of the perpendicular from the middle of the base (by theorem 6.) whence AD is known : then, as tang. AC : tang. A : AD :: rad. : co-sine A (by theor. 1.)
12	All the three angles A, B, and ACB	A side, suppose AC	As co-tang. $\frac{ABC+A}{2}$: tang. $\frac{ABC-A}{2}$:: tang. $\frac{ACB}{2}$: tan. of the angle included by the perpendicular and a line bisecting the vertical angles : whence ACD is also known : then (by theorem 5.) tang. A : co-tang. ACD :: rad. : co-sine AC.

TRI

TRIHLATÆ, *tres* "three," and *hilum* "an external mark on the seed;" the name of the 23d class in Linnaeus's Fragments of a Natural Method; consisting of plants with three seeds, which are marked with an external cicatrix or scar, where they are fastened within the fruit. See BOTANY, p. 1237.

TRIM, implies in general the state or disposition by which a ship is best calculated for the several purposes of navigation.

TRI

Thus the trim of the hold denotes the most convenient and proper arrangement of the various materials contained therein relatively to the ship's motion or stability at sea. The trim of the masts and sails is also their most apposite situation with regard to the construction of the ship and the effort of the wind upon her sails.

As the stowage of the hold, or the disposition of the several articles of the cargo, considerably affects the

Fig. 1. Rectangular TRIGONOMETRY

Plate CCLXXXVII



Fig. 2. Oblique angled TRIGONOMETRY

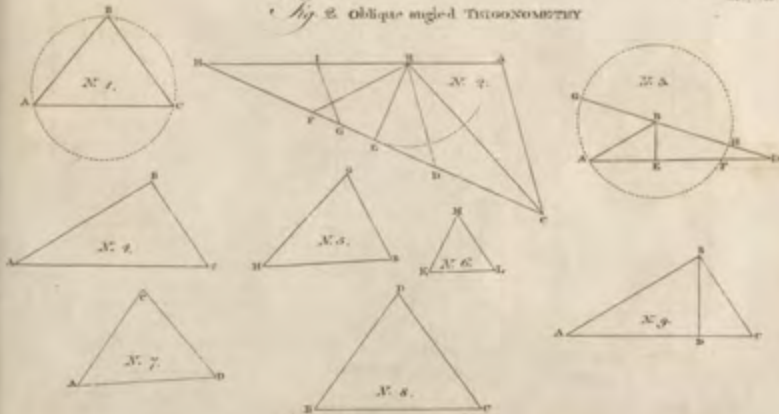
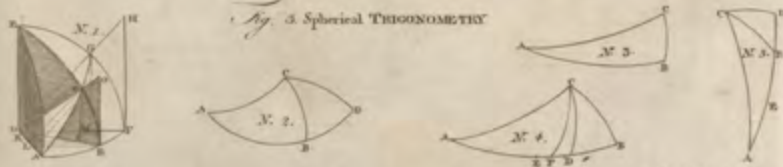
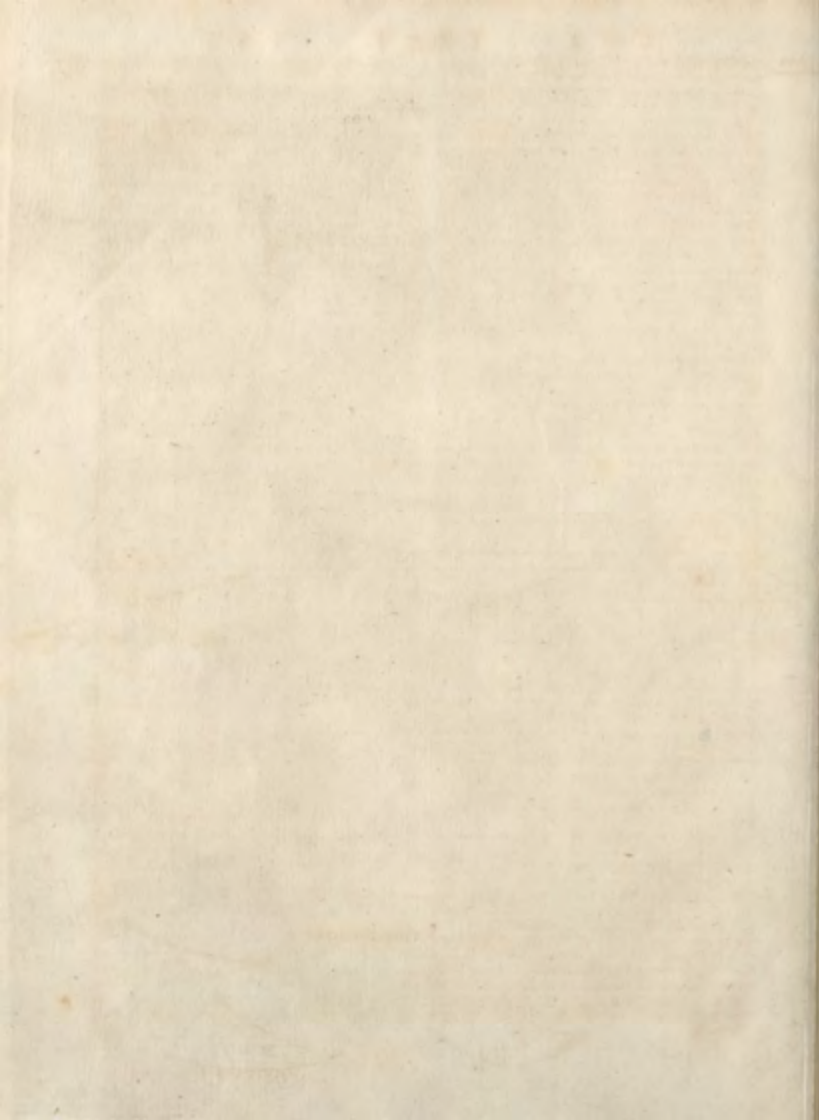


Fig. 3. Spherical TRIGONOMETRY



A. Bell, sculp.



the ship's motion and stability, it will be necessary to give a general idea of the action of a heavy body upon the fluid that supports it, and the re-action of the fluid on the floating body.

The whole weight of any body, then, may be considered as united in its centre of gravity; so that, if it were suspended by a line fastened to this centre, the line would hang in a perpendicular position, as directed through the centre of gravity to the centre of the earth. A body which floats in a fluid is not, however, supported by its centre of gravity, but by the compression of the surrounding filaments of water: and each of these, being considered as infinitely small, will act upon a very minute portion of the surface of the floating body with regard to the specific gravity, and conform to a principle applicable to all fluids, in proportion to the height of these filaments, viz. that the weight of a column of any fluid will be in proportion to the specific gravity of the fluid and the height of the column multiplied by its base.

But as heavy bodies endeavour, by their gravity, to approach the centre of the earth in a vertical line passing through their centres; so the pressure of fluids endeavours to carry bodies in a vertical, tending from the centre of the earth towards their surface, and passing through the centre of gravity of the submerged part, which forces them towards the surface. So, in any submerged body at rest, these two opposite forces coincide in the same vertical, acting in a direction quite contrary to each other.

From this theory it results, that the stability or trim of a ship chiefly depends upon her construction, as considering the bottom to be homogeneous. This, however, can only happen when her cargo consists of the same materials throughout, as with corn, salt, or any species flowed in bulk, and when her hold is entirely filled. For if the ship has not sufficient breadth to resist the effort of the wind upon her sails; or if she is built too high or too sharp in the floor, her centre of gravity will be too high, and she will be very crank, i. e. apt to overturn.

But as the stiffness of a ship, or quality to carry sail without danger of overturning, depends very much on the stowage of the hold, the centre of gravity may thereby be considerably lowered, by which her stability will be increased in proportion. It is a general maxim amongst mariners, that a ship will not carry sufficient sail till she is laden so deep that the surface of the water may glance on her extreme breadth amidships. She must therefore have a great deal of weight, as ballast, &c. to bring her to this situation, which is called a *good sailing trim*.

Several circumstances are also to be particularly considered with regard to the quality, weight, and stowage of the ballast. The centre of gravity being placed too high, will render the ship incapable of carrying a sufficient quantity of sail: and by having it too low, she will be in danger of rolling away her masts. When it is placed too far forward, the ship will pitch, and labour heavily; and when too far aft, she will occasionally be exposed to the circumstance of a pooping sea. These extremes being carefully avoided, it remains to proportion the contents of every part of the hold to its capacity, and to place the lightest materials uppermost.

VOL. X.

TRIM, when applied to the sails, denotes the general arrangement which is best calculated to accelerate the ship's course, according to the direction of the wind.

If the ship were always to sail before the wind, it would be a very simple operation to trim the sails; because nothing else could be required than to dispose them so as to receive the greatest possible effort of the wind, which is evidently performed by arranging them at right angles with its direction. But when the current of wind acts more directly upon the ship's side, it necessarily falls more obliquely on the surface of the sails, so as to diminish their effort to push the ship forward, and to augment their tendency to make her incline to one side. Hence we may conclude, that an increase of the wind, when accompanied with a variation unfavourable to the ship's course, will by no means augment her velocity; because the force previously employed to push her forward, will afterwards operate to overturn her; and because this impression renders it necessary to reduce the quantity of sail; the effort of which is farther diminished by the obliquity of the action of the wind upon its surface.

By this theory it appears, that the effect of the wind to advance the ship decreases in proportion to its obliquity with any sail upon which it operates. The mechanical disposition of the sails, according to every direction of the wind upon their surfaces, is copiously described in the article *CLOSE-HAULED, SAILING, and TACKLING*.

Trim, when expressed of the masts, denotes their position with regard to the ship and to each other. Thus, in the latter sense, they should neither be too near nor too far apart, and in the former they should not be too far forward or aft; and, according to the situation or quality which communicates a greater velocity to the vessel, they should either be upright, or inclining aft or forward.

TRINGA, the SANDPIPER, in ornithology, a genus of birds, belonging to the order of gallæ. The beak is somewhat cylindrical, and as long as the head; the nostrils are linear; and there are four toes on the feet, the hind one consisting of one joint, and elevated above the ground. There are 23 species; of which the most remarkable are,

1. The vanellus, or lapwing, inhabits most of the heaths and marshy grounds of this island. Their length is about $13\frac{1}{2}$ inches, the breadth $2\frac{1}{2}$ feet. The bill is black: the crown of the head of a shining blackness: the crest of the same colour, consisting of about 20 slender unwebbed feathers of unequal lengths: the longest are 4 inches: the cheeks and sides of the neck are white, but beneath each eye is a black line: the throat and fore-part of the neck are black: the plumage on the hind-part is mixed with white, ash-colour, and red: the back and scapulars are of a most elegant glossy green; and the latter finely varied with purple: the lesser covert feathers of the wings are of a resplendent black blue and green: the greater quill-feathers black, but the ends of the four first are marked with a white spot: the upper half of the lesser quill feathers are black: the lower white: the breast and belly are white: the vent-feathers and covers of the tail orange-colour: the tail consists of 12 feathers; the outmost on each

Tringa. side is white, marked on the upper end of the inner web with a dusky spot; the upper half of all the others are black, tipped with a dirty white; their lower half of a pure white; the legs are red; the irides hazel. The female is less than the male. Merret, in his *Pinax*, p. 182, says, that there is in Cornwall a bird related to this; but less than a thrush, having blue feathers and a long crest.—The lapwing lays four eggs, making a slight nest with a few bent. The eggs have an olive cast, and are spotted with black. The young, as soon as hatched, run like chickens: the parents show remarkable solicitude for them, flying with great anxiety and clamour near them, striking at either men or dogs that approach, and often flutter along the ground like a wounded bird, to a considerable distance from their nest, to delude their pursuers; and to aid the deceit, become more clamorous when most remote from it: the eggs are held in great esteem for their delicacy, and are sold by the London poulterers for three shillings the dozen. In winter, lapwings join in vast flocks; but at that season are very wild: their flesh is very good, their food being insects and worms. During October and November, they are taken in the fens in nets, in the same manner that ruffs are; but are not preserved for fattening, being killed as soon as caught.

2. The *Squatarola*, or grey sandpiper, is in length 12 inches; in breadth 24: the bill black, about an inch long, strong and thick: the head, back, and coverts of the wings are black, edged with greenish ash-colour and some white; cheeks and throat white, marked with oblong dusky spots: the belly and thighs white; the exterior webs of the quill-feathers black, the lower part of the interior webs of the four first white; the rump white: the tail marked with transverse bars of black and white: the legs of a dirty green: the back toe very small. These appear in small flocks in the winter-time, but are not very common: their flesh is very delicate.

3. The *pugnax*. The males of this species, called *ruffs*, assume such variety of colours in several parts of their plumage, that it is scarce possible to see two alike; but the great length of the feathers on the neck, that gives name to them, at once distinguish these from all other birds. On the back of their necks is a singular tuft of feathers spreading wide on both sides. These, and the former, in some are black; in others white, yellow, or ferruginous; but this tuft and the ruffs frequently differ in colours in the same bird. The feathers that bear an uniformity of colouring through each individual of this sex are the coverts of the wings, which are brown inclining to ash colour; the feathers on the breast, which are often black or dusky; the four exterior feathers of the tail, which are of a cinereous brown; and the four middle, which are barred with black and brown: the bill is black towards the end, red at the base. The legs in all are yellow. In moulting they lose the character of the long neck-feathers, nor do they recover it till after their return to the fens the spring following. It is then they regain that ornament, and at the same time a set of small pear-shaped yellow pimples break out in great numbers on their face above the bill.—The stags, or male birds of the first year, want these marks, and have sometimes been mistaken for a new species of *tringa*; but they may be easily known by the colours of the

coverts of the wings, and the middle feathers of the tail.—The older the birds are, the more numerous the pimples, and the fuller and longer the ruffs.

The length of the male to the tip of the tail is one foot, the breadth two; of the reeve or female, ten inches, the breadth nineteen; the weight of the former when just taken is seven ounces and a half; of the latter only four. The reeves never change their colours, which are pale brown; the back spotted with black, slightly edged with white; the tail brown, the middle feathers spotted with black; the breast and belly white; the legs of a pale dull yellow.

These birds appear in the fens in the earliest spring, and disappear about Michaelmas. The reeves lay four eggs in a tuft of grass, the first week in May, and sit about a month. The eggs are white, marked with large rusty spots. Fowlers avoid in general the taking of the females; not only because they are smaller than the males, but that they may be left to breed.

Soon after their arrival, the males begin to hill, that is, to collect on some dry bank near a splash of water, in expectation of the females, who resort to them. Each male keeps possession of a small piece of ground, which it runs round till the grass is worn quite away, and nothing but a naked circle is left. When a female lights, the ruffs immediately fall to fighting. It is a vulgar error, that ruffs must be fed in dark lest they should destroy each other by fighting on admission of light. The truth is, every bird takes its stand in the room as it would in the open fen. If another invades its circle, an attack is made, and a battle ensues. They make use of the same action in fighting as a cock, place their bills to the ground and spread their ruffs. Mr Pennant says, he has set a whole room-full a-fighting, by making them move their stations; and after quitting the place, by peeping through a crevice, seen them resume their circles and grow pacific.

When a fowler discovers one of those hills, he places his net over night, which is of the same kind as those that are called *clap* or *day nets*; only it is generally single, and is about fourteen yards long and four broad. The fowler resorts to his stand at day-break, at the distance of one, two, three, or four hundred yards from the nets, according to the time of the season; for the later it is, the fiercer the birds grow. He then makes his first pull, taking such birds as he finds within reach: after that he places his stub birds or stakes to entice those that are continually traversing the fen. An old fowler told our author that he once caught forty-four birds at the first haul, and in all six dozen that morning. When the stakes are set, seldom more than two or three are taken at a time. A fowler will take forty or fifty dozens in a season.—These birds are found in Lincolnshire, the isle of Ely, and in the East Riding of York. They visit a place called *Martin-Mere* in Lancashire, the latter end of March or beginning of April; but do not continue there above three weeks; where they are taken in nets, and fattened for the table with bread and milk, hempseed, and sometimes boiled wheat; but if expedition is required, sugar is added, which will make them in a fortnight's time a lump of fat: they then sell for two shillings or half a crown a piece. Judgment is required in taking the proper time for killing

Tringa.

killing them, when they are at the highest pitch of fatness; for if that is neglected, the birds are apt to fall away. The method of killing them is by cutting off their head with a pair of scissars: the quantity of blood that issues is very great, considering the size of the bird. They are dressed like the woodcock, with their innards; and, when killed at the critical time, say the Epicures, are the most delicious of all morrels.

4. The canutus, or knot, has the forehead, chin, and lower part of the neck, brown, inclining to ash-colour; the back and scapulars deep brown, edged with ash-colour; the coverts of the wings with white, the edges of the lower order deeply so, forming a white bar; the breast, sides, and belly white, the two first streaked with brown; the coverts of the tail marked with white and dusky spots alternately; the tail ash-coloured, the outermost feather on each side white; the legs of a bluish grey; and the toes, as a special mark, divided to the very bottom; the weight four ounces and a half.—These birds, when fattened, are preferred by some to the ruffs themselves. They are taken in great numbers on the coasts of Lincolnshire, in nets such as employed in taking ruffs; with two or three dozens of stales of wood painted like the birds, placed within; fourteen dozens have been taken at once. Their season is from the beginning of August to that of November. They disappear with the first frosts. Camden says they derive their name from king Canute, Knute, or Knout, as he is sometimes called; probably because they were a favourite dish with that monarch. We know that he kept the feast of the purification of the Virgin Mary with great pomp and magnificence at Ely; and this being one of the fen-birds, it is not unlikely but he meet with it there.

5. The morinellus, turnstone, or sea-dottrel, is about the size of a thrush; the forehead and throat are ash-coloured; the head, whole neck and coverts of the wings, are of a deep brown, edged with a pale reddish brown; the scapular feathers are of the same colour, very long, and cover the back; that and the rump are white, the last marked with a large triangular black spot; the tail consists of twelve feathers, their lower half is white, the upper black, and the tips white: the quill feathers are dusky, but from the third or fourth the bottoms are white; the legs are short, and of an orange colour.—These birds take their name from their method of searching for food, by turning up small stones with their strong bills to get at the insects that lurk under them.

6. The ochropus, or green sandpiper. This beautiful species is not very common in these kingdoms. The head and hind part of the neck are of a brownish ash-colour, streaked with white; the under part mottled with brown and white; the back, scapular, and coverts of the wings are of a dusky green, glossy and refulgent as silk, and elegantly marked with small white spots; the lesser quill-feathers of the same colours; the under sides of the wings are black, marked with numerous white lines pointing obliquely from edges of the feather to the shaft, representing the letter V; the rump is white; the tail of the same colour.—Except in pairing time, it is a solitary bird: it is never found near the sea; but frequents rivers, lakes, and other fresh waters. In France it is highly esteem-

ed for its delicate taste; and is taken with limed twigs placed near its haunts.

7. The hypoleucos, or common sandpiper, agrees with the former in its manners and haunts; but is more common: its note is louder and more piping than others of this genus. Its head is brown, streaked with downward black lines; the neck an obscure ash-colour; the back and coverts of the wings brown, mixed with a glossy green, elegantly marked with transverse dusky lines; the breast and belly are of a pure white; the quill-feathers and the middle feathers of the tail are brown; the legs of a dull pale green.

8. The alpina, or dunling sandpiper, is at once distinguished from the others by the singularity of its colours. The back, head, and upper part of the neck are ferruginous, marked with large black spots; the lower part of the neck white, marked with short dusky streaks; the coverts of the wings ash-colour; the belly white, marked with large black spots, or with a black crescent pointing towards the thighs; the tail is ash-coloured; legs black; toes divided to their origin. In size it is superior to that of a lark. These birds are found on our sea-coasts; but may be reckoned among the more rare kinds. They lay four eggs of a dirty white colour, blotched with brown round the thicker end, and marked with a few small spots of the same colour on the smaller end. They are common on the Yorkshire coasts, and esteemed a great delicacy.

9. The cinclus, or purr, is in length $7\frac{1}{2}$ inches; extent 14; the head and hind part of the neck are ash-coloured, marked with dusky lines; a white stroke divides the bill and eyes; the back is of a brownish ash-colour; the breast and belly white; the coverts of the wings and tail a dark brown, edged with light ash-colour or white; the upper part of the quill-feathers dusky, the lower white; the legs of a dusky green; the toes divided to their origin. The bill an inch and a half long, slender and black; irides dusky.—These birds come in prodigious flocks on our sea-coasts during the winter: in their flight they perform their evolutions with great regularity; appearing like a white or a dusky cloud, as they turn their backs or their breasts towards you. They leave our shores in spring, and retire to some unknown place to breed. They were formerly a well known dish at our tables, under the name of *flints*.

TRINIDAD, or TRINITY-ISLAND, is situated in the Atlantic or American ocean, between 60° and 62° of west longitude, and between 9° and 11° of north latitude; it is about 90 miles long, and 60 broad. The soil is fruitful, producing sugar, cotton, fine tobacco, Indian, corn and fruits; but the air is unhealthy.

TRINIDAD, a port-town of Mexico, in America, situated in the province of Guatimala, 120 miles south-east of the city of Guatimala. W. Long. 94° N. Lat. 13° . It is an open town; but very important, because there is no other harbour on this coast.

TRINITARIANS, those who believe in the Trinity; those who do not believe therein being called *Antitrinitarians*.

TRINITARIANS, also denote an order of religious instituted at Rome in the year 1198, under the pontificate of Innocent III. the founders whereof were John de Matha and Felix de Valois. His holiness gave them

Trinidad,
Trinitarians

Trinity
||
Tripod.

permission to establish this order for the deliverance of captives, who groaned under the tyranny of the infidels: he gave them as a habit a white gown ornamented with a red and blue cross. After the death of the two founders, pope Honorius III. continued the order; and their rule was approved by his successor Clement IV. in 1367. At first they were not permitted to eat flesh; and when they travelled, were to ride only upon asses. But their rule was corrected and mitigated by the bishop of Paris, and the abbots of St Victor and St Genevieve, who allowed them to eat any kind of food, and to use horses. This order possesses about 250 convents in 13 different provinces: six of which are in France; namely, France, Normandy, Picardy, Champagne, Languedoc, and Provence; three in Spain, viz. New Castile, Old Castile, and Aragon; one is in Italy, and one in Portugal. There was formerly the province of England, where this order had 43 houses; that of Scotland, where it had nine; and that of Ireland, where it had 52; besides a great number of monasteries in Saxony, Hungary, Bohemia, and other countries. The convent of Cerroty in France is head of the order.

TRINITY, in theology, the ineffable mystery of three persons in one God; Father, Son, and Holy Spirit.

TRINITY-HOUSE, is a kind of college at Deptford, belonging to a company or corporation of seamen, who have authority by the king's charter to take knowledge of those that destroy sea-marks; also to redress the faults of sailors, and divers other things belonging to navigation. Eliz. c. 13. By a late statute, pilots of ships coming up the Thames, are to be examined and approved by the master and wardens of Trinity-house, &c. 3 Geo. 1. c. 13.

TRINITY Sunday, a festival observed on the Sunday next after Whit Sunday, in honour of the holy Trinity. The observation of this festival was first enjoined in the council of Arles, anno 1260.

Fraternity of the TRINITY, a religious society instituted at Rome by St Philip Neri in 1548. These religious were appointed to take care of the pilgrims who came to visit the tombs of St Peter and St Paul. The society originally consisted of only fifteen religious, who assembled on the first Sunday of every month, in the church of St Saviour del Campo, to hear the exhortations of the founder; after whose death pope Paul IV. gave the fraternity the church of St Bened. near which they have since built a large hospital for the reception of pilgrims. The fraternity is one of the most considerable in Rome, and most of the nobility of both sexes have been members thereof.

TRINOABANTES, (anc. geog.) a people of Britain, supposed to have occupied Middlesex and Essex.

TRIO, in music, a part of a concert wherein three persons sing; or, more properly, a musical composition consisting of three parts.

TRIPHTHONG, in grammar, an assemblage or concurrence of three vowels in one syllable; as, *que*.

TRIPLE, in music, is one of the species of measure or time. See **MUSIC**.

TRIPOD, in antiquity, a famed sacred seat or stool, supported by three feet, whereon the priests and sybils were placed to render oracles. It was on the tripod that the gods were said to inspire the Pythias

with that divine fury and enthusiasm wherewith they were seized at the delivery of their predictions.

TRIPOLI, a considerable town of Africa, and capital of a republic of the same name in Barbary, and under protection of the grand seignior, with a castle and a fort. It is pretty large, and the inhabitants are noted pirates. It was taken by Charles V. who settled the knights of Rhodes there; but they were driven away by the Turks in 1551. It was formerly very flourishing; and has now some trade in fluffs, saffron, corn, oil, wool, dates, ostrich feathers, and skins; but they make more of the Christian slaves which they take at sea; for they either let high ransoms upon them, or make them perform all sorts of work. It is seated on the coast of the Mediterranean, in a sandy soil, and surrounded by a wall, strengthened by other fortifications. E. Long. 13. 10. N. Lat. 32. 54.

TRIPOLI, a kingdom of Africa, in Barbary; bounded on the north by the Mediterranean sea; on the south, by the country of the Berberes; on the west, by the kingdom of Tunis, Biledulgerid, and a territory of the Gadamis; and on the east, by Egypt. It is about 925 miles along the sea-coast; but the breadth is various. Some parts of it are pretty fruitful; but that towards Egypt is a sandy desert. It had the title of a *kingdom*; but is now a republic, governed by a dey. He is not absolute; for a Turkish bashaw resides here, who receives his authority from the grand seignior, and has a power of controlling the dey, and levying taxes on the people. The dey is elected by the soldiers, who make no scruple of deposing him when the please.

TRIPOLI, an ancient and considerable town of Asia, in Syria, on the coast of the Mediterranean sea. The inhabitants are near 60,000, consisting of Turks, Christians, and Jews. There is one very handsome mosque; and all the houses have fountains belonging to them. It is defended by a good citadel, with a garrison of janissaries. This town was anciently in Phoenicia, whose inhabitants were so famous for navigation in the early ages of the world. It is the residence of a bashaw or sangiac, who also governs the territory about it, where there are a great number of mulberry-trees, which enable them to carry on a silk-manufactory in the town. E. Long. 39. 0. N. Lat. 34. 15.

TRIQUETROUS, among botanists, expresses a fruit or leaf that has three sides or faces all flat.

TRIEMIS, in antiquity, a galley with three ranks of oars on a side.

TRISMEGISTUS, an epithet or surname given to one of the two Hermeses. See **HERMES**.

TRISMUS, the LOCKED JAW. See **MEDICINE**, n° 388.

TRISSYLLABLE, in grammar, a word consisting of three syllables.

TRITICUM, WHEAT; in botany, a genus of the digynia order, belonging to the triandria class of plants. See **AGRICULTURE**, n° 112, &c.

TRITON, in zoology, a genus belonging to the order of vermes mollusca. The body is oblong; the tongue is spiral; it has 12 testacula, six on each side, the hindmost ones having claws like a crab. There is but one species, found in holes of rocks about the shore.

Tripoli
||
Triton.

Triton, a sea demigod, held by the ancients to be an officer or trumpeter of Neptune, attending on him, and carrying his orders or commands from sea to sea.

TRITURATION, the act of reducing to solid body into a subtille powder; called also *pulverisation* and *levigation*.

TRIUMPH, in Roman antiquity, a public and solemn honour conferred by the Romans on a victorious general by allowing him a magnificent entry in the city.

The greater triumph, called also *curulis*, or simply the *triumph*, was decreed by the senate to a general, upon the conquering of a province or gaining a signal victory. The day appointed for the ceremony being arrived, scaffolds were erected in the forum and circus, and all the other parts of the city where they could best behold the pomp: the senate went to meet the conqueror without the gate called *Capena* or *Triumphalis*, and marched back in order to the capitol; the ways being cleared and cleaned by a number of officers and tipstaves, who drove away such as thronged the passage or straggled up and down. The general was clad in a rich purple robe, interwoven with figures of gold, setting forth his great exploits; his buskins were beset with pearl; and he wore a crown, which at first was only laurel, but afterwards gold; in one hand he bore a branch of laurel, and in the other a truncheon. He was drawn in a magnificent chariot, adorned with ivory and plates of gold, drawn usually by two white horses; though sometimes by other animals, as that of Pompey, when he triumphed over Africa; by elephants; that of Marc Antony, by lions; that of Helioagalabus, by tygers; that of Aurelian, by deer, &c. His children were at his feet, and sometimes on the chariot-horses. The procession was led up by the musicians, who played triumphal pieces in praise of the general: these were followed by young men, who led the victims to the sacrifice, with their horns gilded, and their heads adorned with ribbands and garlands; next came the carts and waggons, loaded with all the spoils taken from the enemy, with their horses, chariots, &c. these were followed by the kings, princes, and generals, who had been taken captives, loaden with chains: after these appeared the triumphal chariot, before which, as it passed, they all along strewed flowers, and the people with loud acclamations called out, *Io triumph!* The chariot was followed by the senate, clad in white robes; and the senate by such citizens as had been set at liberty or ransomed; and the procession was closed by the priests and their officers and utensils, with a white ox led along for the chief victim. In this order they proceeded through the triumphal gate, along the via sacra, to the capitol, where the victims were slain. In the mean time all the temples were open, and all the altars loaded with offerings and incense; games and combats were celebrated in the public places, and rejoicings appeared every where.

TRIUMVIR, one of three persons who govern absolutely, and with equal authority, in a state. It is chiefly applied to the Roman government: Cæsar, Pompey, and Crassus, were the first triumvirs who divided the government amongst them. There were also other officers so called; as the *triumviri* or *tresviri*

capitales, who were the keepers of the public goal: they had the office of punishing malefactors; for which purpose they kept eight lictors under them.

TROAS, (anc. geog.) a district comprised between the two Mysiæ; and therefore distinct from the kingdom of Troy and the possessions of Priam; and was the Troas Propria; for, according to Homer, both the Mysiæ were under the empire of the Trojans, from the neighbourhood of the river *Ælepus*, and that of Cyzicene, to the river *Caycus*, (Strabo); called *Phrygia Minor*, (Ptolemy). Alexandria, a town in this district, was also called *Troas*, a Roman colony.

TROCHANTER, in anatomy. See there n° 37.

TROCHE, in pharmacy, a sort of medicine made of glutinous substances into little cakes, and afterwards exsiccated. See PHARMACY, n° 836—853.

TROCHILUS, the HUMMING-BIRD, a genus belonging to the order of picæ. There are 60 species; all of them remarkable for the beauty of their colours, and most of them for the smallness of their size, though some are eight or nine inches in length.—They are divided into two families, viz. those with crooked bills, and those with straight bills. Of these we shall describe the three following species, from Mr Latham's Synopsis of birds.

1. The little humming-bird has a crooked bill, is an inch and an half in length; frequently weighing less 50 grains. The bill is black, and half an inch in length: the body greenish-brown, with a red, shining, imitable gloss: the head is crested with a small tuft, green at bottom, but of a sparkling gold colour at top: quills and tail fine black. It is a native of Guiana; and the velocity of it in flying is so great, that the eye can scarce keep pace with its motion.

2. The moletinus, or ruby-necked humming-bird, according to Marcgrave is the most beautiful of the whole genus. Its length is three inches four lines: the bill straight, eight lines long, and blackish: the top of the head and hind part of the neck are as bright as a ruby, and of the same colour: the upper parts of the body are brown, with a faint mixture of green gold: the throat and fore part of the neck are the colour of the most brilliant topaz: the belly, sides, and thighs, are brown; but on the lower part of the belly, on each side, is a spot of white: the tail is rufous purple, inclining to violet at the ends; the two middle feathers are shortest: the legs and claws blackish. The female has only a dash of golden or topaz on the breast and fore part of the neck; the rest of the under parts are greyish white. This species is found in Brasil, Curassao, Guiana, and Surinam.

3. The minimus, or least humming-bird, is exceeded, both in weight and dimensions, by several species of bees. The total length is one inch and a quarter: a d when killed, weighs no more, according to Sir Hans Sloane, than 20 grains. The bill is straight and black, three lines and a half in length: the upper parts of the head and body are of a greenish gilded brown, in some lights appearing reddish: the under parts are greyish white; the wings are violet-brown; the tail of a bluish black, with a gloss of polished metal; but the outer feather, except one on each side, is grey from the middle to the tip, and the outer one wholly grey; legs and claws brown. The female is less than the male: the whole upper side of a dirty brown, with a

Slight

Trochilus. flight glossy of green; the under parts of a dirty white. These birds are found in various parts of South America and the adjacent islands.—Our author received it from Jamaica.

These birds subsist on the nectar or sweet juice of flowers: they frequent those most which have a long tube; particularly the *impatiens noli me tangere*, the *monarda* with crimson flowers, and those of the convolvulus tribe. They never settle on the flower during the action of extracting the juice, but flutter continually, like bees, moving their wings very quick, and making a humming noise; whence their name. They are not very shy, suffering people to come within a foot or two of the place where they are, but on approaching nearer fly off like an arrow out of a bow. They often meet and fight for the right to a flower, and this all on the wing: in this state they often come into rooms where the windows stand open, fight a little, and go out again. When they come to a flower which is juiceless, or on the point of withering, they pluck it off as it were in anger, by which means the ground is often quite covered with them. When they fly against each other, they have, besides the humming, a sort of chirping noise like a sparrow or chicken. They do not feed on insects nor fruit; nor can they be kept long in cages, though they have been preserved alive for several weeks together by feeding them with water in which sugar had been dissolved.

This bird most frequently builds in the middle of a branch of a tree, and the nest is so small that it cannot be seen by a person who stands on the ground; any one, therefore, desirous of seeing it, must get up to the branch, that he may view it from above: it is for this reason that the nests are not more frequently found. The nest is in course very small, and quite round: the outside, for the most part, is composed of green moss, common on old pales and trees; the inside of soft down, mostly collected from the leaves of the great mullein, or the silk-grass; but sometimes they vary the texture, making use of flax, hemp, hairs, and other soft materials: they lay two eggs of the size of a pea, which are white, and not bigger at one end than the other.

The above account of the manners will in general suit all the birds of this genus; for as their tongues are made for suction, it is by this method alone that they can gain nourishment: no wonder, therefore, that they can scarcely be kept alive by human artifice. Captain Davies, however, informed our author, that he kept these birds alive for four months by the following method:—He made an exact imitation of some of the tubular flowers with paper, fastened round a tobacco-pipe, and painted them of a proper colour; these were placed in the order of nature, in the cage wherein these little creatures were confined; the bottoms of the tubes were filled with a mixture of brown sugar and water as often as emptied; and he had the pleasure of seeing them perform every action; for they soon grew familiar, and took the nourishment in the same manner as when ranging at large, though close under his eye.

TROGLODITES, in the ancient geography, a people of Ethiopia, said to have lived in caves under ground. Pomponius Mela gives a strange account of the Troglodites: he says, they did not so properly speak as shriek; and that they lived on serpents. They are ranked by Linnaeus with mankind; (see *Homo*.)

But we have given their character and natural history under *SMIA*, among their proper companions. See that article.

TROGUS (Pompeius), Latin universal historian to the time of Augustus Cæsar, of whom we have only an abridgement by Justin, flourished about 41. B. C.

TROIA (anc. geog.), a celebrated name denoting a district, at first called *Idea*; and the city, *Ilium*. But the custom has prevailed to call both district and city *Troia*; and this last more commonly *Troia* than *Ilium*, and both with the epithet *Vetus*. Trojans, the people; often called *Phryges*, (V. rel.); and *Troes*, from Tros, (Stephanus); *Trojanus*, *Troius*, and *Phrygius*, the epithets, (Virgil); *Troicus*, (Ovid). Whether the Phrygians before the Trojan times, or after the destruction of Troy, occupied that country, is hard to determine in such a distant antiquity.

TROIS RIVIERES, a town of North America, in the province of Canada, situated on the river S. Lawrence, 50 miles south of Quebec. W. Long. 75° N. Lat. 46. 45.

TROLLIUS, the *GLOBE FLOWER*, or *Lucken Gowan*; a genus of the polygalia order, belonging to the polyandria class of plants. There are two species; of which the most remarkable is the european, a native of the northern countries of Europe. The leaves are divided first into five segments down to the base; the segments are again divided, each about half way, into two or three lobes, which are sharply indented on the edges. The stalk is a foot high, and scarcely branched: the flower is yellow, globose, and specios. It grows at the foot of mountain, and by the sides of rivulets. The country people in Sweden strew their floors and pavements on holidays with the flowers, which have a pleasant smell, and are ornamental in gardens.

TROMP (Martin Happeriz Van), a celebrated Dutch admiral, was born at the Bille, in Holland. He raised himself by his merit, after having distinguished himself on many occasions, especially at the famous engagement near Gibraltar in 1607. He passed for one of the greatest seamen that had till that time appeared in the world; and was declared admiral of Holland, even by the advice of the prince of Orange. He in that character defeated a large Spanish fleet in 1630, and gained 32 other victories at sea; but was killed when under deck, in an engagement with the English in 1653 †. The states general caused medals to be struck to his honour, and lamented him as one of the greatest heroes of their republic. Van Tromp, in the midst of the greatest glory, constantly discovered a remarkable modesty; for he never assumed a higher character than that of a burgher, and that of being the father of the sailors.

TRONAGE, an ancient customary duty, or toll, for weighing of wool. According to Fleta, *trona* is a beam to weigh with, mentioned in the Stat. Westm. 2. cap. 25. And tronage was used for the weighing wool in a staple or public mart, by a common trona or beam; which, for the tronage of wool in London, was fixed at Leadon-Hall. The mayor and commonalty of London are ordained keepers of the beams and weights for weighing merchants commodities, with power to assign clerks, and porters, &c. of the great beam and balance; which weighing of goods and wares is called

tronage;

Trogus
Tronage

† See Brit-
tain, 10174.

tronage: no stranger shall buy any goods in London before they are weighed at the king's beam, on pain of forfeiture.

TRONE WEIGHT, the most ancient of the different weights used in Scotland; and, tho' now forbidden by several statutes, is still used by many for home-commodities, and that in a very irregular manner; for the pound varies in different places, and for different purposes, from 20 to 24 Dutch ounces. The common allowance is 2½ oz. for wool, 20½ for butter and cheese, 20 for tallow, lint, hemp, and hay. It is divided into 16 of its own ounces, and 16 pounds make a stone.

TROOP, a small body of horse or dragoons, about 50 or 60, sometimes more, sometimes less, commanded by a captain, lieutenant, cornet, quarter-master, and three corporals, who are the lowest officers of a troop.

TROPE. See **ORATORY**, n° 49—59.

TROPHONIUM ANTRUM or *Oraculum*, (anc. geog.), a cave near Lebadeia in Bœotia, between Helicon and Chæroneia, (Strabo): so called from Trophonius, an enthusiastic diviner; who, descending into this cave, pretended to give answers and pronounce oracles; and was hence called *Jupiter Trophonius*. Such as went down to this cave never after smiled; hence the proverbial saying of a man who has lost his mirth, That he is come out of Trophonius's cave. Though Pausanias, who writes from experience, contradicts this; affirming that persons came out of the cave affected indeed with a stupor, but that they soon after recover themselves.

TROPHY, (*Trophaum*), among the ancients, a monument of victory. As the term, so the custom is of Greek original. At first it only consisted of the trunk of a tree, lopped of its branches, fixed in the earth on an eminence, and adorned with the armour taken from the enemy, (Virgil.) Afterwards the trophies were pillars of brass or stone; but such were in disrepute among the Greeks, as serving to perpetuate contention, which ought to be buried in oblivion, (Plutarch.) They were accounted inviolable; none was to remove or destroy them; but, if consumed by length of time, it was thought an invidious act and a renewal of grudge to restore them. On every trophy there was an inscription, setting forth the cause of the war, and manner of the victory; with an account of the spoils with which they were adorned. Some of the spoils taken from the enemy were also hung up in the temples; and these too were called *trophies* and *anathemata*, because suspended or hung up in view.

TROPICS, in astronomy. See there n° 110, & seq.

TROS, king of Tencir, founder of the ancient city of Troy, and after whose name his subjects took the appellation of Trojans, flourished about 1334 B. C.

TROTTER (Mrs Catharine), was the daughter of captain David Trotter, a Scots gentleman. He was a commander in the royal navy in the reign of Cha. II. and at his death left two daughters, the youngest of whom, Catharine, our celebrated author, was born in London, August 1679. She gave early marks of her genius; and learned to write, and also made herself mistress of the French language, by her own application and diligence, without any instructor; but she had some assistance in the study of the Latin grammar and logic, of which latter she drew up an abstract for her own use. The most serious and important subjects,

and especially religion, soon engaged her attention. — But notwithstanding her education, her intimacy with several families of distinction of the Romish persuasion, exposed her, while very young, to impressions in favour of that church; which not being removed by her conferences with some eminent and learned members of the church of England, she embraced the Romish communion, in which she continued till the year 1707. In 1695, she produced a tragedy called *Agnes de Castro*, which was acted at the theatre-royal when she was only in her 17th year. The reputation of this performance, and the verses which she addressed to Mr Congreve upon his Mourning Bride in 1697, were probably the foundation of her acquaintance with that celebrated writer. Her second tragedy, *Fatal Friendship*, was acted in 1698, at the new theatre in Lincoln's Inn-Fields. This tragedy met with great applause, and is still thought the most perfect of her dramatic performances. Her dramatic talents not being confined to tragedy, she brought upon the stage, in 1701, a comedy called *Love at a loss*, or *Miss vetes carry it*. In the same year she gave the public her third tragedy, entitled the *Unhappy Penitent*, acted at the theatre-royal in Drury-lane. But poetry and dramatic writing did not so far engross the thoughts of our author but that she sometimes turned them to subjects of a very different nature; and distinguished herself in an extraordinary manner in defence of Mr Locke's writings, a female metaphysician being a remarkable phenomenon in the republic of letters.

She returned to the exercise of her dramatic genius in 1703, and fixed upon the revolution of Sweden, under Gustavus Erickson, for the subject of a tragedy. This tragedy was acted in 1706, at the queen's theatre in the Hay-Market. In 1707, her doubts concerning the Romish religion, which she had for many years professed, having led her to a thorough examination of the grounds of it, by consulting the best books on both sides of the question, and advising with men of the best judgment, the result was a conviction of the fallaciousness of the pretensions of that church, and a return to that of England, to which she adhered during the remainder of her life. In 1708, she was married to the Rev. Mr Cockburn, then curate of St Dunstan's in Fleet-street, and he afterwards obtained the living of Long-Horsely, near Morpeth in Northumberland. He was a man of considerable abilities; and, among several other things, wrote an account of the Mosiac Deluge, which was much approved by the learned.

Mrs Cockburn's remarks upon some writers in the controversy concerning the foundation of moral duty and moral obligation, were introduced to the world in August 1743, in the Literary Journal, intitled *The History of the Works of the Learned*. The strength, clearness, and vivacity shown in her remarks upon the most abstract and perplexed questions, immediately raised the curiosity of all good judges about the concealed writer; and their admiration was greatly increased when her sex and advanced age were known. Dr Rutherford's Essay on the Nature and Obligations of Virtue, published in May 1744, soon engaged her thoughts; and notwithstanding the ailmatic disorder which had seized her many years before, and now left her small intervals of ease, she applied herself to the confutation of that elaborate discourse, and finished it with

Trotter
||
Truiss.

with a spirit, elegance, and perspicuity equal, if not superior, to all her former writings.

The loss of her husband in 1748, in the 71st year of his age, was a severe shock to her; and she did not long survive him, dying on the 11th of May 1749, in her 71st year, after having long supported a painful disorder with a resignation to the Divine will, which had been the governing principle of her whole life, and her support under the various trials of it.

Her works are collected into two large volumes 8vo., by Dr Birch; who has prefixed to them an account of her Life and Writings.

TROUBADOURS. See POETS *Provençal*.

TROVER, in law, an action that a man hath against one that, having found any of his goods, refuseth to deliver them upon demand.

TROY. See *TROIA*.

TROY-Weight, the most ancient of the different kinds used in Britain. The ounce of this weight was brought from Grand Cairo in Egypt, about the time of the crusades, into Europe, and first adopted in *Troyes*, a city of Champagne; whence the name.

The pound *English* Troy contains 12 ounces, or 5760 grains. It was formerly used for every purpose; and is still retained for weighing gold, silver, and jewels; for compounding medicines; for experiments in natural philosophy; and for comparing different weights with each other.

Scott's Troy Weight was established by James VI. in the year 1618, who enacted, that only one weight should be used in Scotland, viz. the French Troy stone of 16 pounds, and 16 ounces in the pound. The pound contains 7600 grains, and is equal to 17 oz. 6 dr. averdupois. The cwt. or 112 lb. averdupois, contains only 103 lb. 2½ oz. of this weight, though generally reckoned equal to 104 lb. This weight is nearly, if not exactly, the same as that of Paris and Amsterdam; and is generally known by the name of *Dutch weights*. Though prohibited by the articles of union, it is still used in weighing iron, hemp, flax, most Dutch and Baltic goods, meal, butcher-meat, unwrought pewter and lead, and some other articles.

TRUFFLES. See LYCOPERDON.

TRUMPET, a musical instrument, the most noble of all the wind-kind, used chiefly in war among the cavalry, to direct them in the service.

Speaking TRUMPET. See ACOUSTICS, n° 26.

TRUNCATED, in general, is an appellation given to such things as have, or seem to have, their points cut off: thus we say, a truncated cone, pyramid, leaf, &c.

TRUNCHEON, a short staff or baton, used by kings, generals, and great officers, as a mark of their command.

TRUNDLE, a sort of carriage with low wheels, whereon heavy and cumbersome burdens are drawn.

TRUNK, among botanists, that part of the herb which arises immediately from the root, and is terminated by fructification; the leaves, buds, and auxiliary parts of the herb not entering in its description.

TRUNNIONS, or TAUNIONS, of a piece of ordnance, are those knobs or bunches of the metal which bear her up on the cheeks of the carriage.

TRUSS, a bundle, or certain quantity of hay, straw,

&c. A truss of hay is to contain 56 pounds, or half an hundred weight: 36 trusses make a load.

TRUSS is also used for a sort of bandage or ligature made of steel, or the like matter, wherewith to keep up the parts in those who have hernias or ruptures.

TRUSS, in a ship, a machine employed to pull a yard home to its respective mast, and retain it firmly in that position.

TRUSTEE, one who has an estate, or money, put or trusted in his hands for the use of another.

TRUTH, a term used in opposition to falsehood, and applied to propositions which answer or accord to the nature and reality of the thing whereof something is affirmed or denied. See METAPHYSICS, n° 214, &c.

TRYPHIODORUS, an ancient Greek poet, who lived some time between the reigns of Severus and Anastasius. His writings were very numerous; yet none of them have come down to us, except an epic poem, on which Mr Addison has made some entertaining remarks in the *Spectator*, N° 63. Treating of the several species of false wit among the ancients, he mentions the *lipogrammatists*, or letter-droppers of antiquity, and adds, "One Tryphiodorus was a great master in this kind of writing. He composed an *Odyssy*, or epic poem, on the adventures of Ulysses, consisting of 24 books, having entirely banished the letter A from his first book, which was called *Alpha*; as *lucus à non lucendo*, because there was not an alpha in it. His second book was inscribed *Beta* for the same reason. In short, the poet excluded the whole 24 letters in their turns; and showed them, one after another, that he could do his business without them. It must have been very pleasant to have seen this poet avoiding the reprobate letter as much as another would a false quantity; and making his escape from it thro' the several Greek dialects, when he was pressed with it in any particular syllable: for the most apt and elegant word in the whole language was rejected, like a diamond with a flaw in it, if it appeared blemished with a wrong letter."

The first edition of this extraordinary work was published by Aldus, at Venice, with Quintus Calaber's *Paralipomena*, and Coluthus's poem on the rape of Helen. It has been since reprinted at several places, particularly at Francfort in 1580 by Frischlinus; who not only corrected many corrupt passages, but added two Latin versions, one in verse, and the other in prose. That in verse was reprinted in 1742, with the Greek, at Oxford, in 8vo, with an English translation in verse, and Notes, by Mr Merrick.

TUAM, a town of Ireland, in the province of Connaught, and county of Galway, with an archbishop's see. It was once a famous city, though now it is reduced to a village; yet it still retains the title of a city, as being an archiepiscopal see. It is seven miles from the borders of Mayo. W. Long. 9. o. N. Lat. 53. 25.

TUB, in commerce, denotes an indetermined quantity or measure: thus, a tub of tea contains about 60 pounds; and a tub of camphor from 56 to 80 pounds.

TUBAL CAIN, the son of Lamech and Sella, was born about the 2975th year before the Christian æra. He invented the art of working in brass, iron, and other metals; and many have imagined that from him the pagan authors took the idea of their Vulcan.

TUBE,

Tubis
||
Tubal.

TUBE, in general, a pipe, conduit, or canal; a cylinder, hollow within-side, either of lead, iron, glass, wood, or other matter, for the air or some other matter to have a free conveyance through it.

Auricular Tube, or instrument to facilitate hearing. See **Acoustics**, n° 26.

TUBERCLES, among physicians, denote little tumours which suppurate and discharge pus; and are often found in the lungs, especially of consumptive persons.

TUCUMAN, a province of South America, in Paraguay; bounded on the north by the provinces of Los-Chicas and Chaco; on the east by Chaco and Rio-de-la-Plata, on the south by the country of Chichitos and Pampas, and on the west by the bishopric of St Jago. The air is hot, and the earth sandy; however, some places are fruitful enough, and the original natives have a good character. The Spaniards possess a great part of this country.

TUFO, a kind of stone, according to M. Raspe, formed of volcanic ashes ferruginated and concreted together. It is of various colours; blackish-grey, bluish-grey, and yellow; every colour having a different mixture and solidity: but all of them have the bad quality of mouldering down on long exposure to the weather; notwithstanding which, they have been used in buildings both ancient and modern. The yellow kind reflects the air less than any other.

TULIPA, the **TULIP**; a genus of the monogynia order, belonging to the hexandria class of plants. There are three species, two of which only are known in the English gardens; and one of these in particular (the first sort) is famous for the extraordinary beauty of its large noble flowers, most elegantly striped and stained with a vast diversity of rich colours, in a thousand various forms; constituting so many different varieties, all very great ornaments to our gardens in April and May.

1. The *gesneriana*, Gesner's Turkey tulip of Cappadocia, or common garden-tulip, hath a large, oblong, truncated, solid, bulbous root, covered with a brown skin, sending up long oval spear-shaped leaves; an upright round stalk, from half a foot to a yard high, garnished with a few leaves, and its top crowned with a large bell-shaped erect hexapetalous flower, of almost all colours and variegations in the different varieties.

The principal varieties are, early dwarf tulip (*præcocæ*), rising with short stalks, from five or six to 10 or 12 inches high, with smallish flowers.—Tall late-flowering or common tulip (*serotina*), rising from about half a yard to two or three feet high, with large well-formed flowers.—Double tulip, rising a foot or two high, or more, having large double flowers.—Whole-blown, or self coloured tulip, being all of one original colour, either purples, reds, violets, greys, copper-colours, yellows, &c. which gradually break into numerous variegations.—Variegated tulip, comprising innumerable varieties, in respect to the different colourings, variegations, and stripes.

Each of the above varieties comprehends numerous intermediate ones, in respect to the colours and variegations of the flower; each, however, is originally all of one colour, especially seedlings, which, when arrived to a flowering state, each separate flower is either wholly red, purple, violet, grey, brown, black, or yellow.

low, &c. without any variegations or stripes, consisting of self-coloured flowers with white bottoms; self-coloured flowers with yellow bottoms; and some also with blue, purple, and blackish bottoms; all of which, whilst they retain this original same colour, are in the florists language called *suble blowers* or *breakers*, because each flower is wholly of one self-colour. The roots being planted a year or two in prepared soils, to breed, or dispose them gradually to produce flowers that break from the original self-colour into variegations and stripes in various different forms, they are then called *breakers*, each different variegation constituting a distinct variety; consisting of flowers with—white bottoms, broken with brown stripes, with blue stripes, violet stripes, rose stripes, red stripes, &c. separated by streaks of white and other colours, variously disposed—yellow bottoms, broken with different reds, crimsons, and golden-yellow flakes, and various other colours—blackish purple bottoms, &c. broken with stripes of dark colour, yellow, and tints of red: so that in these sorts of breakers, or variegated tulips, with white and yellow bottoms particularly, there are also white and red striped flowers—white and purple striped—white and violet striped—white and rose striped—white and brown striped—violet and white flaked—red and white flaked—red and yellow flaked—brown, yellow, and red flaked and numerous other intermediate variegations and stripes, variously disposed in an endless diversity.

Thus the breakers or variegated tulips are diversified with an infinity of colours in innumerable different ways, forming so many different varieties; the principal of which are by the florists distinguished by pompous names, either of some great personages, eminent florists, places of their original growth, &c.: but as vast numbers of new varieties are annually obtained from seedlings in so many different places, distinguished by various new names, and old ones rejected, and often the same flower, with a different name imposed by different florists, it would be impossible to give any correct list here of the names of such numerous varieties, so often changing every where.

2. The *silvestris*, or wild European tulip, hath an oblong bulbous root, sending up long narrow spear-shaped leaves; and a slender stalk, supporting at top a small yellow flower, nodding on one side, having acute petals.

Both these species of tulipa are hardy perennials, durable in root, or at least, altho' the old bulb decays annually, it perpetuates its species by off-sets, and is annual in leaf and stalk; which rising from the bulb early in the spring, arrives to a flowering state in April and May, each plant having only one flower, supported on the top of the naked stalk without any calix or cup, and consists of six large petals, three within and three without, mostly in an erect position; the whole together forming a sort of large cup, either bell or egg shaped, though the double tulip have the petals multiplied in an indeterminate number. All the varieties are succeeded by plenty of ripe seed in July and August, contained in an oblong capsule of three cells, having the seeds placed on each other in double rows. By the seeds numerous new varieties may be raised, which however will not attain a flowering state till they are seven or eight years old; and after that will require

Tulipa. two or three years or more to break into variegations, when the approved varieties may be marked, and increased by off-sets of the root, as directed in their propagation.

Of the two species of tulip, the first sort, *Tulipa gesneriana*, or common garden-tulip, and its vast train of varieties, is the sort so generally cultivated for the ornament of our gardens, and so much admired by all for its great variety and beautiful appearance: It grows freely in the open ground in any common soil of a garden, and proves a very great decoration to the beds and borders of the pleasure-ground, for six weeks or two months in spring, by different plantings of early and late sorts; planting the principal part in autumn, and the rest towards Christmas, and in January or February. The autumn plantings will come earliest into bloom, and flower the strongest; and the others will succeed them in flowering; observing, that in summer, when the flowering is past, and the leaves and stalks assume a state of decay, the bulbs of the choicest varieties are generally taken up, the off-sets separated, and the whole cleaned from filth; then put up to dry till October or November, and then planted again for the future year's bloom.

Of this species, which is the florist's delight, the varieties may be divided into two principal classes, viz. 1. Early or dwarf spring-tulips (*præcocea*). 2. Late-flowering tall tulips (*ferotina*).

Early tulips.—The early tulips are among florists distinguished by the appellation of *præcocea* (early), because they flower early in the spring, a month or more before the others; are much shorter stalked, and the flowers smaller; but are in greater reputation for their early bloom and their gay lively colours, both of self-colours, and broken into flaked variegations; such as reds, crimson, scarlet, carnation, violets, purples, yellow, &c. with flowers of each, edged and flaked with red, yellow, and white, in many diversities.

Late-flowering common tulips.—This class is denominated *late flowering*, and by the florists called *ferotines*, because they blow later in the spring, a month or more, than the *præcocea*, i.e. not coming into flower before the end of April, May, and June. They are all of tall growth, supporting large flowers, and furnish an almost endless variety in the vast diversity of colours, after they break from whole-blowers into variegations and stripes, exceeding all others of the tulip kind in beauty and elegance of flower.

Tulips are also subdivided into other classes, such as whole blowers, and broken tulips.

Whole blowers or breeders.—These are seedling tulips, having flowers wholly of one colour; they being raised from seed to a state of flowering, the flowers remain two, three, or more years of one self-colour, before they break into variegations; which are also divided into classes, according to the Dutch florists, called,—1. *Bizarres*; being generally almost of a brown copper colour, having at the bottom a small round spot, either yellowish, or black mixed with a little yellow, which when broken into different colours become *bizarres* with yellow bottoms.—2. *Violettes*; being either all of purple-violet, pale violet, grideline, cherry-crimson, or red; having the spot at bottom, either a clear white, or black sh-grey mixed with a little white; and their production when broken into different colours be-

come tulips with white bottoms, called by the Dutch *bybloemen*.

Broken or variegated tulips.—Such as are broken from the self original colour of the whole-blower or breeding tulips, into variegations and stripes of different colours, observing they generally break into different variegations according to that of the former self-colour; generally, however, either wholly expelling the original self-colour of the breeder, or leave but very little remains thereof, which is a desirable requisite in these kind of flowers among professed florists; and, when thus broken or variegated with different colours, they exhibit themselves variously mixed, striped, flaked, feathered, marbled, spotted, edged, &c. a thousand different ways in an admirable manner; and are by the florists divided into the following classes, called by the Dutch

Baguette primo.—Tulips with white bottoms, striped with brown, &c.

Baguette rigau.—Tulips with a white bottom, broken with dark-brown stripes, &c.

Bybloemen.—Tulips with a white bottom, striped with violet and blackish brown, &c. White bottom tulips, striped with rose-colour, vermilion, and ruby.

Bizarres.—Yellow bottom tulips, striped with various colours.

Among florists the principal properties requisite in the above classes of tulips to constitute a fine flower, are—The stem must be tall, especially of the *ferotines*, from half a yard to two or three feet high, or more, being proportionably thick and strong; the flower large, composed of six petals, as in the characteristic state, these being broad, thick, rounded at top, and stand firmly erect without turning much inward or outward, but so as to cup well, and give the flower a regular form. The colours and stripes of the flower must be bright, arising unmixed, regularly and distinct from the bottom, with but little or none of the original self-colour remaining.

The colours in greatest estimation in the broken tulips, are the blacks, golden-yellows, purple-violets, rose, and vermilion, each of which being variegated various ways; and such as are striped with three different colours distinct and unmixed, with strong regular streaks, with but little or no tinge of the breeder, may be called the most perfect tulips. Though it is rare to meet with a tulip possessing all the properties.

As to the manner of obtaining this wonderful variety of colours in tulips, it is often accomplished principally by nature alone, which however is sometimes assisted and forwarded by some simple operations of art; such as, that in the first place, when the seedling bulbs of the whole blower or breeder are arrived to full size, and have flowered once, to transplant them into beds of any poor dry barren soil, in order that by a defect of nutriment in the earth the natural luxuriance of the plant may be checked, and cause a weakness in their general growth, whereby they generally in this weakened or infirm state gradually change and break out into variegations, some the first year, others not till the second or third; and according as they are thus broke, they should be planted in beds of good earth.

Another method to assist nature in effecting the marvellous work of breaking the breeding tulips into diversified colours, is to make as great a change as possible

Tulipa
Tun.

sible in the soil; if they were this year in a light poor soil, plant them the next in a rich garden mould, and another year in a compost of different earths and dung; or transplant them from one part of the garden to another, or into different gardens, &c. or from one country to another; all of which contributes in affixing nature in producing this desirable diversity of colours and variegations.

The double tulip is also a variety of the common tulip, and is very beautiful, tho' not in such estimation among the florists as the common single variegated sorts, not possessing such a profusion of variegations in the colours and regularity of stripes: they however exhibit an elegantly ornamental appearance, as they rise with an upright, tallish, firm stem, crowned with a very large double flower composed of numerous petals, multiplied in several series one within another like a double peony, but far more beautiful in their diversity of colours, variegations, and stripes of white and red, yellow and red, &c. so that they highly deserve culture, both in beds alone near the other sorts to increase their variety, also to plant in patches about the borders, in assemblage with the late variegated tulips, as they blow nearly about the same time, *i. e.* April and May.

Tulip-roots are sold in full collection, consisting of numerous varieties, at most of the nurseries and seedsmen, who both propagate them themselves by off-sets and seed; and import vast quantities annually from Holland; the Dutch being famous for raising the grandest collections of the finest tulips, and other bulbous flowers, in the greatest perfection, for the supply of almost all the other European gardens; distinguishing every variety in their vast collections by some pompous name or other, as before observed, arranged in regular catalogues, charging prices in proportion to their estimation; which formerly was so great, among the Hollanders themselves in particular, that there are accounts of a single root being sold for from 2000 to 5500 guilders; however, they are now more plentiful, and are sold at from 5s. or 10s. to 50 many pounds *per* hundred, and even *per* root for very scarce capital sorts.

TULIP Tree. See LIRIODENDRON.

TULL (Jethro), an Oxfordshire gentleman who farmed his own land, and introduced a new method of culture, to raise repeated crops of wheat from the same land without the necessity of manure; the principles of which he published about 30 years since, in *A Treatise on Horse-hoeing Husbandry*. See AGRICULTURE.

TUMBRELL, **TUMBRELLUM**, or *Turbichetum*, is an engine of punishment, which ought to be in every liberty that hath the view of frank-pledge, for the correction of scolds and unquiet women.

TUMEFACATION, the act of swelling or rising into a tumour.

TUMOUR, in medicine and surgery, a preternatural rising or eminence in any part of the body.

TUMOURS, in farrery. See there, § xxiv.

TUN, a large vessel or cask, of an oblong form, biggest in the middle, and diminishing towards its two ends, girt about with hoops, and used for stowing several kinds of merchandise for convenience of carriage; as brandy, oil, sugar, skins, hats, &c.

TUN is also the name of a measure. A tun of wine is four hogheads; of timber, a square of 40 solid feet;

and of coals, 20 Cwt.

TUN is also a certain weight whereby the burden of ships, &c. are estimated. See SHIP.

TUNBRIDGE, a town of Kent in England, situated on a branch of the river Medway, over which there is a bridge. It is a large well built place, noted for the mineral waters four or five miles south of the town. E. Long. o. 16. N. Lat. 54. 14.

TUNICA, a kind of waistcoat or under garment, in use among the Romans. They wore it within doors by itself, and abroad under the gown. The common people could not afford the toga, and so went in their tunics; whence Horace calls them *populus tunicatus*.

TUNICA, in anatomy, is applied to the membranes which invest the vessels, and divers others of the less solid parts of the body; thus the intestines are formed of five tunics or coats.

TUNIS, a large and celebrated town of Africa, in Barbary, and capital of a kingdom of the same name. It is seated on the point of the Gulph of Goletta, about eight miles from the place where the city of Carthage stood. It is in the form of a long square, and is five miles in circumference, with 10 large streets, 5 gates, and 35 mosques. The houses are all built with stone, though but one story high; but the walls are very lofty, and flanked with several strong towers. It has neither ditches nor bastions, but a good citadel, built on an eminence on the west side of the city. Without the walls are two suburbs, which contain 1000 houses. Within the walls are 10,000 families, and above 3000 tradesmen's shops. The divan, or council of state, assemblies in an old palace; and the dey is the chief of the republic, who resides there. The harbour of Tunis has a very narrow entrance, through a small canal. In the city they have no water but what is kept in cisterns, except one well kept for the bashaw's use. It is a place of great trade, and is 10 miles from the sea. E. Long. 10. 51. N. Lat. 36. 40.

TUNIS, a kingdom of Africa, bounded on the north-east by the Mediterranean Sea and the kingdom of Tripoli; on the south by several tribes of the Arabs, and on the west by the kingdom of Algiers and the country of Esab; being 300 miles in length from east to west, and 250 in breadth from north to south. This country was formerly a monarchy; but a difference arising between the father and son, one of which was for the protection of the Christians, and the other for that of the Turks, in 1574 the inhabitants shook off the yoke of both. From this time it became a republic under the protection of the Turks, and pays a certain tribute to the bashaw who resides at Tunis. The air in general is healthy; but the soil in the eastern parts is indifferent for want of water. Towards the middle the mountains and valleys abound in fruits; but the western part is the most fertile, because it is watered with rivers. The environs of Tunis are very dry, upon which account corn is generally dear. The inroads of the Arabs oblige the inhabitants to sow their barley and rye in the suburbs, and to inclose their gardens with walls. However, there are plenty of citrons, lemons, oranges, dates, grapes, and other fruits. There are also olive-trees, roses, and odoriferous plants. In the woods and mountains there are lions, wild bees, ostriches, monkeys, camels, roe-bucks, hares, pheasants, partridges, and other sorts of birds and beasts.

Tun
Tunis.

Tunnage
Turbo.

The most remarkable rivers are the Guadalcarbar, Magrida, Mageracla, and Caps. The form of government is aristocratic; that is, by a council, whose president is the dey, not unlike the doge of Venice. The members of the divan or council are chosen by the dey, and he in his turn is elected by the divan; which is composed of soldiers, who have more than once taken off the dey's head. The bashaw is a Turk, residing at Tunis; whose business is to receive the tribute, and protect the republic: the common revenues are only 400,000 crowns a-year, because the people are very poor; nor can they send above 40,000 men into the field; nor no more than 12 men of war of the line to sea, even upon the most extraordinary occasions. There are generally about 12,000 Christian slaves in this country; and the inhabitants carry on a great trade in linen and woollen cloth. In the city of Tunis alone, there are above 3000 clothiers and weavers. They also have a trade in horses, olives, oil, soap, ostriches eggs and feathers. The Mahometans of this city have nine colleges for students, and 86 petty schools. The principal religion is Mahometanism; but the inhabitants consist of Moors, Turks, Arabs, Jews, and Christian slaves. However, the Turks, though fewest in number, domineer over the Moors, and treat them little better than slaves.

TUNNAGE. See TONNAGE.

TUNNY, in ichthyology. See SCOMBER.

TURBAN, the head-dress of most of the eastern nations. It consists of two parts, a cap and a shawl of fine linen or taffety, artfully wound in divers plaits about the cap. The cap has no brim, is pretty flat, though roundish at top, and quilted with cotton; but does not cover the ears. There is a good deal of art in giving the turban a fine air; and the making of them is a particular trade. The shawl of the Turks turban is white linen; that of the Persians red woollen. These are the distinguishing marks of their different religions. Sophi king of Persia, being of the sect of Ali, was the first who assumed the red colour, to distinguish himself from the Turks, who are of the sect of Omar, and whom the Persians esteem heretics.

TURBINATED, is a term applied by naturalists to shells which are spiral or wreathed conically, from a larger basis to a kind of apex.

TURBITH, or TURPETH-Root, in the materia medica, the cortical part of the root of a species of convolvulus. See CONVOLVULUS.

TURBITH Mineral. See CHEMISTRY, n° 154.

TURBO, the WREATH, in zoology, a genus of insects belonging to the order of vermes testacea. The animal is of the snail kind; the shell consists of one spiral solid valve, and the aperture is orbicular. There are 49 species; of which the most remarkable are, 1. The littoreus, or periwinkle. This is abundant on moist rocks far above low-water mark. The Swedish peasants believe that when these shells creep high up the rocks, they indicate a storm from the south. They are eaten by the poor people in most parts of this kingdom. Young lobsters are said to take up their lodging in the empty shells of these animals, which has given occasion to a notion that periwinkles are changed into lobsters. 2. The clathrus, or barbed wreath, has a taper shell of eight spires, distinguished by elevated divisions running from the aperture to the apex. There

is a variety pellucid, with very thin edges. It is analogous to that curious and expensive shell, the *ventile-trap*.

TUREDOT, in ichthyology. See PLEURONECTES.

TURCÆ, or TURCI, (Mela); supposed to be the *Tufci* of Ptolemy; whom he places between Caucasus and the Montes Ceraunii. The name is said to denote, "to desolate, or lay waste." Herodotus places them among the wild or barbarous nations of the north. There is a very rapid river called *Turk*, running into the Caspian Sea, from which some suppose the Turks to take their name. They made no figure in the world till towards the 7th century; about the beginning of which they sallied forth from the Portæ Caspiæ, laid waste Persia, and joined the Romans against Chosroes king of Persia. In 1042, they subdued the Persians, in whose pay they served, and from whom they derived the Mahometan religion; and afterwards pouring forth, over ran Syria, Cappadocia, and the other countries of the Hither Asia, under distinct heads or princes, whom Ottoman subduing, united the whole power in himself, which to this day continues in his family, and who fixed his seat of empire at Prusa in Bithynia. His successors subdued all Greece, and at length took Constantinople in 1453; which put a period to the Roman empire in the East, under Constantine the last emperor. It is a standing tradition or prophecy among the Turks, that their empire will at length be overturned by the Franks or Christians; which seems now to be drawing on apace towards accomplishment.

TURCICA TERRA, *Turkey-Earth*, a very fine bole dug in great quantities in the neighbourhood of Adrianople, used by the Turks as a sudorific and astringent, and famous among them in pestilential diseases.

TURCOISE, in natural history, an ore of copper. There are indeed two kinds of turcoises; the one a true and genuine ore of copper, and the other the bones of animals tinged to a beautiful blue colour by having been buried in places where copper ore has been near them.

TURCOMANIA, a province of Asiatic Turkey, answering to the ancient kingdom of Armenia.

TURDUS, the THRUSH; a genus of birds belonging to the order of passeræ. The bill is somewhat cylindrical and cultrated; the nostrils are naked; the fauces is ciliated; and the tongue is lacerated. There are 28 species, the most remarkable of which are,

1. The visivorus, or the mistle, is the largest of the genus. Its length is 11 inches; its breadth 16½. The bill is shorter and thicker than that of other thrushes; dusky, except the base of the lower mandible, which is yellow. The irides are hazel. Head, back, and lesser coverts of the wings, are of a deep olive brown. The lower part of the back is tinged with yellow. The lowest order of lesser coverts, and the great coverts, are brown; the first tipped with white, the last both tipped and edged with the same colour. The inner coverts of the wings white. The tail is brown; the three outermost feathers tipped with white. The cheeks and throat are mottled with brown and white; the breast and belly are whitish yellow, marked with large spots of black; the legs are yellow.

These birds build their nests in bushes, or on the side of some tree, generally an ash, and lay four or five eggs; their note of anger or fear is very harsh, be-

Turbot
Turdus.

tween a chatter and skrick; from whence some of its English names. Its song, however, is very fine; which it begins sitting on the summit of a high tree, very early in the spring, often with the new year, in blowing showery weather, which makes the inhabitants of Hampshire to call it the *storm-cock*. It feeds on insects, holly and mistletoe berries, which are the food of all the thrush kind: in severe snowy weather, when there is a failure of their usual diet, they are observed to scratch out of the banks of hedges, the root of arum, or the cuckoo pint; this is remarkably warm and pungent, and a provision suitable to the season.

2. The *pilaris*, or fieldfare, is in length 10 inches, in breadth 17. The head is ash-coloured inclining to olive, and spotted with black; the back and greater coverts of the wings of a fine deep chestnut; the tail is black; the lower parts of the two middlemost feathers, and the interior upper sides of the outmost feathers excepted; the first being ash-coloured, the latter white. The legs are black; the talons very strong.

This bird passes the summer in the northern parts of Europe; also in lower Austria. It breeds in the largest trees; feeds on berries of all kinds, and is very fond of those of the juniper. Fieldfares visit our islands in great flocks about Michaelmas, and leave us the latter end of February or the beginning of March.

These birds and the redwings were the *turdi* of the Romans, which they fattened with crumbs of figs and bread mixed together. Varro informs us that they were birds of passage, coming in autumn, and departing in the spring. They must have been taken in great numbers; for, according to Varro (lib. 3. c. 5.) they were kept by thousands together in their fattening aviaries. They do not arrive in France till the beginning of December.

3. The *musculus*, or thrush, is in length 9 inches, in breadth 13½. In colours it so nearly resembles the mistle-thrush, that no other remark need be added, but that it is less, and that the inner coverts of the wings are yellow.

The thrush is the finest of our singing birds, not only for the sweetness and variety of its notes, but for the long continuance of its harmony; for it obliges us with its song for near three parts of the year. Like the mistle-bird, it delivers its music from the top of some high tree; but to form its nest defends to some low bush or thicket: the nest is made of earth, moss, and straw, and the inside is curiously plastered with clay. It lays five or six eggs, of a pale bluish green, marked with dusky spots.

4. The *iliacus*, or redwing, has a very near resemblance to the thrush; but is less: their colours are much the same; only the sides under the wings and the inner coverts in this are of a reddish orange, in the thrush yellow; above each eye is a line of yellowish white, beginning at the bill and passing towards the hind part of the head.

These birds appear in Great Britain a few days before the fieldfare: they come in vast flocks, and from the same countries as the latter. With us they have only a disagreeable piping note; but in Sweden during the spring, they sing very finely, perching on the top of some tree among the forests of maples. They build their nests in hedges, and lay six bluish-green eggs spotted with black.

5. The *merula*, or black-bird, when it has attained its full age, is of a fine deep black, and the bill of a bright yellow; the edges of the eye-lids yellow. When young, the bill is dusky, and the plumage of a rusty black, so that they are not to be distinguished from the females; but at the age of one year they attain their proper colour.

This bird is of a very retired and solitary nature; frequents hedges and thickets, in which it builds earlier than any other bird: the nest is formed of moss, dead grass, fibres, &c. lined and plastered with clay, and that again covered with hay or small straw. It lays four or five eggs of a bluish-green colour, marked with irregular dusky spots. The note of the male is extremely fine, but too loud for any place except the woods: it begins to sing early in the spring, continues its music part of the summer, descends in the moulting season, but resumes it for some time in September and the first winter-months.

6. The *torquatus*, or ring-ouzel, is superior in size to the black-bird; the length is 11 inches, breadth 17. The bill in some is wholly black, in others the upper half is yellow; on each side the mouth are a few bristles; the head and whole upper part of the body are dusky, edged with pale brown; the quill-feathers and the tail are black. The coverts of the wings, the upper part of the breast, and the belly, are dusky, slightly edged with ash-colour. The middle of the breast is adorned with a white crescent, the horns of which point to the hind part of the neck. In some birds this is of a pure white, in others of a dirty hue. In the females and in young birds this mark is wanting, which gave occasion to some naturalists to form two species of them.

The ring-ouzel inhabits the Highland hills, the north of England, and the mountains of Wales. They are also found to breed in Dartmoor, in Devonshire, and in banks on the sides of streams. The places of their retreat is not known. In Scotland and Wales they breed in the hills, but descend to the lower parts to feed on the berries of the mountain-ash. They migrate in France at the latter season; and appear in small flocks about Monthard in Burgundy, in the beginning of October, but seldom stay above two or three weeks.

7. The *cinclus*, or water-ouzel. See *STURNUS*, species 2. where it was inserted by mistake as a species of that genus.

8. The *polyglottus*, or mocking-bird, is a native of America. It is about the size of a thrush, of a white and grey colour, and a reddish bill. It is possessed not only of its own natural notes, which are musical and solemn, but it can assume the tone of every other animal in the wood, from the wolf to the raven. It seems even to sport itself in leading them astray. It will at one time allure the lesser birds with the call of their males, and then terrify them when they have come near with the screams of the eagle. There is no bird in the forest but it can mimic; and there is none that it has not at times deceived by its call. But, unlike such as we usually see famed for mimicking with us, and who have no particular merit of their own, the mock-bird is ever sure to please when it is most itself. At those times it usually frequents the houses of the American planters; and sitting all night on the chimney-top, pours forth the sweetest and the most various notes of any bird whatever. It would seem, if accounts be true, that

Turkey.
Turgence
Turkey.

that the deficiency of most other song-birds in that country is made up by this bird alone. They often build their nests in the fruit-trees about houses, feed upon berries and other fruits, and are easily rendered domestic.

TURGESCE, among physicians, denotes a swelling, or growing bloated.

TURIN, an ancient, populous, strong, handsome, flourishing city of Italy, and capital of Piedmont, where the sovereign resides, with an archbishop's see, a strong citadel, and an university. It is seated on a vast plain, at the confluence of the rivers Doria and Po. It is one of the handsomest places in Italy; but the air is unhealthy in the autumn and winter, on account of the thick fogs. One half of this place is lately built; and the streets are straight and clean, being washed by an aqueduct. The two largest streets are the New-street, and that of the Po, which are lighted in the winter time. The houses are handsome, and all built of the same height. The ducal palace consists of two magnificent structures, joined together by a gallery, in which are several statues, all sorts of arms, the genealogy of the dukes of Savoy, a representation of the celestial signs, a royal library, and many other curiosities. Besides these two structures, there is the palace of the prince of Carignan, the hospital of St John, the seminary of the Jesuits, the royal hospital, and the metropolitan church of St John, wherein they pretend to keep the cloth in which is the print of the face of Jesus Christ. There are all superb structures. When the plague reigned at Marseilles in 1720, a great number of artificers withdrew to Turin; inso much that there are now above 54,600 inhabitants, and 48 churches and convents. Turin is very well fortified, and extremely strong; as the French found by experience in 1706, who then besieged it a long while to no purpose. The citadel, which is flanked with five bastions, is without doubt a masterpiece of architecture. There are very fine walks on the ramparts, which require two hours to pass round them. There are also very fine gardens on the side of the river Po; and the house commonly called *La Charité* is remarkable, as there is room for 3000 poor people. The college of the academy is very large and well-built, and has a great number of ancient inscriptions. In the royal library are 19,000 manuscripts, besides 30,000 printed books; when the last king died, a present of 7000 was made to the university. It is charmingly seated at the foot of a mountain, 62 miles north-east of Genoa, 72 south-west of Milan, and 280 north-west of Rome. E. Long. 7. 45. N. Lat. 44. 50.

TURKEY, in ornithology. See MELEAGRIS.

TURKEY, a very extensive empire, comprehending some of the richest countries in Europe, Asia, and Africa. See TURCÆ.

Under the article **CONSTANTINOPLE**, n^o 115, *et seq*, we have given an account of the origin and progress of the Turks, as far as seemed necessary for understanding the subsequent and more important part of their history. In 1453 they made themselves masters of the city of Constantinople, which from that time became the capital of their empire. Mohammed II. at that time the sultan, after having treated the inhabitants with the greatest cruelty, began to think of adding Servia to his dominions. Accordingly, in 1454, he entered that coun-

try at the head of 20,000 men, and obliged the inhabitants to pay him an annual tribute of 40,000 ducats. On his return to Adrianople, Mohammed re-peopled the towns and villages about Constantinople with 4000 men and women who fell to his share; and going to that city, built a palace eight stadia in compass, which he lined with lead taken from the monasteries. Next year a fleet was sent against the islands of Rhodes and Chios; but the attempt on both proved unsuccessful: however, the island Cos was reduced, and some other places; after which the sultan, turning his arms towards Hungary, laid siege to Belgrade. At first he met with success; beat down part of the wall, and stopped the navigation of the river with 60 vessels: but the celebrated John Hunniades, happening to arrive at that critical juncture, made a furious sally, entirely routed the Turkish army, wounded Mohammed himself in the thigh, and burnt all his ships. Hunniades himself did not long survive this engagement, dying soon after of a wound he had received therein, according to some, or of the plague, according to others.

Mohammed being thus repulsed from Belgrade, set about the entire conquest of the Morea, the ancient Peloponnesus. The Grecian princes, among whom were two of the emperor's brothers, Thomas and Demetrius, were so terrified by the taking of Constantinople, and the great progress of the Turks, that they prepared to retire into Italy; upon which the Albanians seized on the country, choosing one Manuel Cantacuzenus, a Greek, for their prince. Then falling on the Greeks who remained, they made an offer to the sultan of the cities and fortresses, provided he would allow them to keep the open country; for the Albanians were shepherds, who had no fixed habitation. At this time, however, the sultan chose rather to support the Greeks than let the country fall into the hands of such barbarians; and having defeated the Albanians, was content to accept of a tribute from the Greeks. But the danger was no sooner over, than the Grecian princes revolted anew; upon which Mohammed entering the country with a powerful army, prince Thomas, with his family, fled to Italy; while Demetrius thought it most eligible to submit to the sultan, by whom he was carried away, with many of the most considerable persons of Lacedæmon, Achaia, &c. where Turkish governors were appointed. Two thousand families were also carried away from the Morea, in order to be settled at Constantinople, and 2000 young men to be enrolled among the sultan's troops. Many cities at this time fell into the hands of the Turks, among which the principal were Corinth and Athens. The Greeks, however, still made some faint struggles; but all in vain: for by the year 1459 the whole country was subdued, excepting some maritime places held by the Venetians; and prince Thomas was obliged finally to take up his abode at Rome, where he was lodged in the pope's palace, and had a pension of 3000 livres a year allowed him for his expenses.

Mohammed now pursued his good fortune; and having made war on the emperor of Trebizond, he subdued his dominions, and put him to death. His career, however, was for some time stopped by Scanderbeg the Epirote. This prince had already defeated an army of 12,000 Turkish horse, of whom only 5000 escaped the slaughter; and dispersed another, against the

Turkey.

Unsuccessful attempt on Rhodes and Chios.

Mohammed repulsed at Belgrade.

Expeditions against the Morea.

One of the Greek princes submits.

The whole country subdued.

War with Scanderbeg.

His success against the Turks.

Turkey. with the loss of their general, and 4120 of his men killed on the spot. Encouraged by this success, he laid siege to Belgrade, which it seems was now in the hands of the Turks: but, through the treachery of his scouts, his army was defeated, and 5000 of his men killed; upon which, one of his generals, by name *Mofet*, went over to the Turks.

Scanderbeg, not at all dispirited by this misfortune, prosecuted the war with the utmost vigour. His first enterprise was against his perfidious general Moles, who had been immediately put at the head of an army by the sultan. This army was by Scanderbeg totally destroyed, excepting about 4000 men; upon which Moles fell into such disgrace with the Turks, that he returned to his old master, who forgave his treachery, and restored him to all his former posts.

The bad success of Moles did not prevent Amefia, the nephew of Scanderbeg, from following his example. Mohammed received him kindly, and lent him with Ishak bafhaw of Constantinople; whom he intrusted with an army of 50,000 men, against his uncle. Scanderbeg with only 6000 men, retired towards Lyfia, a maritime city of the Venetians. The Turks pursued, contrary to the advice of Amefia; and being surprised by Scanderbeg, were utterly defeated, with the loss of their camp, 20,000, or, according to others, 30,000 men killed on the spot, and the treacherous Amefia taken prisoner. With the like good fortune Scanderbeg defeated three other Turkish armies, one of 20,000, another of 30,000, and the third of 18,000 men. On this Mohammed sent against him an old experienced commander, at the head of 40,000 chosen troops; but as he likewise was able to achieve nothing, the sultan thought proper to conclude a peace with Scanderbeg, in 1461.

Mohammed being thus freed from such a troublesome enemy, completed the conquest of the Greek islands; subdued Walachia, Bosnia, and Illyria, extending his empire nearly to the confines of Italy. But as it was easy to see that no conquest would satisfy the Turkish ambition, the Venetians, who found themselves ill treated by their warlike neighbours, entered into an alliance with the Hungarians to repress the overgrown power of the Turks, and prevent the western parts of the world from being totally over-run by them; and into this alliance Scanderbeg was soon drawn, notwithstanding his treaty with Mohammed already mentioned. The Hungarians invaded the Turkish dominions on the west side, defeated some troops, and carried off 20,000 slaves: the Venetians invaded the Morea, where they made some conquests, but were soon obliged to abandon them: however, they recovered the island of Lemnos; but being defeated in two engagements at land, they were obliged to solicit assistance from France, Germany, and Spain. Having obtained considerable supplies from those parts, they again entered the Morea; but meeting with still worse success than before, they applied for assistance to Matthias, the son of John Hunniades king of Hungary. Matthias willingly made another incursion into the Turkish dominions, ravaged Servia, and carried off a vast number of prisoners with a great booty.

In the mean time Mohammed, fearing lest Scanderbeg should be declared generalissimo of the Christian forces, sent to him, desiring a renewal of the league be-

tween them. But this being refused, the war was renewed with the utmost vigour. Many Turkish armies were sent against this hero; but they were utterly defeated and dispersed, till the year 1466, when by his death the sultan was freed from the most formidable enemy he had ever encountered.

The death of Scanderbeg was followed by the entire reduction of Epirus and Albania. The Venetians in 1469 defeated the Turks in a pitched battle; but were driven out of Negropont, at that time the strongest city in Europe: after which they entered into an alliance with Ferdinand king of Naples, Lewis king of Cyprus, and the grand master of Rhodes, at the same time that they sent ambassadors to Uzun Hassan king of Persia, in order to persuade him to attack the Turkish dominions on the east side. Mohammed did not lose his courage at the number of his enemies; but having defeated the Persians, reduced the Venetians to such distress, that they were obliged to conclude a treaty in 1479.

In 1481 the war was renewed, and the city of Rhodes besieged, but without success; however, the city of Cephalonia was taken from the Venetians, Italy invaded, and the city of Otranto taken. This was the last of the exploits of Mohammed II. who died this year of the gout, and was succeeded by his son Bajazet II. Under this prince a war commenced with the Mamelukes of Egypt, which, under his successor Selim I. ended in the total subjection of that country. Bajazet, however, greatly facilitated Selim's conquest by the reduction of Circassia, from whence the Mamelukes drew their principal resources. Caramania and Croatia were totally reduced; the cities of Lepanto, Modon, and Durazzo, taken by the Turks, though the Venetians recovered Cephalonia; Syria on the east, and Moldavia on the west, were invaded and ravaged by the victorious armies of the sultan; till at last a peace was concluded with the European powers in 1503.

The year 1509 is remarkable for a dreadful earthquake at Constantinople, which overturned a great number of houses, and destroyed 13,000 people; being also followed by an epidemic distemper, which carried off great numbers. About this time also the sultan, finding the infirmities of old age drawing on, and being desirous of passing the remainder of his days in quiet, resolved to resign the throne to his eldest son Ahmed. But having engaged in this affair with too favour of great precipitation, and before he had gained over his eldest grandees, his second son Selim, whom he had made governor of Trabezond, hastily crossing the Euxine sea, dethroned and put to death his father, in the year 1512.

The new emperor, who had not scrupled to sacrifice his father to his ambition, did not hesitate at establishing himself on the throne by the death of his brother also. Accordingly, as Ahmed, knowing he could be no where safe, resolved to stand on his defence, Selim with a powerful army marched against him; and having defeated the few forces of his brother, took him prisoner, and put him to death. Having thus secured himself, he marched against the Persians, whom he overthrew in a great battle: after which he took the city of Tauris; made some other conquests; and having secured tranquillity on the eastern side of his dominions, turned

Turkey.

Scanderbeg dies.

Epirus and Albania reduced.

The Venetians obliged to sue for peace.

Death of Sultan Mohammed.

Further conquests of the Turks.

Peace concluded.

Earthquake at Constantinople.

Sultan Bajazet desirous of resigning the throne.

Is deposed, and put to death by his second son Selim.

Selim defeats the Persians, and reduces Egypt.

Turkey. turned his arms against Sultan Gauri of Egypt. Him he reduced in the manner related under the article EGYPT, n° 100. His farther designs of conquest were frustrated by his death, which happened in the year 1519.

24 Is succeeded by Solymán a warlike prince. Selim was succeeded by his son Solymán I. surnamed *Kanuni*, or *The lawgiver*, who proved no less ambitious and warlike than his father. Having defeated and killed the governor of Damascus, who had rebelled against him, he attacked the European princes with a design to extend his dominions as far to the westward as he possessed to the eastward of his capital. In 1520, he set out with a great army to conquer Hungary. The city of Belgrade was immediately invested, and in a short time taken. Rhodes also being attacked by a great force by sea and land, was obliged to submit, after a most desperate resistance, as is related under that article, n° 31 *et seq.*; and Solymán entered the city in triumph on Christmas day 1522. His conquests for some time were stopped by a rebellion in Egypt; but this being soon quashed, the war with Hungary was renewed in 1525. King Lewis having rashly engaged the Turkish army of 200,000 men with only 25,000, was utterly defeated, himself drowned in a ditch, and his whole army, excepting a few horse, cut in pieces. This defeat was followed by the surrender of Buda, which, however, the Hungarians retook in 1528; but next year it was again taken by the Turks, and soon after, both the Moldavians submitted to their jurisdiction.

25 The city of Rhodes reduced. The city of Vienna besieged without success. The city of Vienna was then invested; but after being reduced to the greatest straits, the sultan was obliged to abandon the siege by the coming on of the autumnal rains; which, however, he did not without barbarously massacring all his prisoners.

26 The king of Hungary defeated and killed. The raising the siege of Vienna was followed by an entire repulse of the Turks from the German territories: on which Solymán, resolving to extend his dominions on the east, subdued the country of Georgia, and made himself master of the city of Bagdad; at the same time that his admiral, the celebrated Barbarossa, ravaged the coasts of Italy, and took the cities of Biserta and Tunis in Africa. But, in 1536, he was obliged to retire before Charles V. of Spain, who retook the city of Tunis. Solymán, to revenge this disgrace, suspended for a time the war in Persia, in order to turn all his forces against Italy: but while this country was in danger of being totally overwhelmed, a Venetian captain having rashly taken and sunk some Turkish vessels, Solymán changed his design of attacking Italy into that of chastising the Venetians. However, after some trifling encounters, a peace was concluded in 1540.

27 Georgia, Bagdad, &c. reduced. This year the war was renewed in Hungary: the transactions were very unfortunate for the Christians, and ended in the entire reduction of the kingdom to a Turkish province. The kingdom of France, being oppressed by its enemies, entered into an alliance with Solymán, who was now grown so powerful, that the whole European power seemed scarce able to resist him. However, in 1565, he was baffled by the knights of MALTA, as is related under that article; and in 1566 an end was put to his ambition and his conquests by death.

28 Hungary reduced to a Turkish province. Solymán was succeeded by his son Selim II. surnamed *Mesir*, or *The Drunken*. Under him the empire

at first lost nothing of its lustre. But in 1571 the maritime power of the Turks was almost entirely destroyed at Lepanto, where one of the most remarkable sea engagements mentioned in history took place. The Christian fleet was commanded by Doria the Venetian admiral; and consisted of 78 Spanish and 3 Maltese galleys, under Don John of Austria, natural son to the emperor Charles V. Besides these, under Venieri a Venetian officer, were 108 galleys, 6 galleasses, 2 tall ships, and a great many small galliots. Colonna, a kinsman of the pope, had also 12 of his galleys under his command. On board this fleet were 20,000 good soldiers, many of them persons of great quality, who went volunteers in the expedition. The Turkish fleet consisted of 335 sail; but the most experienced officers were against fighting at that time, considering the great strength of the confederates, and that there was no necessity for an engagement. But the opinion of Ali Pasha the chief admiral, who was for a battle, prevailing, Parteu Pasha, the next in command, took on board 12,000 janissaries and spahis, drawn out of the neighbouring garrisons; besides 4000 other soldiers. Then putting out of the gulf, the fleet steered their course for the idle of Corzulates, of old Echinates, half-way between Lepanto and Patras. Their line of battle was thus: Parteu and Ali Pasha commanded the centre, Mohammed Beg with 56 galleys was in the right wing, and Kilij Ali with 95 galleys in the left; while Morad Dragut, with 30 galleys, and several other small vessels, brought up the rear. Mean time, the Christians moving towards them, both fleets came in sight, October 7. afternoon. Hereupon Don John, having ordered the great ensigns of the confederates, which was the signal for engaging, to be hoisted, clad in armour, went in his long boat to encourage the several squadrons of the centre under his command; while Doria did the like in the right wing, and Barbadioc, the Venetian proveditor-general, in the left.

The day was now well spent, when both fleets were ready for the battle, which was one of the most considerable that ever happened at sea. The signal was no sooner given, than the Turks, with a hideous cry, fell on six galleasses which lay at anchor near a mile ahead of the confederate fleet; but those ships fired so briskly on them, first from their forecables, and then as they passed by, so galled their galleys with whole broadsides, that several of them were sunk, which made the rest bear farther off. The wind likewise chopped about to the west, and incommoded the Turks with the smoke. However, they soon made good their disordered squadrons, and came on with surprising resolution. Ali Pasha observing the admiral's galley, ran upon her with such violence, that both their beaks were broken off, and fell into the sea. Hereupon ensued a most terrible fight between these two great commanders, and the other ships which seconded them; but as there were in Don John's galley 400 men picked out of the whole army, and consisting mostly of officers, they entered the enemy's galleys three times to the very main-mast, yet were as often repulsed.

Venieri, seeing how things went, hastened to the general's relief; but on his way was encountered by Parteu Pasha with his galleys. Here the Turks behaved so bravely, that notwithstanding the example and amazing courage of that admiral, now 70 years old, they

Turkey. Account of the battle of Lepanto.

they entered the prow of his galley, and must have taken it, had not the sudden coming of two brave Venetian captains to his relief turned the scale a little, though with the loss of their own lives. At length Venieri's ship took two of the Turkish galleys, while Parteu Pasha fled out of the danger in a long boat. Not far from thence Colonna, the pope's admiral, being furiously engaged, made great slaughter of the enemy, and took one galley. Ligni the Genoese admiral did the like; on board of whom the prince of Parma, with other volunteers, gained immortal honour.

At the same time, Mohammed Beg falling on the galleasses with the right wing, and being sorely damaged by them, to avoid this inconvenience, as also a shelfe lying between him and the shore, he sent Ali, a Genoese renegade, with great part of his galleys, round about on the right, to fall on the rear of Barbado, who presently tacked about to receive him. But as he had no fewer than five galleys at a time upon his own, he in this terrible fight grappling with the enemy, and shunning no danger, was struck in at the left eye, and almost through the brain, with an arrow; of which wound he died three days after. This encouraged the Turks so much, that the galley must needs have been lost, had not the been speedily relieved by Nani and Portia. These presently cleared her of her boarders, among whom they made a great slaughter: but were themselves dangerously wounded; and had been lost if more galleys had not come to their assistance; with which reinforcement they took one of the principal galleys of the enemy. Not far from thence, the noble Giovanni Contarini had a terrible engagement with Mohammed Beg; whose galley at length being taken, and all the men either slain or forced overboard, he was found half dead, and dispatched out of the way.

Don John, who had been three hours engaged with Ali Pasha, finding himself in much danger notwithstanding the assistance from Bacianono in the rear, on a sudden called forth his 400 select men from under the hatches, by whose valour that admiral's galley was soon taken. The Pasha himself being mortally wounded, and all over bloody, was slain outright; and his head being cut off, was held aloft on the point of a spear by Don John as a trophy of his victory. This fight, with the cry of victory through the Christian fleet, so discouraged the rest of the galleys which were still valiantly fighting, that they fled towards the shore, about a mile distant: but several of them were taken by Canalis, who commanded the galleys of Candia. Among the slain was Karakojia, the famous renegade pirate; while Ahmed and Mohammed, the two sons of Ali Pasha, and nephews of sultan Selim, were both taken aboard their galley.

For all this good success, the fortune of the day was still doubtful in the right wing, where Doria was engaged with Kilij Ali, a valiant and expert commander. The Spanish admiral at first seemed to keep off, while the Turkish extended his wing as if to hem him in; yet offered not battle, expecting some advantage. This he soon obtained by enclosing 12 of the Venetian galleys separated from the rest, which he boarded and took; only Superantio, a nobleman, rather than fall into the enemy's hand, blew himself and his galley up. Mean time the noise of the firing in

this part of the fleet brought Pietro Justiniani, admiral of Malta, to Doria's assistance; but coming up singly, he was presently attacked by six Turkish galleys, which plied him so close, that he was on the very brink of being lost. But two of the other Maltese galleys, which were engaged with three of the enemy's, seeing the danger their admiral was in, came presently and rescued him. Kilij Ali, by this time understanding that the centre and right wing of the fleet was overthrown, thought it best to make his escape; which with some difficulty he effected, with 25 galleys and 10 galliots, into the gulf of Lepanto.

The number of Turks slain in this famous naval fight could not with certainty be known. An author, who wrote an account of this war, makes their number 32,000 besides prisoners, who were about 3500. The galleys taken from them amounted to 161. Forty more were sunk or burnt; and of galliots, with other small vessels, about 60 were taken. The Turkish admiral's galley was exceedingly rich and beautiful. In it was found Ali Pasha's casket, with 6000 ducats in it. This, with a yearly pension of 300 ducats, was given in reward to a Greek of Macedonia, who slew that admiral. He was likewise knighted for that exploit by Don John; and had the barrel of the Turkish standard bestowed on him. This barrel, on his return to Venice, he sold to a goldsmith; and the senate bought it of the goldsmith, paying a ducat for every ounce, to deposit it among the other trophies of that victory.

Notwithstanding the prodigious loss sustained by the Turks on this occasion, the confederates reaped but little advantage from this victory; and next year Kilij Ali Pasha, who had succeeded to the post of high admiral, fitted out a fleet of 250 galleys, which he ravaged the coasts of Christendom wherever he came, and maintained his ground so well, that the confederates could never gain the least advantage over him.

The Turkish power from this time, however, began to decline. The progress of civilization being much more quick among the western nations, and their improvements in the art of war very considerable, the Turks found it not only impossible to extend their dominion over Germany, but even found it a matter of some difficulty to withstand the power of the western princes. During the remainder of the reign of Selim, the war was carried on in Hungary with little advantage on either side; but under his successor, sultan Morad III. the Turks met with several severe checks from the Germans.

In 1594, Mohammed III. having succeeded his father Morad, destroyed his 19 brethren, in order to secure himself on the throne; and for the same reason caused ten of his father's wives and concubines to be thrown into the sea, lest any of them should prove with child. The emperor Rodolph II. having entered into a confederacy against him with the princes of Transylvania, Wallachia, and Moldavia, defeated the Turks and their Tartar auxiliaries in several engagements, and took many cities; while so grievous a famine and plague raged in Hungary, that of 85,000 Tartars who had entered the country the year before, scarce 8,000 remained alive. This was followed by new misfortunes; so that in the year following the

Turkey.

Turks were entirely driven out of Transylvania, Moldavia, and Walachia; notwithstanding which the war continued for some time, though generally to the disadvantage of the Turks.

38
War with Poland.

In 1621, under Othman, or Ozman, II. we find the Turks first engaged in a war with Poland. In this, however, the sultan found himself unable to succeed, though he opposed an army of 30,000 strong to 40,000 Poles and 8000 Germans. A peace was therefore concluded the same year; the chief article of which was, that the Poles should have a free trade in the Turkish dominions, and that for this their merchants should pay 10,000 sequins. The Turkish affairs continued pretty much in the same way till the year 1673, when a dreadful war broke out with Germany, Russia, and Poland, whose army was at that time commanded by the celebrated John Sobieski. The year before, hostilities had commenced on account of the Poles having endeavoured to detach the Cossacks from their allegiance to the sultan. At this time the Turks were successful, through the dissensions which reigned among the Poles; and the latter were obliged to pay an annual tribute of 20,000 rixdollars, and to deliver up 48 towns and villages in the territory of Kamienieck. However, the articles of this treaty were never executed; for, in 1673, the states of Poland sent a letter to Kyoprihi Ahmed Pasha the vizir at that time, informing him, that they considered as null the conditions of the treaty, being concluded without their consent, and that they would rather suffer death than submit to the infamy of paying one single farthing by way of tribute. On this the sultan, Mohammed IV. determined to take a severe revenge on their perfidy, set out with a great army; but was entirely defeated, with the loss of 20,000 men killed on the spot, all the baggage, 25,000 waggon-loads of provision and ammunition, and 2000 purses of money for paying the army. Soon after this victory, John was proclaimed king of Poland: but his subjects, jealous of his glory, refused to support him properly in prosecuting his advantage; so that, four years after, a treaty was concluded, by which the Poles for ever resigned their pretensions to Kamienieck and to the dominion of the Cossacks in Podolia.

43
The Turks defeated, and peace concluded.

But though peace was thus made with Poland, the war was carried on very unsuccessfully with Russia. In 1678, an army of the Tartars was entirely cut in pieces or taken near the city of Cherin; which so intimidated another army of 40,000 Turks, who had waited for the arrival of these auxiliaries, that they threw away their arms, and fled without stopping till they had crossed the river Bog. This defeat inclined the sultan to peace; but the negotiations proving ineffectual, he, in 1679, again sent a powerful army of 80,000 Turks, 30,000 Tartars, and 4000 Cossacks, under the command of the wazir, to retrieve his lost honour. This army, however, succeeded little better than the former: for the wazir was defeated in several engagements; and at last, according to custom, put to death on account of the bad success of the war. In 1684 the Venetians again declared war, while the Poles and Germans continued their hostilities with the utmost violence. The Turks were forced to yield to the superior fortune and valour of their adversaries; they were defeated in a great number of engagements, and lost many

places of importance. In short, their affairs seemed to be totally going to wreck, when, in 1688, they were retrieved by the new wazir Ahmed Kyoprihi, a man of great skill and experience in war, as well as of the most upright and blameless character. Having prevailed in the divan to have the war carried on, he applied his whole care to the raising of an army and providing warlike stores. But finding the people everywhere intimidated and unwilling to oppose the enemy, the treasury exhausted, and an universal languor prevailing, he made a new kind of proclamation, in which he told the people, that "as he found it necessary to trust the command of the army against the haughty Germans to none but himself, so he would not employ in this expedition any soldiers forced into the service; as knowing that the will was of more value with God than the deed: that he would only put the Mussulmans in mind, that, by the precepts of God and his prophet, every one is commanded neither to avoid martyrdom, nor to despair of success against Infidels," &c. Having thus once roused the enthusiasm of the common people, they flocked in great numbers to his standard; after which, having reformed many abuses both in the civil and military departments, he led them against the enemy. The good effects of his reformations were evident. Great numbers of the enemy were cut off, and almost all the important places taken which had been lost before, when, in 1691, he was defeated and killed by the Germans at Islanakamen. After his death, the Turkish affairs again fell into disorder, and, though the utmost efforts were used by succeeding vizirs, no progress could be made; and, in 1697, a prodigious overthrow was given them by prince Eugene at Zenta. At last, in 1698, all parties being weary of such an expensive and ruinous war, a pacification took place at Carlowitz, but on different terms, with the different nations who had been at war with the Turks. The emperor made a truce for 25 years, upon condition that all Transylvania should be resigned to him: the city of Temeswar was to be restored to the Turks, and the navigation of the Teisse and Maros rivers be free to both nations; that the country between the Danube and the Teisse, called *Bachbak*, remain in the emperor's hands; that the boundary of the eastern part of Hungary, belonging to the emperor, should be a right line drawn from the mouth of the Maros towards the banks of the Teisse to the mouth of the Boscut, where it falls into the Save; that towards the south the Save should part the Turkish from the imperial limits, till it receives the Uma: and that no new castles besides Belgrade and Peterwaradin should be erected, or old ones fortified, any where within those boundaries.

The Russian ambassador made a truce only for two years, upon the foot of each party possessing what he had taken. The Poles made a truce on the like terms with the sultan; namely, that they should have Kamienieck, Podolia, and Ukraina restored to them, in the same extent as possessed by them before sultan Mohammed's first expedition into Poland; and, on the other hand, resign Soczava, Nemoz, and Soraka, in Moldavia, to the Turks. The Venetians obtained these conditions: That all the Morea, as far as Hexamilos, should belong to them; and the firm land, with Naupaktum (or Lepanto), Prevesa, and the castle of Romania,

Turkey.

47
The Turkish affairs retrieved by Kyoprihi.

49
He rouses the enthusiasm of the people.

49
Is at last defeated and killed.

50
Peace concluded.

51
Terms made with the emperor.

52
With the Russians.

53
With the Venetians.

45
Another army defeated, and reduced to great distress.

46
War with the Venetians.

Turkey. Romania, which had been demolished, should be restored to the Turks; that the bay of Corinth should be common to both, and the Venetians possess Lepadusa with the adjacent islands. The yearly tribute paid by the islands in the Archipelago to the Venetians was to be abolished; and Zakynthos to be declared free from the like burden by the Turks. In Dalmatia, Knin, Cing, Kikht, Verlika, Duare, and Vergoraz, were to be left to the republic, and fixed as the boundaries of their dominions on that side. The Ragusians were to continue free, and the Venetians to retain the castles of Castelluovo and Rifano, with what they possessed in the neighbourhood. Both parties were allowed to fortify their borders with new fortresses; or to repair those which were decayed, excepting Naupaktum, Preveza, and the castle of Romania before mentioned.

54 From the conclusion of the peace of Carlowitz to the year 1769, nothing very remarkable occurs in the Turkish history, excepting their recovery of the Morea from the Venetians by the treaty of Passarowitz. See the article VENICE. Their war with the Russians under Peter the Great has been taken notice of under the article RUSSIA; those afterwards with PERSIA, under that article. None of these, indeed, were of any great consequence; but, in 1769, a war commenced with Russia, which threatened the Ottoman empire with destruction, and which has given it such a severe check as it can scarcely recover. The origin of this war is given under the article POLAND, n° 94; and during the course of it, an almost uninterrupted train of successes attended the Russian arms.—About the end of March 1769, a body of Russian troops made themselves masters of the important fortress of Alopeh, at the mouth of the river Don. In the end of April, prince Gallitzin, commander in chief of the Russian army on the frontiers of Poland, passed the river Niester, hoping to take the fortress of Choczim by surprise; but being disappointed, he was obliged to return. Near the beginning of July, however, he again passed that river, and on the 13th attacked and defeated the van of the grand vizir's army, consisting of about 50,000 or 60,000 men. Thirteen thousand of the fugitives entered Choczim; which was next day invested by the Russians: but they were at last obliged to raise the siege, and repass the Niester; which they could not effect without considerable loss.

58 In the mean time both the Ottoman and Russian courts were displeased with the conduct of their generals. The Turkish grand vizir was deprived of his command, and afterwards beheaded; and was succeeded by Moldovani Aga Pacha, a man of a bold and enterprising spirit. On his first taking the command of the army, finding it impossible to subsist where he was, he attempted to force a passage over the Niester; but being three times repulsed with great loss, he made a precipitate retreat towards Bender, at the same time drawing the troops out of Choczim, which the Russians immediately took possession of.

59 Prince Gallitzin was now superseded by general Romanzow, who took the command of the army on the 29th of September. Soon after his arrival, he received news of the success of general Elmt, who, with a body of 10,000 men, had reduced the province of Yassy. He invested Bender; but finding the season

of the year too far advanced, he soon withdrew his troops, and put them into winter-quarters.

This first campaign had proved so unpropitious to the Turkish affairs, that the court would gladly have concluded a peace, if they could have obtained it upon honourable terms; but the Russians insisting upon the entire cession of Moldavia and Walachia as a preliminary article, the negotiations came to nothing. A new campaign was therefore resolved on; and this proved still more unsuccessful than before. The grand Russian army under general Romanzow passed the Niester in the month of May 1770; and, having assembled at Choczim on the 3d of June, marched towards Pruth: at the same time their second army, commanded by general Panin, arrived before Bender. The plan of operation was, that the latter should form the siege of Bender, and Romanzow should cover it.

63 On the 18th of July, general Romanzow attacked an army of 80,000 Turks and Tartars, commanded by the Khan of Crimea, and strongly entrenched on an almost inaccessible mountain, forced their intrenchments, and obliged them to flee in the utmost confusion, leaving an immense quantity of ammunition and provisions, &c. in their camp; which they totally abandoned to the victors.—After this victory, the Russian general pushed on towards the Danube; and on the 2d of August attacked another Turkish army, commanded by the grand vizir in person, and totally defeated it, making himself master of their camp, ammunition, 143 pieces of cannon, and above 7000 carriages loaded with provisions. The loss of the Turks on this occasion was not reckoned less than 40,000 men, and some accounts raised it to 60,000.—During the course of this summer also, the fortress of Kilia Nova, at the most northerly mouth of the Danube, surrendered by capitulation; and likewise that of Ackerman, or Bialogorod, near the mouth of the Niester. Bender was taken by storm on the 27th of November; and the Russians, enraged at the obstinate resistance they had met with, made a terrible slaughter of their enemies. It was computed that 30,000 Turks perished on this occasion. The fortress of Brailow, situated on the northern side of the Danube, was invested on the 26th of September; and the garrison were so much intimidated by the taking of Bender, that they abandoned the place, and most of them were drowned in crossing the river.—During this campaign, it was reckoned that the Russians took 1000 pieces of cannon from their enemies.

66 This year also a Russian fleet of 16 or 18 ships entered the Mediterranean, and landed a body of troops in the Morea. These being joined by the Greeks, some troops committed great cruelties on the Turks, and made on themselves masters of almost the whole country. At last, however, the Porte, notwithstanding their bad success in other parts, found means to send a force into the Morea sufficient to overpower the Russians. The Greeks now suffered in their turn; and the Russians, hearing that a Turkish fleet had passed the Dardanelles, abandoned the Morea, and failed to meet their antagonists. A battle ensued, in which the Turks were defeated; and having imprudently retired into a neighbouring harbour, they were next day entirely destroyed by the Russian fire-ships, except one ship of 64 guns, which was taken. This fleet consisted of

Turkey. 61
Unsuccessful negotiations for peace.

63 The Turks and Tartars defeated by General Romanzow.

64 The grand vizir defeated with prodigious slaughter.

65 Bender taken, and the inhabitants massacred.

66 Vast number of cannon taken by the Russians.

67 A Russian fleet lands on the Morea.

68 They destroyed the Turkish fleet.

Turkey. 15 ships of the line, from 96 to 60 guns, three large frigates, and seven large armed vessels, besides galleys. After this victory, the Russian fleet blocked up the mouth of the Dardanelles, interrupted the Turkish trade, prevented the carrying of provisions to Constantinople by sea, and raised contributions from most of the islands in the Archipelago.

69 They take Giurgewo and defeat general Essen.

70 In 1771, matters did not at first go on so successfully on the part of the Russians. On the side of the Danube, they were obliged to keep on the defensive. Another army, under prince Dolgorucki, had better success; they reduced the whole peninsula of Crim Tartary in less than a month, though defended by an army of 50,000 men.—During those transactions the Turks made themselves masters of the fortresses of Giurgewo; which enabled them to become so formidable on the side of Walachia, that prince Repnin durst not attack them. Upon his refusal to do so, he was deprived of his command; which was given to General Essen. On the 17th of August, he attacked the Turkish intrenchments; but, after a desperate engagement of four hours, was defeated, with the loss of upwards of 3000 men.

71 Are outwitted by General Romanzow.

72 Two Turkish armies totally defeated.

73 The grand vizir defeated, and driven beyond a vast quantity of artillery taken, and likewise the town and castle of Badabadgh; while the vizir, with the remains of his army, fled 30 miles to seek refuge at Mount Hemus. A few days afterwards general Essen

74 The Turks driven out of Walachia, &c.

75 They sue for peace.

Turkey. that the Russians should enjoy an unlimited freedom of navigation on the Black sea, together with the possession of the city of Asoph, on the mouth of the Don; and that a sum of money should be paid them by way of indemnification for the expenses of the war. These terms, however, were rejected; and the negotiations, which continued through the whole year 1772, at last came to nothing. The commissioners on both sides retired from Bucharek, the place where the congress was held, on the 22d of March 1773. For some time a desultory kind of war was carried on between detachments from the two armies. But as this was very prejudicial to the Russians, who could not be so easily recruited as the Turks, about the middle of June, Romanzow made preparations for passing the Danube with the grand Russian army, consisting of 87,000 men: which, however, he did not accomplish till the 24th; and then marched with his army, in large divisions, towards the city of Silistria. He was terribly harassed on his march by large bodies of the Turkish cavalry, of whom the grand vizir had detached 27,000 for this purpose. At last, however, they arrived before the city, which was strongly fortified, and defended by a body of troops consisting of about 24,000 men. On the 29th of June, this body was defeated by General Weismann, who commanded the van of the Russian army, and forced to retire into Silistria. The grand vizir then detached 50,000 men to the relief of the place: upon this the Russians found it necessary to retreat; which was not accomplished without very great difficulty and loss. In this retreat General Weismann was killed, and the army left all their magazines behind them.

76 Negotiations broken off.

77 Romanzow passes the Danube.

78 A Turkish army defeated by General Weismann.

79 Who is killed.

80 The Turkish army everywhere defeated.

81 Almost the whole army deserts.

82 Not

Many other severe conflicts happened this campaign, which proved less glorious to the Russians than any of the former ones. In 1774, however, their arms were attended with better success. Romanzow's army was reinforced by 40,000 men; and, on the night between the 16th and 17th of June, passed the Danube, in spite of all opposition. A continued series of engagements then happened between the Russian generals and different bodies of the Turks. In these the latter were always defeated; and at last became so much dispirited, that a body of 40,000, or, according to some accounts, of 70,000 Turks, fled at the first sight of a body of their enemies greatly inferior in number, leaving behind them all their tents and baggage, with a fine train of brass artillery. From this time, disorder, mutiny, and dismay, seized all the Turkish armies, and they absolutely refused to face their enemies. They plundered the baggage, robbed and murdered their officers, deserted by thousands, taking the road to Constantinople, and committing every kind of outrage by the way. The ministers of state, after having tried all methods to induce this lawless crew to return to their duty, were obliged to furnish them with vessels for their transportation into Asia. According to some accounts, no fewer than 140,000 of the Turkish troops deserted in this manner. Even in the grand vizir's camp at Schumla, matters went on in the same manner. He was abandoned by his whole cavalry; his European and Asiatic troops quarrelled, and cut one another to pieces before his face; and, in short, the vast army he commanded was reduced almost to nothing. The Russian general did

Turkey.

Turkey.

82
Romanzow
dictates
terms of
peace.

not fail to take advantage of these misfortunes. He placed the different divisions of his army in such advantageous situations, that he totally cut off all communication between the Turkish camp and every mean of subsistence. The unfortunate vizir, therefore, was obliged at last to submit to the terms which Romanzow dictated to him. The principal articles were, the independency of the Crimea; the absolute cession of Kilburn, Kerche, and Jenickala, and all the country between the Bog and the Dniپر; a free navigation in all the Turkish seas, in which was included the passage through the Dardanelles, with all the privileges and immunities which were granted to the most favoured nations. Russia gave up all her conquests, except Afoph and Taganrok. There were, besides, several stipulations in favour of the inhabitants of Moldavia and Walachia, and the Greek islands which were restored by Russia.

83
Account of
the Turkish
dominions.

The Turkish empire comprehends several countries in Europe, Asia, and Africa. In Europe it is bounded on the south by the Mediterranean; on the north, by Croatia, Sclavonia, and Transylvania; on the east, by Poland, Russia, and Asia; and on the west, by the Adriatic and Dalmatia. The principal countries of Turkey in Europe are Romania, Bulgaria, Servia, Walachia, Moldavia, Bessarabia, Greece, Macedonia, Albania, Thessaly, Levadia, Morea, and the Archipelago islands. Turkey in Asia is divided into Eastern and Western. The Eastern comprehends Georgia, Turcomania, and Dearbekr; and the Western, Anatolia, or Asia Minor, Syria, and Palestine.—In Africa the Turkish dominions are Egypt, and some districts of Barbary. But for an account of these different countries, see the articles as they occur in the order of the alphabet.

84
Of the go-
vernment,
&c. in Tur-
key.

The grand signior, or emperor of the Turks, is restrained by no laws or compacts, the government being purely monarchical: but if he indulges not the humours of the people, and especially of the mutinous janisaries, he is in danger not only of being deposed, but also of being put to death. Those who have offices under the government he squeezes, disgraces, and puts to death, upon the least suggestion of their dissaffection or misconduct, without giving them an opportunity of answering for themselves, they being looked upon as more immediately his slaves: but others seem to enjoy almost as great a degree of security, both in their persons and properties, as the subjects of other absolute monarchies. Indeed, in all such there is a gradation of governors and officers, of which the higher fleece and oppresses those below them, and the lowest make reprisals upon the common people. In the succession to the empire, no regard is paid to age or birth-right, the Turks thinking it sufficient if, in their elections, they keep to the family. Women are excluded from the throne. The emperor's council is either ordinary or extraordinary. The first, meeting every Sunday and Thursday, consists of the great officers of state, and is called the *galibé divani*. To the other, which is called *ajaké divani*, are summoned all the great persons and officers of the empire, and even the oldest and most experienced soldiers. The sultan hears what passes from an adjoining chamber. At the head of the ministry is the grand vizir, who is as it were his lieutenant-general, with whom he divides,

or rather to whom he leaves the care of the whole empire; he being entrusted not only with the finances, with foreign affairs, and the administration of justice in civil and criminal matters, but also with the conduct of the war, and the command of the army. Great and dangerous as this charge is, there have been men who have executed it with safety and success, both in peace and war, and have died quietly in their beds; but that is not the case with the most of them, it being the usual policy of the emperors to shelter themselves from the clamours of the people by throwing the whole blame of any mal-administration upon him, and giving him up to the public repentment. His income, without any breach of probity, may amount to 600,000 dollars, exclusive of presents and other perquisites. Notwithstanding his high dignity, his palace is open to every one, and he gives audience to the meanest of the poor. When the sultan names a grand vizir, he put into his hand the seal of the empire; and when he honours him with the command of an army, he takes out one of the plumes of his own turban at the head of the troops, and delivers it to him to place it in his own. The other great officers of state are the kaimakan, or vizir's deputy, not to be confounded with the governor of Constantinople, who is also called *kaimakan*; the vizirs of the bench, or bassas of three horse-tails, because three horse-tails are carried before them when they march, and who sit in the divan or courts of justice with him; the kadilaskiers, or chief justices of provinces; the beiglerbegs, or viceroys, of which the chief are those of Romelia, Natolia, and Damascus; the ordinary bassas, or governors of towns and districts under the beiglerbegs; the reis effendi, or lord chancellor and secretary of state; the tefterdar, or high treasurer; the aga of the janisaries; the aga of the spahis; the aga of the siluds, &c. The chief officers of the seraglio are the kishlaragi, who is superintendent of the women, and has the command of all the black eunuchs; the capî aga, who has the command of all the white eunuchs, and to whom all petitions to be presented to the prince are delivered. Both these are also eunuchs, and of the same complexion as those of whom they have the command. Besides the women and eunuchs, there are in the seraglio the ichoglans and azamoglans, mutes, dwarfs, and buffoons. The ichoglans are young men bred up in the seraglio, not only to serve about the prince, but to fill in time the first posts of the empire. The azamoglans are trained up there for inferior employments.

No children are admitted into the seraglios of Constantinople, Pera, or Adrianople, till they are first reviewed and approved of by the grand signior. They are generally the most beautiful, well-made, and sprightly, that can be met with. They are first taught, after being circumcised, silence and a modest humble behaviour. Then they are instructed in the Mohammedan religion, to speak and write the Turkish language, and afterwards the Persian and Arabic. As they grow up, they are taught manly exercises, and whatever is thought requisite to qualify them for state-employments: but they are seldom preferred out of the seraglio until the age of 40.

The ladies of the harem are a collection of young beautiful virgins, either the presents of governors, pure-

Turkey.

purchased, or captives taken in war; most of them being the children of Christian parents. They are taught music, dancing, and other accomplishments, and furnished with the richest cloaths and ornaments. Some of them frequently play and dance before the grand signior, while others divert him with their conversation. They have a great many female slaves to wait on them; but are scarce ever suffered to go abroad, except when the grand signior changes his place of residence; when a troop of black eunuchs convey them to the boats, which are enclosed with lattices: and when they go by land, they are put into close chariots, and signals made at certain distances, to give notice that none may approach the road through which they are to pass.

85
Dress,
manners,
&c. of the
Turks.

The Turks are generally robust and well-shaped, of a good mien, and patient of hardships, which render them fit for war. They shave their heads; but wear their beards long, except the military and those in the seraglio, who wear only whiskers. They cover their heads with a white linen turban of an enormous size, and never pull it off but when they sleep. None but Turks must presume to wear a white turban. Their breeches or drawers are of a piece with their stockings; and they have slippers instead of shoes, which they pull off when they enter a temple or house. They wear shirts, with wide sleeves, not gathered at the wrists, and over them a vest tied with a sash; their upper garment being a loose gown, something shorter than the vest.

The womens dress pretty much resembles that of the men; only they have a stiffened cap with horns, something like a mitre, on their heads instead of a turban, and wear their hair flowing down. When they go abroad, they are so wrapped up, that their faces cannot be seen.

The Turks sit, eat, and sleep, according to the custom of the east, on iophas or cushions, mattresses, and carpets. Rice is their most general food, and coffee their common drink. Their most usual salutation is to bow the head a little, laying the right-hand on their breasts; but to persons of rank they stoop so low as to touch the border of their vest. The women are kept under a rigorous confinement. They have generally delicate skins, regular features, black hair and eyes, with an admirable chest. Many of them are complete beauties. Their cleanliness is extraordinary; for they bathe twice a-week, and suffer not the smallest hair, or the least soil, to be upon their bodies. As to the qualities of their minds, they are said to want neither wit, vivacity, nor tenderness; and to be exceedingly amorous. It is no doubt for this reason that the men never suffer their wives faces to be seen, not even by the dearest friend they have in the world.

There is no need of much wit to behave one's self well here; for a good mien and gravity supply the place of merit in the east, and much gaiety would spoil all. Not that the Turks want wit; but they speak little, and pride themselves in sincerity and modesty more than eloquence. The Turks use no unnecessary words, whereas the Greeks talk incessantly. Though these two nations are born under one climate, their tempers are more different than if they lived in the most distant countries. The Turks make pro-

Turkey.

fession of candour and faithfulness, and are a charitable good-natured people, jealousy excepted, and very sober. On the other hand, they are extremely proud, insolent, indolent, superstitious, and covetous. They are also much addicted to unnatural lusts; and despise all other nations in general, especially those which are not of their religion. The common appellation that they give the Christians is that of dogs. An uniformity runs through all the actions of the Turks, and they never change their manner of living. They seem to have no kind of genius for the improvement of the arts and sciences, though they live under the influence of the same heaven, and possess the same countries, as the ancient Grecians d.d. They generally loiter away their time, either among the women in the haram, or in smoking or taking opium; and though they herd together, you will observe as little conversation among them as amongst so many horses in a stable. They seldom travel, or use any exercise or rural sports; and discover little or no curiosity to be informed of the state of their own or any other country: but Turkey, after all, is not without men of parts, probity, and honour; nor without benevolent, liberal, conversible, and ingenious people. They behave very commendably to their slaves and servants, and frequently better than the Christians do to theirs. There are no hereditary governments or titles of nobility in Turkey; and indeed the commonalty there enjoys the greatest liberty.

86

The languages spoken in Turkey in Europe are the Turkish and Tartarian, which have a great affinity and learn-
to one another; the modern Greek, which differs wide-ly from the ancient; the Slavonian, and Walachian. The Arabic is the language of the learned. Learning is at a very low ebb among the Turks: however, they have some schools, colleges, and academics; but they are on a very different footing from those among us. Not many years since, a printing-house was set up at Constantinople, where books of all kinds were allowed to be printed, except on matters of religion. The most ingenious musklemen employ themselves in reading the Alcoran and the commentators upon it, to which almost all their learning is confined. Some of them amuse themselves with poetry, in which they are said to succeed very well. Other Turks delight in music, and spend the whole day in playing upon an instrument, without being tired, though they only repeat the same tune. It is said there are a great many manuscripts in the Turkish, Arabian, and Persian languages, among the Turks; but it is not to be supposed that they contain any very deep, solid, ingenious, or useful learning.

87

The Turkish regular troops are the spahis and Forces. timar-spahis, who are light-horse. The latter, who have estates in land assigned them instead of pay, are obliged to bring a certain number of slaves into the field with them. The tributary princes of Moldavia and Walachia, and the Crim Tartars, are also obliged to send auxiliaries. But the flower of the Turkish army consists of the janisaries, who amount to about 40,000, and are all infantry. They have particular privileges, being subject to no jurisdiction but that of their aga or commander. Their pay is three aspers a-day, besides victuals, and a suit of cloaths every year. They are all lodged at Constantinople together
in

Turkey.

in a fort of barracks, having been educated in the seraglio, and trained up to the exercise of arms from their infancy. Besides the janisaries, there is another body of foot called *capis*. The whole Turkish army, regulars and irregulars, amounts to above 300,000 men. Besides the true janisaries, or janisaries of the porte, and in actual pay, there are great numbers all over the empire, who procure themselves to be registered in this body, in order to be entitled to their privileges. The bachelors only are capable of bearing offices in the barracks or chambers at Constantinople. When any of the janisaries are disabled in the service, they have an allowance for life. To distinguish them, they wear a cap of a particular make. The emperor's guards are composed of them, and they are feared and respected every where, though they carry only a cane in their hand; for arms are not delivered to them but when they take the field. The chief commanders of the army are distinguished by two or three horse-tails carried before them. The Turkish navy is not so considerable as might be expected in such extensive dominions, situated on several seas, and abounding in commodious harbours. By their neglecting navigation and foreign commerce, they can never find sailors to man a great fleet; and those they have are unskilful, as well as their pilots and officers. If they would apply themselves to navigation, and make the most of their situation and advantages, they could not fail to become a very formidable maritime power. Their navy generally consists of about 40 large ships, exclusive of galleys. In time of war they hire or buy merchant-ships, and others are sent them from Algiers, Tunis, and Tripoli. The captain-bassa, or admiral, is the second officer in the empire, the grand vizir being the only officer above him. His power is absolute when he is out of the Dardanelles; and not only the sea-officers, but all the governors of the maritime provinces, receive orders from him. The pilots are mostly Greeks, and the captains renegadoes. The captain-bassa sails round the Archipelago, in summer, to collect the capitation-tax, and learn the state of affairs in those parts.

88

Revenues.

The revenues of the empire are paid either into the public treasury, or into the sultan's private treasury. The former, called by the Turks *deitulumali mufsimim*, i. e. *the public money of the Mussulman*, is not to be touched but on the most pressing exigency of the state. The other the sultan may dispose of at pleasure. Prince Cantimir says, in his time, 27,000 purses, amounting to 13,000,000 and a half of crowns, were annually returned to both treasuries; arising from the produce of the customs, demesne lands, the capitation or tax paid by every subject of the empire who is not of the Mahometan religion; the annual tributes paid by the chám of the Crim Tartars, the princes of Moldavia, Wallachia, the little republic of Ragusa, and part of Mingrelia; together with half a million of money out of a million and a half levied annually in Egypt. These are the fixed revenues: but vast sums are also raised by the confiscations of the estates and effects of the bassas and other officers, and from the estates of Turks dying without male issue.

89

Manufactures and commerce.

The manufactures and commodities of Turkey are silks, carpets, goat's hair, wool, camel's hair, cotton-yarn, dimity, burdets, waxed linen, shagreen-skins,

blue, red, and yellow Morocco leather; coffee, rhubarb, turpentine, florax, gums, opium, galls, mastic, emery, lemnian bole, pomegranate-shells, sponges, dates, almonds, wine, oil, figs, raisins, mother-of-pearl, boxwood, saffron, &c. These are exported in large quantities by the several European trading nations, who import their own goods and purchase those of the country. The inland trade is carried on chiefly by the Jews and Armenians; and even the Turks send merchandise, both by land and water, from one part of the empire to another, but not to foreign Christian countries. No nation is more advantageously situated for traffic than the Turkish; having the navigation of the Black Sea, the Levant, and the Red Sea, and consequently greater opportunities of importing the rich merchandises of the East, and distributing them all over Europe, than any maritime power: but they never attempt distant voyages, and have but few merchant-ships, both their imports and exports being chiefly made in foreign bottoms. Tyre, Sidon, and Alexandria, which once commanded the navigation and trade of the world, are in their possession, but make no figure in commerce at this day: and well it is for the Christians that the Turks are such an indolent generation; for their situation and vast extent of empire would enable them to monopolize the trade of the world, if they attended to it. Several European Christian nations have envoys and residents at Constantinople, and consuls in other ports. In this empire there is a great traffic in human species; not only male slaves, but beautiful young girls, being publicly bought and sold.

The empire is styled the Ottoman kingdom or empire, the Ottoman Porte, the Sublime Porte, the Sublime Sultanian Porte, &c. The appellation of *Porte* is said to be derived from the large gate built by Mohammed II. at the entrance of the seraglio at Constantinople; though the Orientals in general call a royal palace the *king's porte or gate*.

TURMERIC, in botany. See CURCUMA.

TURNERUS (Adrian), an eminent French critic, born of a genteel family in Normandy in 1512. He acquired so extensive a reputation by his learning, that he had great offers made him from Italy, Germany, and England; but we are told he preferred poverty in his own country to riches in any other. He taught polite literature first at Toulouse; but in 1547 went to be Greek professor at Paris, whither his name drew scholars to him from all parts of Europe: in 1552, he took upon him the care of the royal Greek press for three years, when he quitted it on being admitted into the number of royal professors. He died in 1565; and his works, which are all in Latin, were printed at Strasburg, in one vol. folio, 1600. His *Adversaria*, 3 vols folio, had been printed at Paris before.

TURNER, in botany, a species of brassica. For the culture of them, see AGRICULTURE, n° 125.

TURNER-Bread. See BREAD.

TURNING, a branch of sculpture, being the art of fashioning hard bodies, as brass, ivory, wood, &c. into a round or oval form in a lathe.

TURPENTINE, a transparent viscous substance, flowing either naturally or by incision from several unctuous or resinous trees; as the terebinthus, pine, larch,

Turkey

Turpentine

Turpentine larch, fir, &c. See CHEMISTRY, n° 498. MATERIA MEDICA, the Table; and PHARMACY, sect. x. and xi. *passim*.

Oil of TURPENTINE. See CHEMISTRY, n° 498. and PHARMACY, n° 538.

TURQUOISE. See TURCOISE.

TURETIN (Francis), minister and professor of divinity at Geneva, his native place, was born in 1623. Having studied at Geneva, Leyden, Saumur, Montauban, and Nîmes, with great success, he was admitted into the ministry in 1648, and served at the same time the French and Italian churches at Geneva. Two years after, he was offered the professorship of philosophy, which he refused; but accepted the invitation of the church of Lyons. He was recalled to Geneva at a year's expiration, because he was wanted to give lectures of divinity; and began them in 1653. He was sent to Holland in 1661, to desire the assistance of money which the city of Geneva had occasion for. He had in that journey all the success he could promise himself; and gained such a character there, that he was strongly importuned by the Walloon churches at the Hague and at Leyden to enter into their service. On his return he resumed the functions of his place, and continued there till his death with remarkable application. He died in 1687, with the character of a man of great merit; eloquent, judicious, laborious, learned, and zealous for orthodoxy. His works were published by his son John Alphonfus, in 3 and in 4 vols 4to, and are much esteemed.

TURTLE, in ichthyology. See TESTUDO.

TUSCAN ORDER, in architecture. See ARCHITECTURE, n° 47.

TUSCAN Earth, a yellowish kind of bole dug in many parts of Italy, particularly about Florence, where there is a stratum of it eight or ten feet thick, at the depth of five or six feet from the surface. It has an astringent property.

TUSCANY, a duchy of Italy, which makes part of the ancient Etruria, excepting some small detached parts, is encompassed by a part of the Mediterranean, called here the *Tuscan Sea*; the ecclesiastical state; the duchy of Modena; and the republic of Lucca; its extent from north to south being about 116 English miles, and from east to west about 80.

Though some parts of it are mountainous, yet both the hills and dales are covered with vines, olives, citron, lemon, and orange trees, &c. The mountains yield also copper, iron, alum, &c. and some quarries of the finest marble and porphyry. Here is also plenty of corn, rice, saffron, honey, wax, wool, flax, hemp, with mineral waters, rich pasture, salt-pits, sulphur, alabaster, chalcedony, lapis lazuli, borax, amethysts, cornelians, jaspers, quicksilver, crystals, and black slate. In some places the elms and ashes yield manna.

The principal river in Tuscany is the Arno, which has its source in the Appennine mountains, and falls into the sea below Pisa. There are some other smaller rivers.

This duchy fell under the dominion of the Romans about 455 years before Christ. The Ostrogoths possessed themselves of it in the fifth century, and after them the Lombards, who were expelled by Charlemagne anno 800, in consequence of which it became subject to the German emperors, who appointed governors over it. At last the cities of Florence, Pisa,

Sienna, and some others, during the contentions between the pope and the emperor, and their respective adherents, the Guelphs and Gibbelines, withdrew themselves into separate commonwealths. In that of Florence, John de Medicis, a popular nobleman, so influenced himself into the favour of his countrymen, that that they invested him with sovereign power. Pope Pius V. conferred the title of grand duke on Cosmo de Medicis anno 1570, in whose family the duchy continued until the death of Gaston de Medicis, who died anno 1737. The duchy was then transferred to the duke of Lorraine, the late emperor, in lieu of the duchy of Lorraine, which, by the peace of 1736, was given to king Stanislaus during his life, and then was to be annexed to France. The grand duke's annual revenues are computed at about 500,000 l. sterling, arising chiefly from the tenths of all estates that are sold or alienated, and the ground-rents of the houses in Leghorn, and the duties on almost all manner of provisions.

The great duke is absolute in his dominions. His standing forces consist only of three regiments of foot and two of dragoons, and his marine of a few galleys and galleasses; but, in case of necessity, it is said he can bring 30,000 men into the field, and increase his marine with 20 men of war; but it does not appear how he can man them.

The only order of knighthood in this state is that of St Stephen, instituted in 1554 by Cosmo I. which consists of three classes, namely, the Cavalieri della Giusitina, della Gratia, and de Commenderie. The duke is always grand-master; and the badge of the order an octagonal red cross, with a golden border, worn on the breast.

The principal places are Florence, Pisa, Leghorn, Sienna, Orbitello, Piombino, and Arezzo.

TUSK, or TORSK, in ichthyology. See GADUS.

TUSCULANUM, a villa belonging to Cicero, near Tusculum, where he wrote his *Quæstiones Tusculanae*, so named from the place; thus become famous as well for the productions of genius as of nature. Formerly the villa of Sylla: now called *Grotta Ferrata*.—Another *Tusculanum*, (inscription), a town of the Transpadana, situated on the west side of the Lacus Benatus. Now said to be called *Tuscolano*, in the territory of Breſcia, subject to Venice. Here many monuments of antiquity are dug up.

TUSCULUM, (anc. geog.), a town of Latium, to the north of Alba; situated on an eminence, and therefore called *Supernum*, (Horace, Strabo). In sight of Rome, at about the distance of 100 stadia, or 12 miles. Adorned with plantations and princely edifices: The spot remarkable for the goodness of the soil, and its plenty of water. Built by Telegonus, who slew his father Ulysses, (Ovid, Horace); called the grandson of Ulysses in Silius Italicus. A municipium, (Cicero); the birth-place of the elder Cato, (Nepos, Cicero). Now *Frescati*, in the Campania of Rome.

TUSSILAGO, COLTS-FOOT, a genus of the polygamia superflua order, belonging to the syngenesia class of plants. There are nine species; of which the most remarkable are, 1. The farfara, or common colts-foot, growing plentifully on the banks of rivulets, or in

Tuscany
Tusillago

Tutor
||
Tweed.

in moist and clayey soils, in England and Scotland.—The leaves are smoked in the manner of tobacco, or a syrup or decoction of them and the flowers stand recommended in coughs and other disorders of the breast and lungs. The present practice, however, seems almost entirely to have rejected it. The downy substance under the leaves, boiled in a lixivium with a little saltpetre, makes excellent tincture. 2. The petasites, or common butter-bur, is frequent in wet meadows and by the sides of rivers. Its leaves are the largest of any plant in Great Britain, and in heavy rains afford a seasonable shelter to poultry and other small animals. The root dug up in the spring is resinous and aromatic. A drachm of it in a dose has been sometimes given as a sudorific and alexipharmic; but as it possesses those virtues but in a small degree, it has lost its reputation in the shops.

TUTOR, in the civil law, is one chosen to look to the persons and estate of children left by their fathers and mothers in their minority. A person nominated tutor either by testament or by the relations of the minor, is to decline that office if he have five children alive; if he have any other considerable tutorage; if he be under 25 years of age; if he be a priest or a regent in an university; or if he have any law-suit with the minors, &c. The marriage of a pupil without the consent of his tutor is invalid. Tutors may do any thing for their pupils, but nothing against them; and the same laws which put them under a necessity of preserving the interest of the minors, put them under an incapacity of hurting them.

TUTTY, *tutia*, a recreation of mixed metals, in which lapis calaminaris, or zinc in its metallic form, is an ingredient, collected in the furnaces where brass is made from copper and calamine, and where the mixed metals are run. In these furnaces they place, under the roof and about the upper parts of the sides, rods of iron, and sometimes rolls of dry earth, about which the tutty is afterwards found. Therefore the tutty which we use in the shops at this time owes its origin truly and properly to zinc, which sublimes with a very small fire into a kind of flowers; and when fused with any other metal, flies from it in abundance under this form, and also frequently takes some part of that metal, more or less, up with it. Hence it is evident, that the tutty or cadmia of the ancients must have been wholly different from ours, as they used no zinc nor any of its ores in the furnace where they collected it.

Our tutty, then, is a hard and heavy femimetallic recreation, sometimes met with in the shops in thin flat pieces or flakes; but most abundantly in tubular cylindrical pieces, resembling segments of the barks of trees pushed off from the branches without breaking; these are of different lengths and diameters. The finest tutty is that of a fine deep brown on the outside, and of a yellowish tinge within; the thickest, brightest, and most granulated; the hardest to break; and that which has least foulness amongst it.

Tutty is celebrated as an ophthalmic, and frequently employed as such in unguents and collyria.

TWEED, a river of Scotland, which rises on the confines of the shire of Clydesdale, and running eastward through Tweedale, and dividing the shire of Mers from Teviotdale and Northumberland, falls into the German Sea at Berwick.

Tweedale
||
Twilight.

TWEEDALE, or PEEBLES, a county of Scotland, taking the name of Tweedale from the river Tweed, that runs through the whole length of the county, stretches about 25 miles in length, and at some places 18 in breadth; bounded on the east by Ettrick Forest, on the south by Annandale, on the west by Clydesdale, and on the north by Mid-Lothian. Tweedale is a hilly country, well watered with the Tweed, the Yarrow, and a great number of smaller streams, that fertilize the valleys, which produce good harvests of oats and barley, with some proportion of wheat. All the rivers of any consequence abound with trout and salmon. The lake called *West-Water Loch*, swarms with a prodigious number of eels. In the month of August, when the west wind blows, they tumble into the river Yarrow in such shoals, that the people who wade in to catch them run the risk of being overturned. There is another lake on the borders of Annandale, called *Lochgannan*, which forms a cataract over a precipice 250 paces high: here the water falls with such a momentum as to kill the fish underneath. About the middle of this county is the hill or mountain of Braidalb; from the top of which the sea may be seen on each side of the island. Tweedale abounds with limestone and freestone. The hills are generally as green as the downs in Suffolk, and feed innumerable flocks of sheep, that yield great quantities of excellent wool. The country is well shaded with woods and plantations, abounds with all the necessaries of life, and is adorned with many fine seats and populous villages. The earls of March were hereditary sheriffs of Tweedale, which bestows the title of *marquis* on a branch of the ancient house of Hay, earls of Errol, and hereditary high constables of Scotland. The family of Tweedale is, by the female side, descended from the famous Simon de Fraser, proprietor of great part of this country, who had a great share in obtaining the triple victory at Rosslin. In the neighbourhood of Peebles, near the village of Romana, on the river Lene, we see the vestiges of two Roman castella, or stationary forts; and a great many terraces on the neighbouring hills, which perhaps have served as itinerary encampments. In the shire of Tweedale there are many ancient and honourable families of the gentry. Among these Douglas of Cavers, who was hereditary sheriff of the county, still preserves the standard and the iron mace of the gallant lord Douglas, who fell in the battle of Otterburn, just as his troops had defeated and taken Henry Percy, surnamed *Hotspur*. In the church-yard of Drumalzier, belonging to an ancient branch of the Hay family, the famous Merlin is supposed to lie buried. There was an old traditional prophecy, that the two kingdoms should be united when the waters of the Tweed and the Panfel should meet at his grave. Accordingly the country people observe, that this meeting happened in consequence of an inundation, at the accession of James VI. to the crown of England.

TWELETH-DAY, the festival of the Epiphany, or the manifestation of Christ to the Gentiles; so called, as being the twelfth day, exclusive, from the nativity, or Christmas-day.

TWILIGHT, that light, whether in the morning before sun-rise, or in the evening after sun-set, supposed to begin and end when the least stars that can be seen

Tinkling Tyndale. Tyndale, Type.

by the naked eye cease or begin to appear. By means of the atmosphere, it happens that though none of the sun's direct rays can come to us after it is set, yet we still enjoy its reflected light for some time, and night approaches by degrees. For after the sun is hid from our eyes, the upper part of our atmosphere remains for some time exposed to its rays, and from thence the whole is illuminated by reflection. But as the sun grows lower and lower, that portion of the atmosphere which is above our horizon becomes enlightened till the sun has got 18° below it; after which it ceases to be illuminated thereby, till it has got within as many degrees of the eastern side of the horizon; at which time it begins to illuminate the atmosphere again, and in appearance to diffuse its light throughout the heavens, which continues to increase till the sun be up. Hence it is that during that part of the year in which the sun is never 18° below our horizon, there is a continued twilight from sun-setting to sun-rising.

As the twilight depends on the quantity of matter in the atmosphere fit to reflect the sun's rays, and also on the height of it; for the higher the atmosphere is, the longer will it be before the upper parts of it will cease to be illuminated, the duration of it will be various. For instance, in winter, when the air is condensed with cold, and the atmosphere upon that account lower, the twilight will be shorter; and in summer, when the limits of the atmosphere are extended by the rarefaction and dilatation of the air, of which it consists, the duration of the twilight will be greater. And for the like reason, the morning twilight, the air being at that time condensed and contracted by the cold of the preceding night, will be shorter than the evening one, when the air is more dilated and expanded.

TWINKLING of the STARS. See STARS.

TWINS, two young ones delivered at a birth, by an animal which ordinarily brings forth but one.

TYGER, or **TIGER**, in zoology. See FELIS.

TYLE, or **TILE**, in building, a sort of thin laminated brick used on the roofs of houses: or more properly a kind of fat clayey earth kneaded and moulded of a just thickness, dried and burnt in a kiln like brick, and used in the covering and paving of houses.

TYMPAN, among printers, a double frame belonging to the press, covered with parchment, on which the blank sheets are laid in order to be printed off. See **PRINTING-Press**.

TYMPANUM, in mechanics, a kind of wheel placed round an axis or cylindrical beam, on the top of which are two levers or fixed staves for the more easily turning the axis in order to raise a weight required. The tympanum is much the same with the peritrochium; but that the cylinder of the axis of the peritrochium is much shorter and less than the cylinder of the tympanum.

TYMPANUM, in anatomy. See there, n° 405, c.

TYMPANY, in medicine. See MEDICINE, n° 435.

TYNDALE (William), a learned divine, the first translator and publisher of the Old and New Testament in the English language, was born near the borders of Wales, and educated at Oxford, chiefly in Magdalen-hall. We are told that he was admitted a canon of the new college founded by Wolsey; but Anthony Wood disputes this fact. Having imbibed the opinions of Luther, and being apprehensive of persecution, he

removed to Cambridge, where he finished his academical studies. From thence he went to the house of Sir John Welch at Little Sodbury in Gloucestershire, in the capacity of tutor to that gentleman's children; and being then in orders, frequently preached at Bristol, and in that neighbourhood: but his doctrine being by the clergy of those times deemed heretical, he was obliged once more to fly from persecution. He now removed to London, where he preached for some time in St Dunstan's in the West. Having conceived an idea of bishop Tonstal's moderation from the character given him by Erasmus, he made an attempt to be admitted one of his chaplains; but not succeeding, and now destitute of support, he was taken into the house of Mr Humphrey Monmouth, alderman of London, where he continued about half a year. In this situation he first meditated the translation of the New Testament into English, as the most effectual means to bring about a reformation in religion; but as this could not be safely attempted in England, he embarked for Germany, supported by his friends with a pension of 10*l. per annum*. Having first paid a visit to Martin Luther, at that time in Saxony, he settled at Antwerp, and immediately began his translation of the New Testament, which was first printed in 1526, in 8vo. The gospel was always beholden to persecution for its propagation. The whole impression was in a short time consumed, and Tyndale: by that means enabled to publish a second much more numerous.

Having now finished his first work, the indefatigable Tyndale began his translation of the Old Testament; and the five books of Moses being ready for the press, he embarked for Hamburg with an intention to print them; but the ship being cast away, all his papers, books, and money, were lost. However, he arrived safe at Hamburg; where, with the help of Miles Coverdale, he began the work anew, and finished the Pentateuch, which was printed in 1530. To this he added the book of Jonas, which was published the year following.

The matter now grew serious. The Papists were alarmed; and Tyndale's translations were at all events to be suppressed. The most conscientious Defender of the Faith assembled the heads of the clergy in the star-chamber, and, with their approbation, issued his royal proclamation for the total extinction of the English Bible, with all other books containing pestilential and damnable heresies. The Bibles, as many as were brought in, were accordingly burnt: but this was not enough. To appease the offended genius of Popery, it was necessary that the translator himself should also burn. Poor Tyndale, in consequence of an application from the court of London, was seized by the emperor's procurator-general at Brussels, confined in the castle of Vilvorde, 18 miles from Antwerp; and after 18 months imprisonment, in the year 1536, condemned and executed. They had however the humanity to strangle him first; after which his body was reduced to ashes. Thus died this very honest and learned divine, for having translated and, as was falsely pretended, perverted the scriptures.

TYPE, a copy, image, or resemblance of some model. The word is much used among divines, to signify a symbol, sign, or figure of something to come; in which sense it is commonly used with relation to antitype,

Type
|
Tyrrhel.

titype, which is the thing itself, whereof the other is a type or figure.

TYPE, among letter-founders and printers, the same with letter. See LETTER.

TYPE is also used to denote the order observed in the intention and remission of fevers, pulses, &c.

TYPHA, CAT'S TAIL; a genus of the triandria order, belonging to the monocia class of plants. There are two species; of which the most remarkable is the latifolia, great cat's-tail or reed-mace, frequent in ponds and lakes. The stalk is six feet high; the leaves a yard long, hardly an inch wide, convex on one side: the amentum, or cylindrical club, which terminates the stalk, is about six inches long, of a dark brown or fuscous colour. Cattle will sometimes eat the leaves, but Schröber thinks them noxious: the roots have sometimes been eaten in salads, and the down of the amentum used to stuff cushions and mattresses. Linnaeus informs us, that the leaves are used by the coopers in Sweden to bind the hoops of their casks.

TYPHON. See WHIRLWIND.

TYPOGRAPHY, the art of printing. See PRINTING.

TYRANNION, a celebrated grammarian in Pompey's time, was of Amisus in the kingdom of Pontus. He was the scholar of Dionysius of Thrace at Rhodes. He fell into the hands of Lucullus, when that general of the Roman army defeated Mithridates, and seized his dominions. This captivity of Tyrannion was no disadvantage to him, since it procured him an opportunity of being illustrious at Rome, and raising a fortune. He spent it, among other things, in making a library of above 30,000 volumes. He died very old, being worn out with the gout. His care in collecting books contributed very much to the preservation of Aristotle's works.

TYRANT, among the ancients, denoted simply a king or monarch; but the ill use which several persons invested with that sacred character made of it, has altered the import of the word; and tyrant now carries with it the idea of an unjust or cruel prince, who invades the people's liberty, and rules in a more despotic manner than the laws of nature or of the country allow.

TYRE. See TYRUS.

TYRONE, a county of Ireland, in the province of Ulster, 46 miles in length, and 37 in breadth; bounded on the north by Londonderry, on the east by Armagh and Lough-Neagh, on the south by Fermanagh, and on the west by Donegal. It is a rough and rugged country, but tolerably fruitful; contains 12,683 houses, 30 parishes, 4 baronies, 4 boroughs, and sends 10 members to parliament. The principal town is Dungan-non.

TYRREL (James), author of a history of England, was the eldest son of Sir Timothy Tyrrel of Shot-over, near Oxford, and born in London in 1642. He was educated at queen's college in Oxford, where he took his degrees; and removing thence to the Inner Temple in London, applied himself to the study of the

law, but never practised. He employed himself in studying the history and constitution of his country, of which he at length rendered himself a thorough master, as appears from his answer to Sir Robert Filmer, and his Political Dialogues; as also from his History of England, which reaches no farther than the end of the reign of king Richard II. He died in 1718.

TYRTEUS, an Athenian general and musician, is celebrated by all antiquity for the composition of military songs and airs, as well as the performance of them. He was called to the assistance of the Lacedaemonians in the second war with the Messenians, about 685 B. C.; and a memorable victory which they obtained over that people is attributed by the ancient scholiasts upon Horace to the animating sound of a new military flute or clarion, invented and played upon by Tyrteus. Plutarch tells us that they gave him the freedom of their city; and that his military airs were constantly sung and played in the Spartan army to the last hour of the republic. And Lycurgus the orator, in his oration against Leocrates, says, "The Spartans made a law, that whenever they were in arms, and going out upon any military expedition, they should all be first summoned to the king's tent to hear the songs of Tyrteus;" thinking it the best means of sending them forth in a disposition to die with pleasure for their country. Fragments of this poetry, in elegiac verse, are preserved in Stobaeus, Lycurgus Orat. in Fulvius Ursinus, at the end of Poems by illustrious Women; and in the Oxford edition of *Eleg. & Lyric. Frag. & Scholia*, printed 1759. Τα Τυρτείου, &c.

TYRUS, a very famous and ancient city of Phoenicia, built by the Sidonians, (Justin); consequently of a later date than Sidon. No mention made of Tyre before David's time; none by Homer, who mentions Sidon and the Sidonians, (Strabo). Tyre was a very large rich city, and powerful at sea, the rival of Sidon: formerly situated on an island; but after the time of Alexander, on the continent, or in a peninsula, formed by Alexander's mole or causeway, thrown up at the siege of it, (Curtius, Ovid, Strabo). Famous for its colonies, both within and without the pillars of Hercules, (Strabo, Pliny); and its purple dye. In Hebrew called *Zor* or *Sor*; and, according to another dialect, *Syr*, *Sar*; whence the adjoining country was called *Syria*; and by the Armenians or Syrians, *Tor*, *Tur*, *Tyr*, and with a Greek termination, *Tyres*; also *Sarra*. Their principal deity was Hercules, which Nonnus says was the sun; called *Hercules Tyrius*, (Diodorus); and Tyre itself was called *Tyrus Eraclia*, (Coins). Out of a regard to its fame and antiquity, it enjoyed its liberty both under the Seleucidae and the Romans, (Strabo); it also received a Roman colony, and was then called *Colonia Septimia*, (Coins). Of Tyre were Porphyry, the famous antagonist of Christianity; Maximus, the Platonic philosopher; and Ulpian, the celebrated civilian. Now commonly called *Tyre*, a port-town on the coast of the Levant. E. Long. 36°. N. Lat. 32. 32.

Tyrteus.
Tyros.

U, V.

U
Vaccinium.

U, or *u*, the 20th letter and 5th vowel of our alphabet, is formed in the voice by a round configuration of the lips, and a greater extrusion of the under one than in forming the letter *o*, and the tongue is also more cannulated. The sound is short in *curst*, *must*, *tun*, *tub*; but is lengthened by a final *e*, as in *tune*, *tube*, &c. In some words it is rather acute than long; as in *brute*, *fute*, *lute*, &c. It is mostly long in polysyllables; as in *union*, *curious*, &c. but in some words it is obscure, as in *nature*, *venture*, &c. This letter in the form of *V*, or *v*, is properly a consonant, and as such is placed before all the vowels; as in *vacant*, *venal*, *vibrate*, &c. Though the letters *v* and *u* had always two sounds, they had only the form *v* till the beginning of the fourth century, when the other form was introduced, the inconvenience of expressing two different sounds by the same letter having been observed long before. In numerals *V* stands for five; and with a dash added at top, thus *Ṽ*, it signifies 5000.

In abbreviations, amongst the Romans, *V. A.* stood for *veterani assignati*; *V. B. viro bono*; *V. B. A. viri boni arbitratus*; *V. B. F. vir bone fidei*; *V. C. vir consularis*; *V. C. C. F. vale, conjux charissime, felicitate*; *V. D. D. voto delicatus*; *V. G. verbi gratia*; *Vir. Ve. virgo vestalis*; *VL. videlicet*; *V. N. quinto nonarum*.

VACCINIUM, the WHORTLEBERRY, or *Bilberry*; a genus of the monogynia order, belonging to the octandria class of plants. There are 12 species; of which the most remarkable are, 1. The myrtillus, black-whortle, whortle-berries, or bilberries, growing in woods and on heaths abundantly. The flowers frequently vary, with five segments at the rim, and with ten stamina. The berries when ripe are of a bluish black colour; but a singular variety, with white berries, was discovered by his grace the duke of Athol, growing in the woods, about mid-way between his two seats of Dunkeld and Blair. The berries have an astringent quality. In Arran and the Western Isles they are given in diarrhoeas and dysenteries with good effect. The Highlanders frequently eat them in milk, which is a cooling agreeable food; and sometimes they make them into tarts and jellies, which last they mix with whiskey to give it a relish to strangers. They dye a violet colour; but it requires to be fixed with alum. The grouse feed upon them in the autumn.

2. The uliginosum, or great bilberry-bush, is found in low moist grounds, and almost at the summits of the Highland mountains, as upon Crag-Chailleach in Breadalbane, upon the higher hills about Loch-Rannoch in Athol, upon the mountains of Ross-shire, about Loch-Broom, and Inverness-shire about Loch-Urn, &c. and in the low boggy grounds of the island of Mull, and near the duke of Argyle's, at Inverary, &c. The leaves are full of veins, smooth and glaucous, especially on the under side; the berries are eatable, but not so much esteemed as the preceding; as they are apt, if eaten in any quantity, to give the headach.

3. The *vitis idæa*, or red whortle-berries, being fre-

quent in dry places in heaths, woods, and on mountains. The berries have an acid cooling quality, useful to quench the thirst in fevers. The Swedes are very fond of them made into the form of a rob or jelly, which they eat with their meat as an agreeable acid, proper to correct the animal alkali.

4. The oxycoccos, cran-berries, moss-berries, or moor-berries, frequent on peat-bogs in the Lowlands, but not so common in the Highlands of Scotland. The stalks are long, slender, woody, weak, and trailing; the leaves are stiff, acutely oval, glaucous underneath, their edges turned back, and grow alternate; two or three flowers grow singly on long red footstalks out of the extremity of the branches; the flowers are red, divided deeply into four acute segments, which are reflexed quite backwards; the filaments are downy, the anthers ferrugineous, and longer than the filaments: the berries red, and about the size of the hawthorn-berries. At Longtown, on the borders of Cumberland, they are made so considerable an article of commerce, that, at the season when they are ripe, not less than 20l. or 30l. worth are sold by the poor people each market-day for five or six weeks together, which are afterwards dispersed over different parts of the kingdom, for making the well-known cranberry tarts.

VACUUM, in philosophy, denotes a space empty or devoid of all matter or body.

It has been a matter of much dispute among philosophers, whether there is a possibility of producing in nature a perfect vacuum, or space void of all body whatever. The Cartesians have violently contended against the possibility of this; while the Newtonians have argued as strenuously, not only for the possibility, but even the actual existence of a vacuum. In some instances, however, the arguments on both sides have been very inconclusive. The Cartesians have argued, from the ascent of water in pumps, that nature abhorred a vacuum. The Newtonians have disproved this by showing that the ascent of water in those machines is owing to the pressure of the atmosphere, and cannot be extended beyond a certain space. In like manner the limited ascent of mercury in a barometer, shows that it is occasioned only by the pressure of the atmosphere, and not by any power of suction or abhorrence of a vacuum, which would be equivalent to the pressure of any column of mercury, however high. Another argument in favour of a vacuum is drawn from the motions of the celestial bodies, meeting with no apparent resistance in the heavenly spaces. As no body with which we are acquainted can move through a fluid without sensible resistance, Sir Isaac Newton concludes, for the reason above-mentioned, that "it is necessary the celestial spaces be void of all matter, excepting perhaps some few and much rarefied effluvia of planets and comets, and the passing rays of light." An argument of the same kind is deduced from the motion of pendulums in an exhausted receiver meeting with no sensible resistance from the medium therein contained.—Sir Isaac also contends, that the descent of gravi-

Vaccinium,
Vacuum.

gravitating bodies proves the existence of a vacuum. "If all spaces (says he) were equally full, the specific gravity of that fluid with which the region of the air would in that case be filled, would not be less than the specific gravity of quicksilver or gold, or any other the most dense body; and therefore neither gold, nor any other body, could descend therein.—For bodies do not descend in a fluid, unless that fluid be specifically lighter than the body.—But by the air-pump we can exhaust a vessel, till even a feather shall fall with a velocity equal to that of gold in the open air: the medium, therefore, through which the feather falls must be rarer than that through which the gold falls.

"The quantity of matter, therefore, in a given space, may be diminished by rarefaction: and why may not it be diminished in *infinitum*? Add, that we conceive the solid particles of all bodies to be of the same density: and that they are only rarefiable by means of their pores; whence a vacuum evidently follows."

The strongest argument, however, for a vacuum, perhaps is, that we cannot have any idea of the possibility of motion without a vacuum. The force of this argument will be increased from the two following considerations. 1. That all motion is either in a straight line, or in a curve which returns into itself, as the circle and ellipsis; or in a curve that does not return into itself, as the parabola, &c. And, 2dly, that the moving force must always be greater than the resistance.

For hence it follows, that no force, even though infinite, can produce motion where the resistance is infinite; consequently, there can be no motion either in a straight line or a non-returning curve; because, in either of those cases, the protrusion, and consequently the resistance, would be infinite.—There remains, therefore, only the motion in a revolving curve practicable; which must either be a revolution upon an axis, or an angular motion round a quiescent body; both which are, again, impossible in an elliptic curve: and consequently all motion must be in circles geometrically true; and the revolving bodies must either be spheres, spheroids, cylinders, or portions of them, exactly geometrical; otherwise their revolutions in a plenum would be impossible: but such motions, or such figured bodies, we do not know in nature. Therefore there is a vacuum.

Again, say these philosophers, that there are interspersed vacuities, appears from matter's being actually divided into parts, and from the figures of those parts: for, on supposition of an absolute plenitude, we do not conceive how any part of matter could be actually divided from that next adjoining, any more than it is possible to divide actually the parts of absolute space from another: for by the actual division of the parts of a continuum from one another, we conceive nothing else understood, but the placing those parts at a distance from one another, which, in the continuum, were at no distance from one another; but such divisions between the parts of matter must imply vacuities between. As for the figures of the parts of bodies, upon the supposition of a plenum, they must either be all rectilinear, or all concavo-convex, otherwise they would not adequately fill space; which we do not

find to be true in fact. Lastly, The denying a vacuum, supposes what it is impossible for any one to prove to be true, viz. that the material world has no limits.

To every one of these arguments, however, the assertors of a plenum, now, when assisted by the discoveries concerning the electric fluid, are able to give pretty satisfactory answers. In the cases of pumps of all kinds they contend, that the space once occupied by the air is instantly filled up by the electric fluid which flows in through the sides of the receiver, or otherwise during the time the air is extracting; and they are able to give proofs of the existence of this fluid even in the most perfect vacuum which we can make. With regard to the celestial motions it is contended, that the fluids of light and electricity are the same, and that though, by means of this ethereal fluid, a very violent resistance might be occasioned, yet were its strength and agility applied to the purposes of giving motion, there is not the least doubt that every one of the celestial motions might be continued by its means; and that not only *might* this be the case, but there are strong reasons for believing that it actually *is* so.

The arguments drawn from the descent of bodies, they also contend, are inconclusive. There can only, they say, be two sources of resistance to a body moving through a fluid; one is the friction of the parts of the fluid upon one another, and the other when the fluid itself has a tendency to move in a direction contrary to the moving body. If we suppose the fluid to be totally devoid both of friction, and of any tendency to move towards a centre or otherwise, it not only can make no resistance to motion, but if once a motion is begun in it, it will continue it for ever. Therefore, in the case of pendulums vibrating in an exhausted receiver, they contend, that the medium in which they move, though equally *dense* as before, is yet much more devoid of gravity and of friction than the common atmosphere, and therefore the resistance of it is much less; whence the vibrations of the pendulum are much longer continued than in the open air.—The advocates for a plenum also deny that rarefaction implies a diminution of the quantity of matter in any body. They contend, that there are two kinds of matter, one of which is subject to the laws of gravity, and the other not; consequently, if bodies are compounded of those two kinds of matter, they will to us appear to be rare or dense, as the one or the other kind prevails.

As to the arguments taken from the nature of motion, we know not the figure, nor indeed, when we come to examine the subject strictly, can we have any idea of the ultimate component particles of matter; so that we must resolve every thing into the action of infinite wisdom and power in the construction of the universe. If the particles of matter are infinitely divisible, according to one of Sir Isaac Newton's suppositions; then they must yield to motion in every direction as easily as if nothing was present, provided the body moved with force sufficient to break them; and this force we may, indeed, we must suppose to be *infinitely small*. If, according to another of Sir Isaac Newton's hypotheses, we suppose matter to be composed of solid hard particles which cannot be broken

Vacuum.

by any power whatever, then indeed these particles must have a certain determinate figure, either spherical, concavo-convex, or some other which perhaps has not occurred to human ingenuity. If they are spheres, we are then sure that there must be what is called a *vacuum disseminatum* or *interspersum* equal to the whole quantity of matter in the universe. But there is no necessity for supposing this; nor will our inability to produce motion, or to know how it can be produced, ever be an argument for its being done in this or that particular way; nor can we at all argue with regard to the figure of the component parts of matter, or concerning the bounds of the universe; our faculties being limited to those things which are the objects of our senses, either naturally or by some kind of similitude.

It has been observed of late, that in the most perfect vacuum which can be produced, not only in an air-pump, but even in the upper part of a barometer, evaporation both of water and of mercury takes place: it may not be amiss to inquire into the manner in which this process can be supposed to go on. The phenomenon has already been taken notice of under the article *EVAPORATION*, n° 5, and may receive a satisfactory explanation on the principles there laid down. It is there proved, that all kinds of vapour consist of an union of the principle of heat with the evaporating substance. In consequence of this union the vapours are exceeding light; and because fire may well be supposed devoid of gravity altogether, therefore they will rise till they come to a region where the medium is of equal gravity with their own. In rarefied air the vapours will still rise, though the proportion of heat they have in them must then be greater, to make them ascend in a medium of so little specific gravity. It would seem therefore, that even the medium left behind the mercury when sinking down in the barometer is still somewhat heavier than extremely subtle vapours, as they will arise even in that medium, and condense on the upper part of the tube.—It is natural to suppose that the quantity of heat contained in these vapours is very great in proportion to the quantity of terrestrial matter they contain.

Vacuum, or *Vacuum Boyleanum*, is also used to express that approach to a real vacuum which we are supposed to arrive at by means of the air-pump. See *AIR-PUMP*. Thus, any thing put in a receiver so exhausted, is said to be put *in vacuo*: and thus most of the experiments with the air-pump, are performed *in vacuo*, or *in vacuo Boyleano*.

Some of the principal phenomena observed of bodies in *vacuo* are, that the heaviest and lightest bodies, as a guinea and a feather, fall here with equal velocity: That fruits, as grapes, cherries, peaches, apples, &c. kept for any time in *vacuo*, retain their nature, freshness, colour, &c. and those withered in the open air, recover their plumpness in *vacuo*:—All light, and fire, becomes immediately extinct in *vacuo*:—The coalition of flint and steel in *vacuo* produces no sparks:—No sound is heard even from a bell rung in *vacuo*:—A square viol, full of common air, well closed, breaks in *vacuo*; a round one does not:—A bladder half full of air, will heave up forty pound weight in *vacuo*:—Cats, and most other animals, readily expire in *vacuo*.

By experiments made in 1704, Mr Derham found,

that animals which have two ventricles, and no foramen ovale, as birds, dogs, cats, mice, &c. die in less than half a minute; counting from the first excution: a mole died in one minute, a bat lived seven or eight.—Insects, as wasps, bees, grasshoppers, &c. seemed dead in two minutes; but, being left in *vacuo* 24 hours, came to life again in the open air: snails continued 24 hours in *vacuo*, without appearing much concerned.

Seeds planted in *vacuo* do not grow:—Small-beer dies, and loses all its taste in *vacuo*:—Lukewarm water boils very vehemently in *vacuo*:—Air, rushing through mercury into a vacuum, throws the mercury in a kind of shower upon the receiver, and produces a great light in a dark room.

The air-pump can never produce an entire extraction of the air, as is evident from its structure and the manner of its working: in effect, every excution only takes a part of the air; so that there will still be some left after any finite number of excutions.—Add, that the air-pump has no longer any effect, than while the spring of the air remaining in the receiver is able to lift up the valves: when the rarefaction is come to that degree, you can come no nearer to a vacuum. Sir Isaac Newton, observing that a thermometer suspended in *vacuo*, and in that state removed to a warm or a cold room, receives the heat or cold, rises or falls, almost as soon as another in open air, takes thence occasion to suspect that the heat of the warm room is conveyed through the vacuum by the vibrations, of a much subtiler medium than air, which remained in the vacuum after the air was drawn out.

VADIUM, a pledge in law, is either *vivum* or *mortuum*.

Vadium Vivum, or *Living Pledge*, is when a man borrows a sum (suppose 200*l.*) of another; and grants him an estate, as of 20*l.* *per annum*, to hold till the rents and profits shall repay the sum so borrowed. This is an estate conditioned to be void as soon as such sum is raised. And in this case the land or pledge is said to be living: it subsists, and survives the debts; and, immediately on the discharge of that, returns back to the borrower.

Vadium Mortuum, or *Dead Pledge*. See *MORTGAGE*.

VAGABOND, or *VAGRANT*, one who wanders illegally, without a settled habitation. Such persons are cognizable by the laws. See *IDLENESS*.

VAGINA, properly signifies a sheath or scabbard; and the term *vagina* is used in architecture for the part of a terminus, because resembling a sheath out of which the statue seems to issue.

VAGINA, in anatomy, a large canal, formed of a robust or strong membrane, and reaching from the external orifice, or os pudendi, of women, to the uterus.

VAILLANT (John Foy), a physician and great medalist, to whom, according to Voltaire, France was indebted for the science of medals, and Lewis XIV. for one half of his cabinet, was born at Beauvais in 1632. Through the means of the minister Colbert he travelled into Italy, Greece, Egypt, and Persia, to collect medals for the royal cabinet; and returned with so many as made the king's cabinet superior to any in Europe. In one of his voyages the ship he sailed in was fallen upon and taken by an Algerine corsair.

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After a captivity of near five months he was permitted to return to France, and received at the same time 20 gold medals, which had been taken from him. He embarked in a vessel bound for Marseilles, and was carried on with a favourable wind for two days, when another corsair appeared, which, in spite of all the fail they could make, bore down upon them within the reach of cannon-shot. Mr Vaillant, deprecating the miseries of a fresh slavery, resolved, however, to secure the medals which he had received at Algiers, and in order thereto swallowed them. But a sudden turn of the wind freed them from this adversary, and cast them upon the coasts of Catalonia; where, after expecting to run aground every moment, they at length fell among the sands at the mouth of the Rhone. Mr Vaillant got to shore in a skiff, but felt himself extremely incommoded with the medals he had swallowed, which might weigh altogether five or six ounces, and therefore did not pass like Scarborough waters. He had recourse to a couple of physicians, who were a little puzzled with the singularity of his case; however, nature relieved him from time to time, and he found himself in possession of the greatest part of his treasure when he got to Lyons. Here he explained, with much pleasure to his friends, those medals which were already come to hand, as well as those which were daily expected; among which last was an Otho, valuable for its rarity. He was much careless on his return; and when Lewis XIV. gave a new form to the academy of inscriptions in 1701, Mr Vaillant was first made associate, and then pensionary. He wrote several works relating to ancient coins, and died in 1706.

VAIR, or VAIRE, a kind of fur, formerly used for lining the garments of great men and knights of renown. It is represented in engraving by the figures of little bells reversed, ranged in a line; see HERALDRY, Pl. CLXIV, fig. 2. n° 15. Of this fur is sometimes formed a cross, a band, &c. M. de la Colombiere observes, that when furriers first made this lining, they used small pieces, most frequently of an azure colour, which they fitted to white furs; and he infers from that, that those who have settled the rules of heraldry decreed, in relation to vair, that this fur in its natural blazon should always be argent and azure; so that if it be said, such a family bears vair, it is supposed to be argent and azure; but if there be any other tincture, the same must be expressed, saying, such a family bears vair, or, and gules, or otherwise. The same author relates an account of this fur being first introduced into French armoury, but too tedious to be inserted here.

VAIRY, in heraldry, expresses a coat, or the bearings of a coat, when charged or chequered with vairs.

VALAIS, a valley in Switzerland, which extends from the source of the river Rhone to the lake of Geneva. It is near 100 miles in length, but the breadth is very unequal. It is bounded on the north by the Alps, which separate it from the cantons of Bern and Uri, on the east by the mountains of Forche, and on the south by the duchy of Milan and the Val d'Aoste, and on the west by Savoy and the republic of Geneva. The inhabitants profess the Roman-Catholic religion, and are subject to the swelling of the throat, called *bronchete*; and idiots are said to abound among them more than in any other place of the globe. They are naturally hardy, enterprising, and good-natured. It

is surrounded on all sides by very high mountains, most of which are covered with snow and ice, that never thaw. However, the soil is fertile in corn, wine, and good fruit. The muscat-wine, which is produced here, is excellent, and well known all over Europe. There are mineral waters, plenty of game, and some mines. This country comprehends 55 large parishes, to which one bishop only belongs, whose see is at Sion, the capital. The mountains afford good pasture for their cattle in summer, and their harvest continues from May to October; it being sooner or later, according to the situation of the place.

VALENCIA, a province of Spain, which has the title of a kingdom; and is bounded on the east and south by the Mediterranean sea, on the north by Catalonia and Aragon, and on the west by New Castile and the kingdom of Mercia. It is about 165 miles in length, and 63 in breadth. It is one of the most populous and agreeable parts of Spain, and where they enjoy almost a perpetual spring. The great number of rivers wherewith it is watered render it extremely fertile, particularly in fruits and wine. There are very rugged mountains in it, which contain mines of alum and other minerals.

VALENCIA, a city of Spain, and capital of the kingdom of the same name. It contains about 12,000 houses, besides those of the suburbs and the summer-houses round it. It has an university, and an archbishop's see; and was taken from the Moors by the Christians in the 13th century. The town is handsome, and adorned with very fine structures. It is not very strong, though there are some bastions along the sides of the walls. They have manufactures in wool and silk, which bring in great sums to the inhabitants. It is seated on the river Guadalquivir, over which there are five handsome bridges; and it is about three miles from the sea, where there is a harbour, 110 miles north of Murcia, and 165 east by south of Madrid. This city surrendered to the earl of Peterborough in the year 1705; but it was lost again in 1707. W. Long. o. 5. N. Lat. 39. 30.

VALENS (Flavius), emperor of the East, a great patron of the Arians. Killed by the Goths in the year 379. See CONSTANTINOPLE, n° 74—80.

VALENTINIAN I. emperor of the West, a renowned warrior, but a tyrant over his subjects. See ROME, n° 523.

VALENTINIAN II. emperor of the West, a prince celebrated for his virtues, and above all for his moderation; yet a conspiracy was formed against him by Arbogastes, the commander in chief of his armies; and he was strangled in the year 392. See ROME, n° 536.

VALENTINIANS, in church-history, a sect of Christian heretics, who sprung up in the second century, and were so called from their leader Valentinus.

The Valentinians were only a branch of the Gnostics, who realized or personified the Platonic ideas concerning the Deity, whom they called *Pleroma*, or *Plenitude*. Their system was this: the first principle is Bythos, *i. e.* Depth, which remained many ages unknown, having with it Ennoia, or Thought, and Sige, or Silence; from these sprung the Nous, or Intelligence, which is the only son, equal to and alone capable of comprehending, the Bythos; the filer of Nous they called *Altheia*, or *Truth*; and these constituted the first quarter-

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quaternity of the æons, which were the source and original of all the rest: for Nous and Aletheia produced the World and Life; and from these two proceeded Man and the Church. But besides these 8 principal æons, there were 22 more, the last of which, called *Sophia*, being desirous to arrive at the knowledge of Bythos, gave herself a great deal of uneasiness, which created in her Anger and Fear, of which was born Matter. But the Horos, or Bounder, stopped her, preserved her in the Pleroma, and restored her to perfection. *Sophia* then produced the Christ and the Holy Spirit, which brought the æons to their last perfection, and made every one of them contribute their utmost to form the Saviour. Her Enthemse, or Thought, dwelling near the Pleroma, perfected by the Christ, produced every thing that is in the world by its divers passions. The Christ sent into it the Saviour, accompanied with angels, who delivered it from its passions, without annihilating it: from thence was formed corporeal matter. And in this manner did they romance concerning God, nature, and the mysteries of the Christian religion.

VALERIAN, or VALERIANUS, (Publius Licinius), emperor of Rome, remarkable for his captivity and cruel treatment by Sapor I. king of Persia. See Rome, n° 491.

VALERIANA, VALERIAN; a genus of the monogynia order, belonging to the triandria class of plants. There are 20 species; the most remarkable of which is the officinalis, or great wild valerian, growing naturally in Britain, in ditches, marshy places, and sometimes in dry mountainous pastures. The root is much used in medicine, and consists of a number of strings or fibres matted together, issuing from one common head; of a whitish or pale brownish colour: its smell is strong, like a mixture of aromatics with fetids; the taste unpleasantly warm, bitterish, and subacid. The London college have restrained the shops to that which grows in dry places, and is considerably the strongest, and loses of its quality if transplanted into such soils as the other naturally delights in. The roots produced in low watery grounds have a remarkably faint smell in comparison of the others, and sometimes scarce any at all. Wild valerian is a medicine of great use in nervous disorders; and is particularly serviceable in epilepsies proceeding from a debility of the nervous system. It was first brought into esteem in these cases by Fabius Columna, who by taking the powdered root in the dose of half a spoonful, was cured of an inveterate epilepsy after many other medicines had been tried in vain. Repeated experience has since confirmed its efficacy in this disorder; and the present practice lays considerable stress upon it. The common dose is from a scruple to a dram; in infusion from one to two drams. Its unpleasant flavour is most effectually concealed by a suitable addition of mace.—Cats are very fond of the smell of this root, and seem to be intoxicated by it.

VALERIUS MAXIMUS, a Latin historian, sprung from the families of the Valerii and Fabii, which made him take the name of *Valerius Maximus*. He studied polite literature, and afterwards followed Sextus Pompey to the wars. At his return he composed an account of the actions and remarkable sayings of the Romans and other great men; and dedicated that work to the emperor Tiberius. Many of the learned think that this is the same that is now extant and bears the

name of *Valerius Maximus*; but others maintain, that what we have now is only an abridgment of the work written by this celebrated historian, and that this abridgment was made by one Nepotian of Africa. However, this work is well written, and contains a great number of memorable examples and facts performed by the Greeks and Romans that are worthy of being read.

VALET, a French term, used as a common name for all domestic men-servants employed in the more servile offices, as grooms, footmen, coachmen, &c. But with us it is only used in the phrase *valet de chambre*, which is a servant whose office is to dress and undress his master, &c.

VALETUDINARY, among medical writers, denotes a person of a weak and sickly constitution, and frequently out of order.

VALGUS, Bow or Bandy Legged. Some children are bow-legged from their birth; others become so from setting them on their feet too early. The tibia of some is crooked; the knees of others are distorted; from a fault in the ankle, the feet of some are turned inwards, these are called *vargi*; and in others they turn outwards, these are called *valgi*. The best method of preventing these disorders in weakly children, is to exercise them duly, but not violently; by dancing or tossing them about in one's arms, and not setting them much on their feet, at least not without properly supporting them: if the disorder attends at the birth, or increases after it is begun, apply emollients, then apply boots of strong leather, wool, &c. as required to dispose the crooked legs gradually to a proper form; or other instruments may be used instead of boots; which, when not too costly, are usually to be preferred. Slighter instances of these disorders yield to careful nursing without instruments.

VALID, in law, an appellation given to acts, deeds, transactions, &c. which are clothed with all the formalities requisite to their being put into execution, and to their being admitted in a court of justice.

VALLADOLID, an ancient, large, and handsome city of Spain, in Old Castile, and capital of a principality of the same name, with a bishop's see and an university. It is surrounded with strong walls, embellished with handsome buildings, large public squares, piazzas, and fountains. It is large and populous, containing 11,000 houses, with fine long and broad streets, and large high houses, adorned with balconies. The market-place, called *El Campo*, is 700 paces in circumference, surrounded with a great number of convents, and is the place where the fairs are kept. There is another square in the middle of the city, surrounded with handsome brick houses, having under them piazzas, where people may walk dry in all weathers. Within these piazzas merchants and tradesmen keep their shops; all the houses are of the same height, being four stories; and there are balconies at every window, of iron gilt. In the whole there are 70 monasteries and nunneries; the finest of which is that of the Dominicans, remarkable for its church, which is one of the most magnificent in the city. The kings resided a long while at this place; and the royal palace, which still remains, is of very large extent, though but two stories high; within are fine paintings of various kinds, and at one of the corners a curious clock, made in the
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fame manner as that of Strasburg. The house of the inquisition is an odd sort of structure, for there are no windows, but a few holes to let in the light. The environs of the city are a fine plain, covered with gardens, orchards, vineyards, meadows, and fields. It is seated on the rivers Escurva and Pefuerga, in W. Long. 4. 1. N. Lat. 41. 42.

VALSALVA (anthony Maria), an eminent physician and anatomist, was born at Imbola in 1666, and was the disciple of Malpighi. He taught anatomy at Bologna with uncommon applause, and died in 1723. He wrote an excellent treatise on the Ear, and other works in Latin, printed at Venice, in 4to.

VALUE, in commerce, denotes the price or worth of any thing.

VALUE, in music. Sounds are either comparatively high or low, long or short. In either of these cases they may be said to have a value. In the first their value is relative to harmony, in the last to rhythmus. The value of any particular sound, considered as high or low, is the degree in which it is placed with relation to any other sound above or beneath it, ascertained by comparison.

VALVE, in hydraulics, pneumatics, &c, is a kind of lid, or cover of a tube or vessel so contrived as to open one way, but which, the more forcibly it is pressed the other way, the closer it shuts the aperture; so that it either admits the entrance of a fluid into the tube or vessel, and prevents its return; or admits its escape, and prevents its re-entrance.

VALVE, in anatomy, a thin membrane applied on several cavities and vessels of the body, to afford a passage to certain humours going one way, and prevent their reflux towards the place from whence they came.

VAMPYRE, a species of bat. See VESPERTILIO.

VAN, a term derived from the French *avant*, or *avant*, signifying before or foremost of any thing; thus we say, the van-guard of the army, &c.

VANBRUGH (Sir John), a celebrated English dramatic writer and architect, was descended of a family in Cheshire which came from France, though by his name he appears to have been originally of Dutch extraction. He was born about the middle of the reign of Charles II. and received a liberal education. His first comedy, called the *Relapse*, or *Virtus in Danger*, was acted in the year 1697 with great applause; which gave him such encouragement, that he wrote 11 more comedies. He was the friend of Mr Congreve, whose genius was naturally turned for dramatic performances; and these two gave new life to the English stage, and restored its reputation, which had been some time sinking: but their making vicious persons their most amiable and striking characters, and their bordering too much on obscenity, could be of no service to the cause of virtue; and therefore it was not without reason that they were attacked by Mr Collier, in his piece on the Immorality and Profaneness of the Stage. However, either the reputation Sir John gained by his comedies, or his skill in architecture, procured him very considerable advantages. He was appointed Clarencieux king at arms, which he afterwards disposed of. In 1716 he was appointed surveyor of the works at Greenwich hospital; he was likewise made comptroller-general of his Majesty's works, and surveyor of all the gardens and waters. He was an able architect; but his per-

formances in that way are esteemed heavy. Under his direction were raised Blenheim-house in Oxfordshire, Claremont in Surry, and his own house at Whitehall. He died of a quinsy in 1726.

VANDYCK (Sir Anthony), a celebrated painter, was born at Antwerp in the year 1599. It is said that Vandyck's mother was passionately fond of embroidery, that she excelled in it, and embroidered several historical subjects with such surprising skill, that they have been esteemed masterpieces by proficients in that art. Being desirous to have her son instructed in the first rudiments of grammar, he began by sending him to school to learn reading and writing. As he had ink, paper, and pens, at command, he amused himself more with drawing figures, and other slight sketches, than with making letters. One day his master having threatened to whip one of his school-fellows, Vandyck positively assured him, that he need not fear his master's threats, as he would take care to prevent his receiving the threatened correction.—“How so?” replied his school-fellow. “I'll paint (replied Vandyck) a face on your posterior;” which he did with such skill, that when the master drew up the curtain, he laughed so immoderately, that he forgave the culprit. After giving several early proofs of his excellent genius, he became the disciple of the illustrious Rubens. In the church of the Augustines at Antwerp, at the high altar, is a celebrated picture of Rubens, representing, in one part, the Virgin Mary sitting with the child Jesus in her lap, and in another part several saints and saintesses standing. The breast of one of these, St Sebastian, is said to have been painted by Vandyck when he was only a disciple of Rubens. This great master being engaged one day abroad, his disciples went into his painting-room, where, after having been some time employed in admiring his works, they began to play or romp in such a manner, that the breast of St Sebastian, which was not yet dry, was brushed away by a hat thrown at random. This accident put an end to their play: they were very anxious to restore it, fearing that if Rubens discovered it they should all be discarded. At length it was agreed that Anthony should undertake to mend the saint's breast. In short, taking his master's pallet and brushes, he succeeded so well, that his companions imagined Rubens would overlook it. They were mistaken; for Rubens at his return knew immediately that some one had touched upon his performance: calling his disciples, he asked them why any one had dared to meddle with his painting? They were some time doubtful whether they should confess or deny the fact. Threats at length prevailed: they owned that Vandyck had thrown his hat upon it. Upon this, closeting Vandyck, instead of chiding him, he told him, that “it was proper and even necessary for him to travel into Italy, the only school that produced excellent painters; and that, if he would take his advice, he would arrive at the highest perfection.” Vandyck replied, that “he was very desirous of it; but that his purse was not equal to such a journey, and that he feared he should be obliged to sell his hat on the road.” Rubens assured him that that should be his concern; and accordingly, a few days after, he made him a present of a purse full of pistoles, and added to that gift a dapple grey horse, of great beauty, to carry him thither. In return for this, Vandyck painted his

Vandyck-

Vandyck. master a chimney-piece; and afterwards set out for Italy, about the year 1621, being then about 23 or 22 years of age. Having staid a short time at Rome, he removed to Venice, where he attained the beautiful colouring of Titian, Paul Veronese, and the Venetian school, which appeared from the many excellent pictures he drew at Genoa.

After having spent a few years abroad, he returned to Flanders, with so noble, so easy and natural a manner of painting, that Titian himself was hardly his superior; and no other master could equal him in portraits. Soon after his return, he accidentally met with D. Teniers, who accosted him with great politeness, and asked him whether he had much business since he came from Rome? "What business, think you, can I have had time to do?" (replied Vandyck), "I am only just arrived here. Would you believe, that I offered to draw that fat brewer's picture who just passed by us for two pistoles, and that the looby laughed in my face, saying it was too dear? I assure you, that if the cards do not turn up better, I shall make no long stay at Brussels." Soon after this, he painted those two famous pictures, the Nativity, and a dying Christ; the first in the parish church, the second in that of the Capuchins, at Termond.

When he was in Holland he was very desirous to see Francis Hals the painter, who had great reputation then for portraits. On entering his room, he asked to have his picture drawn. Hals, who knew Vandyck only by fame, undertook it, and went to work. The latter seeing his head finished, rose up, saying, that it was a striking likeness. Afterwards he proposed to Hals, that if he would sit in return, he would also draw his picture; to which Hals having agreed, merely from curiosity, exclaimed, on seeing his picture so soon finished, "Thou art the devil, or else Vandyck." This picture of Hals has been engraved by Colter, at the Hague.

Vandyck finding he could not make a fortune in his own country, took a resolution of going over into England. Accordingly he borrowed some guineas of Teniers, and set out, furnished with letters of recommendation. His superior genius soon brought him into great reputation; and above all, he excelled in portraits, which he drew with an inconceivable facility, and for which he charged a very high price, according to the instructions which had been given him on that head. It is affirmed, that for some of them he received 400 guineas apiece. He soon found himself loaded with honours and riches; and as he had a noble and generous heart, he made a figure suitable to his fortune. He married one of the fairest ladies of the English court, a daughter of the lord Rutliven, earl of Gowry; and, though she had but little fortune, maintained her with a grandeur answerable to her birth. He himself was generally richly dressed; his coaches and equipage were magnificent, and his retinue was numerous. His table was elegant, and plentifully furnished; and he often entertained his guests after dinner with a concert performed by the best English musicians of London. In short, his house was so frequented by persons of the greatest quality of both sexes, that his apartments rather resembled the court of a prince than the lodgings of a painter. Notwithstanding this expence, he amassed great wealth; when a chemist had

the art to infuse himself into his esteem, and inspired him with a desire of converting copper into gold; but the secret had no other effect, than making him convert his gold into smoke. Rubens being informed of it, wrote to his disciple: he acknowledged his error, and corrected it. At length Vandyck being at an early age subject to the gout, it undermined him by degrees, and carried him to the grave in the year 1641, at the age of 42. He was buried in St Paul's; and left to his heirs a considerable estate, which some have made to amount to 40,000*l.* sterling.

VANE, a thin slip of bunting hung to the mast-head, or some other conspicuous place in the ship, to show the direction of the wind. It is commonly sewed upon a wooden frame called the *stock*, which contains two holes whereby to slip over the spindle, upon which it turns about as the wind changes.

VANILLA, or **VANILLO**. See **EPIDENDRUM**.

VAPOUR, in philosophy, the particles of bodies rarified by heat, and thus rendered specifically lighter than the atmosphere, in which they rise to a considerable height. See **EVAPORATION**, **DAMP**, **GAS**, &c.

Many kinds of vapour are unfriendly to animal life, but the most noxious are those which arise from metallic substances. In the melting and refining of lead, a white vapour arises, which, falling upon the grass in the neighbourhood, imparts a poisonous quality to it, so that the cattle which feed there will die; and in like manner stagnant waters impregnated with this vapour will kill fish. Phlogistic vapours are also extremely noxious; and hence painters, and others who are exposed to these vapours, are generally unhealthy. In some places the earth exhales vapours of a very noxious quality; such as the Grotto del Cani, and other places in Italy, where a mephitic vapour constantly hovers over the surface of the ground, proving instantly fatal to such animals as are immersed in it. But the most formidable kind of vapours are those which issue from the mouths of volcanoes, and which seem to be a combination of all others, joined to such a quantity of electric matter as to produce the greatest mischiefs. In some parts of the world there have been instances of people killed, and almost torn to pieces, by a vapour suddenly bursting out of the earth under their feet.

Of the aqueous vapour raised from the earth by the sun's heat are formed the clouds; but though these are commonly at no great height from the earth, we cannot from thence determine the height to which the vapours ascend. Indeed, considering the great propensity of water, and even quicksilver, to evaporate in the most perfect vacuum we can make, it is by no means probable that any limit can be fixed for this ascent.

VAPOURS, in medicine, a disease properly called *hype*, or the *hypochondriacal disease*; and in men particularly, the *spleen*. See **MEDICINE**, n° 385.

VARENIVS (Augustus), a famous Lutheran divine, was born in the duchy of Lunenburg in 1620. He became so well skilled in the Hebrew tongue, that he was considered in Germany as the best skilled in that language of all the Protestants, except the Buxtorfs; and he had such a prodigious memory, that he knew the Hebrew text of all the Old Testament by heart. He wrote a Commentary on the prophecy of Isaiah, and many other works.

He ought not to be confounded with *Bernard Varenivus*,

rentur, a Dutchman and an able physician, who wrote an esteemed geographical treatise, intitled *Geographia universalis, in qua Affectiones generales Telluris explicantur*, which was translated by Sir Isaac Newton.

VARI, in medicine, little, hard, and ruddy tumours, which frequently infect the faces of young persons of a hot temperament of body.

VARIATION, the angle contained between the true meridian and the magnetic meridian.

After the discovery of that most useful property of the magnet, or loadstone, namely, the giving hardened iron and steel a polarity, the compass was for many years used without knowing that its direction in any wife deviated from the poles of the world: and about the middle of the 16th century, so certain were some of its inflexibly pointing to the north, that they treated with contempt the notion of the variation, which about that time began to be suspected. However, careful observations soon discovered, that in England and its neighbourhood, the needle pointed to the eastward of the true north: but the quantity of this deviation being known, mariners became as well satisfied as if the compass had none; because they imagined that the true course could be obtained by making allowance for the true variation.

From successive observations made afterwards, it was found, that the deviation of the needle from the north was not a constant quantity, but that it gradually diminished; and at last, about the year 1660, it was found at London that the needle pointed due north, and has ever since been getting to the westward; and now the variation is more than 20° to the westward of the north: so that in any one place it may be suspected the variation has a kind of libratory motion, traversing through the north to unknown limits eastward and westward. But the settling of this point must be left to time.

During the time of the said observations it was also discovered, that the variation of the needle was different in different parts of the world, it being west in some places when it was east in others; and in places where the variation was of the same name, yet the quantity of it greatly differed. It was therefore found necessary, that mariners should every day, or as often as they had opportunity, make during their voyage proper observations for an amplitude or azimuth; whereby they might be enabled to find the variation of the compass in their present place, and thence correct their courses.

Dr Halley published in the last century a theory of the variations of the compass. In this work he supposes there are four magnetic poles in the earth; two of which are fixed and two moveable, by which he explains the different variation of the compass at different times in the same place. But it is impossible to apply exact calculations to so complicated an hypothesis. M. Euler, son of the celebrated geometrical of that name, has however shown, that two magnetic poles placed on the surface of the earth will sufficiently account for the singular figure assumed by the lines which pass through all the points of equal variation in the chart of Dr Halley.

M. Euler first examines the case wherein the two magnetic poles are diametrically opposite; second, he places them in the two opposite meridians, but at un-

equal distances from the poles of the world; third, he places them in the same meridians. Finally, he considers them situated in two different meridians. These four cases may become equally important; because, if it is determined that there are only two magnetic poles, and that these poles change their situations, it may sometime hereafter be discovered that they pass through all the different positions.

Since the needle of the compass ought always to be in the plane which passes through the place of observation and the two magnetic poles, the problem is reduced to the discovery of the angle contained between this plane and the plane of the meridian. M. Euler, after having examined the different cases, finds that they also express the earth's magnetism, represented in the chart published by Messrs. Mountain and Dodson in 1744, particularly throughout Europe and North America, if the following principles are established.

Between the arctic pole and the magnetic pole $14^{\circ} 53'$.

Between the antarctic pole and the other magnetic pole $29^{\circ} 23'$.

$53^{\circ} 18'$ the angle at the north pole, formed by the meridian's passing through the two magnetic poles.

250° the longitude of the meridian, which passes over the northern magnetic pole.

As the observations which have been collected with regard to the variation are for the most part loose and inaccurate, it is impossible to represent them all with precision; and the great variations observed in the Indian Ocean seem to require, says M. Euler, that the three first quantities should be 14, 35, and 65 degrees. In the mean time, the general agreement is sufficiently satisfactory.

The high reputation of Dr Halley's magnetical chart renders it more particularly necessary to point out the errors contained therein. There is evidently too little distance between the lines of no variation, of which one crosses the equator 17° westward of London, and the other 119° to the eastward. This makes 136° only; whereas it should necessarily exceed 180, and even 200, inasmuch as the pole of the world is supposed further distant from the magnetic pole towards the south than in the north, as is required by the other phenomena. Again, upon the coasts discovered by Diemen, there was no variation in 1642; and Dr Halley also supposes there was none in 1700. Meanwhile, by the alteration observed at Paris, the line of no variation should be advanced 60° towards the south, which will agree better with the calculations, and prove that the distance of the two intersections was really greater than Dr Halley had established.

The table of variation of Messrs. Mountain and Dodson is accompanied with several intertelling particulars, which equally deserve to be inserted here.

At Barbadoes (says Captain Snow), the variation seems very nearly at a stand: for in the road I observed 5° east; and by Dr Halley's draught, in the year 1701, $5\frac{1}{2}^{\circ}$. In 1747, at Port Royal keys, Jamaica, I observed the variation $7^{\circ} 20' E.$; and on the coast of Carthage, the same week, off the high land of Santa Martha, $7^{\circ} 45'$ nearly south of Port Royal. Therefore these curves are not much altered: the curve at Jamaica is nearly at a stand, as though tied, and the fourth part of them with the rest dropping to the westward.

Variation
||
Variety.

Under the equator, in longitude 40° E. of London, the highest variation during the whole 56 years appears to be $17^{\circ} \frac{1}{2}$ W. and the least $16^{\circ} \frac{1}{2}$ W.: and in latitude 15° N. longitude 60° W. from London, the variation has been constantly 5° E. But in other places the case has been widely different. For in the latitude of 10° S. longitude 60° E. from London, the variation has decreased from 17° W. to $7^{\circ} \frac{1}{2}$ W.; and in latitude 10° S. longitude 5° W. from London, from $20^{\circ} \frac{1}{2}$ W. to $12^{\circ} \frac{1}{2}$ W.; and in latitude 15° N. longitude 20° , it has increased from 1° W. to 9° W.

But there is still a more extraordinary appearance in the Indian sea. For instance, under the equator:

LONGITUDE MAGNETICAL VARIATION		
E. from London.	in 1700.	in 1756.
Degrees.	Degrees.	Degrees.
40 ———	$16\frac{1}{2}$ West.	$16\frac{1}{2}$ West.
45 ———	$17\frac{1}{2}$ W.	$14\frac{1}{2}$ W.
50 ———	$17\frac{1}{2}$ W.	$11\frac{1}{2}$ W.
55 ———	$16\frac{1}{2}$ W.	$8\frac{1}{2}$ W.
60 ———	$15\frac{1}{2}$ W.	6 W.
65 ———	$13\frac{1}{2}$ W.	$4\frac{1}{2}$ W.
70 ———	$11\frac{1}{2}$ W.	$3\frac{1}{2}$ W.
75 ———	$9\frac{1}{2}$ W.	1 W.
80 ———	$7\frac{1}{2}$ W.	$0\frac{1}{2}$ East.
85 ———	$5\frac{1}{2}$ W.	$1\frac{1}{2}$ E.
90 ———	$4\frac{1}{2}$ W.	1 E.
95 ———	$3\frac{1}{2}$ W.	$0\frac{1}{2}$ West.
100 ———	$2\frac{1}{2}$ W.	1 W.

Where the west variation, in the longitude 40° E. is the same in both the above years; and in 1700 the west variation seemed to be regularly decreasing from longitude 50° E. to the longitude 100° E.: but in 1756, we find the west variation decreasing so fast, that we have east variation in the longitude 80° , 85° , and 90° E. and yet in the longitude 95° and 100° E. we have west variation again.

To these remarks may be subjoined the following extracts from the *Exposition du calcul astronomique*, by M. de la Lande.

“ At the royal observatory in Paris, a magnetical needle of four inches deviated from the N. $18^{\circ} 10'$ towards the west, on the 15th of February 1759: and on the 22d of April 1760, the same needle varied $18^{\circ} 20'$. It is indeed natural to conceive, that nothing can be precisely ascertained by $10'$ upon a circle whose diameter is only four inches. It is nevertheless sufficiently evident, that this variation continues to increase at Paris. In 1610 the needle declined 8° towards the east, so that the variation has changed $26^{\circ} 20'$ in the space of 150 years; and this appears particularly since 1740: for the same needle, which has always been used by M. Maraldi, is more than 3° advanced towards the west, beyond what it was at that period; and this makes $9'$ in one year.”

VARIETY, a change, succession, or difference, in the appearance or nature of things; in opposition to uniformity. See UNIFORMITY and Variety.

VARIETY, in botany, a plant changed by some accidental cause, which being removed, the variety or mutation disappears, and the species is restored. As many plants of different form and appearance as are produced from seed of the same species, are to be regarded as genuine varieties, and in all cases to be distinguished with great accuracy from the species.

In the form and disposition of the parts of each individual of the same species, there exists, in general, a constant uniformity. Different causes, however, as culture, climate, exposure, age, diseases, luxuriance or poverty of nourishment, contusions, and other circumstances, produce monstrous appearances and accidental varieties in the parts of plants.

It is known, that a superabundance of nourishment gives rise to the numerous tribe of double and prolific flowers: the same cause gives to all the parts of the plant a thickness and extent by no means natural to them. Hence, likewise, the prodigious multiplication of the leaves of some plants, which increase to such a degree, as frequently to injure the flower and fruit.

The leaves of young trees and of new shoots are much larger, and less cut and ramified, than those of a grown tree of the same species. In holly, the leaves lose their prickles when the tree waxes old.

The lower leaves of aquatic plants, as cress-foot and water-drop-wort, are frequently finely cut like hairs, whilst those above are of a different form. Plants of the same species that grow in another soil have no diversity in the form of their upper and under leaves.

Again, in mountainous plants, the lower leaves are generally more entire; the upper ones more divided. Burnet, laxifrage, anise, and coriander, furnish examples.

The seeds or grains of many grasses, particularly of rye, are sometimes prolonged into a horny appearance of a fungous substance, that is pretty hard, and as it were cartilaginous. Some of these monstrous productions are more than two inches long. Rye diseased in this manner, is frequently attended with fatal consequences to such as eat of the bread prepared from it. The same appearance has been observed in *gramen aquaticum fluitans*, and carex. This disease, termed by Linnaeus *clavus*, is common in moist years and rainy seasons, and seems to be principally owing to a defect of perspiration.

The flowers and seeds of many of the esculent grasses, and some other plants, are frequently reduced into a black powder. This appearance has been particularly observed in wheat, rye, barley, oats, pericaria, mariscorzonera, goats-beard, foxtail, and some of the lychnis, pink, and chick-weed tribe. In the greater number, the disease, when it attacks the flower, begins by the receptacle under the form of small black points, which insensibly reach the other parts of the flower; as the flower-cup, petals, and stamina, without attacking the pistil or female organ, which however commonly proves abortive.

The disease termed *ustilago*, or burning, differs from that just mentioned, in that it is contagious and hereditary; the seeds being the only parts that are affected by it. It has been discovered in the same species of grasses as the former, but more abundantly on Indian millet. M. Aymen, a French academician, attributes both these diseases to an internal fault in the sap.

The upper surface of the leaves of some plants, particularly of hop, melon, dead-nettle, hedge-nettle, maple, and gromwell, is subject to be covered with a white appearance, which makes the leaves seem thicker, more weighty, and more opaque. Plants which are attacked by this disease, termed by botanists *erysiphe*, rarely produce any fruit; or if they do, it is badly formed.

Variety.

Variety. formed, and has a crude disagreeable taste.

On the under surface of the leaves of ladies mantle, and a species of euphorbia with cypress leaves, is occasionally dispersed a yellowish dust, which, from its resemblance to rusty iron, has occasioned the name of *rustigo*, or *rust*, to be given to this particular disease; which, like the former, appears to proceed from a defect of perspiration.

White spots are frequently observed on some leaves, which thence appear empty, and as it were transparent: it is occasioned by the influence of a burning sun acting upon them when very much moistened, either in consequence of continued rain or a strong dew. When all the leaves are attacked with this disease, which has obtained the name of *candor*, that is, "the whites," the plant commonly perishes a few days after.

Certain plants of warm climates are subject to lose their petals when cultivated in cold countries; and that even when the fruit arrives at maturity.

Plants which grow in the shade, or in places that are deprived of a proper current of air, are apt to become meagre, and, without taking the consilience which is suitable, to perish before they have produced any fruit. Experiments demonstrate, that the feebleness of such plants proceeds less from a defect of heat, than from a privation of light.

Other causes alter the colour of leaves, and occasionally produce the beautifully variegated leaves so much in request among gardeners. Some leaves are subject to assume a deep red; this is particularly the case with herb Robert, a species of crane's bill.

The branches of ash and willow are frequently flattened in several irregular ways. This is supposed to be in consequence of two buds being naturally grafted in each other before the unfolding of the branch. Two leaves, two fruits, engrafted in this manner, produce other monstrous appearances. By means of artificial grafting, we may in like manner vary the form of leaves, stems, flowers, and fruit.

Lastly, certain insects depositing their eggs under the bark of the leaves and stems of several plants, occasion an extravasation of the sap; and hence give birth to certain singular productions, which in different bodies resemble either nuts, mushrooms, or sponges; and are either round or long, hard or soft, covered with leaves, or guarded with bristly threads.

Such are the galls of oak, which enter into the composition of ink; those of elm, lime, cistus, ground-ivy, a species of hawk-weed, the aspen-tree, and several species of willow. Those of a species of sage, called *felicia bacifera*, are sold in the markets of the Levant by the name of *sage-apples*. Tournefort relates that they are round, nine or ten lines in diameter; of the colour of ashes, cottony, with a white pulp that is somewhat transparent, sweet, and of a very agreeable taste. Those of the scarlet-oak are two lines in diameter; the substance is very red, and being dried, is the kermes, or scarlet-paleil, so well known by the dyers.

Of the same nature with the galls just mentioned, are those strange bodies covered with green, red, or yellow fibres, termed *bedeguar*, which a fly of the same kind produces upon the wild rose: such are likewise the small bladders on the surface of the elm-leaves, which are filled with gnats, and with an alluring balsmy liquor that is an excellent vulnerary.

Such are the principal accidents to which the parts of plants are subject, and which give rise to the numerous tribes of varieties in the vegetable kingdom.

VARIOLA, the SMALL-POX. See MEDICINE, n° 326—328.

VARIX, in medicine, the dilatation of a vein, arising from the too great abundance or thickness of the blood. See SURGERY, n° 14, *et seq.*

VARNISH, a thick, viscid, shining liquor, used by painters, gilders, and various other artificers, to give a gloss and lustre to their works; as also to defend them from the weather, dust, &c.

There are several kinds of varnishes in use, and many receipts have been published for the preparation of them; but very few of these can be depended on. The following are extracted from Dr Lewis's Commerce of Arts, and seem to be well authenticated.

1. *Gold-coloured Varnish, or Lacquer*.—Silver, coated with a transparent gold-coloured varnish, is made to resemble gold so exactly, as wholly to supply the place of gold in some of the works called *gilt*. The basis of the varnish, or what gives adhesiveness and glossiness to the colouring matter, is a solution of lac made in spirit of wine.

Stick-lac is only to be used for varnishes: what is called *shell-lac*, or the grains formed into plates by melting them in boiling water, does not answer so well. The spirit must be highly rectified, or freed as much as possible from any admixture of phlegm or water *. * See Dissolution, n° 6. Some seed-lac, reduced into fine powder, is then added to it, in the proportion of about three ounces to a pint: the vessel being set in a moderate warmth for 24 hours and frequently shaken, a part of the lac dissolves; and the spirit, now tinged of a reddish brown colour, is strained off from the undissolved part, and set by for a day or two to settle. The digestion should be performed in a wide-mouthed vessel, covered so as to prevent the exhalation of the spirit: the undissolved lac softens into a viscous mass, so as scarce to be got out through a narrow aperture.

In different portions of the foregoing solution, poured off clear after the straining and settling, some gamboge and annatto are dissolved separately; the gamboge communicates a high yellow colour, and the annatto a deep reddish yellow. The solution of the gamboge is mixed with about half its quantity of that of the annatto, and trial made of the mixture on some silver leaf: if the colour inclines too much to the yellow or the red, more of the one or the other liquor is added till the true golden colour is obtained. There are sundry other materials, from a due mixture of which a like colour may be produced; such as turmeric, saffron, dragon's-blood, &c.

The silver leaf being fixed on the subject, in the same manner as gold leaf, by the interposition of proper glutinous matters, the varnish is spread upon the piece with a brush or pencil. The first coat being dry, the piece is again and again washed over with the varnish till the colour appears sufficiently deep. What is called *gilt leather*, and many picture-frames, have no other than this counterfeit gilding. Washing them with a little rectified spirit of wine affords a proof of this; the spirit dissolving the varnish, and leaving the silver leaf of its own whiteness. For plain frames, thick tin-leaf may be used instead of silver. The tin-leaf, fixed on the

Variola
H
Varnish.

Varnish.

the piece with glue, is to be burnished, then polished with emery and a fine linen cloth, and afterwards with putty applied in the same manner: being then lacquered over with the varnish five or six times, it looks very nearly like burnished gold. The same varnish, made with a less proportion of the colouring materials, is applied also on works of brass; both for heightening the colour of the metal to a resemblance with that of gold, and for preserving it from being tarnished or corroded by the air.

2. *Spirit Varnish*. Black varnish, for japanning on wood or leather, is prepared by mixing lamp-black or ivory-black with a proper quantity of a strong solution of gum lac in spirit of wine, such as that above-described. The lamp-black is commonly preferred to the ivory-black, on account of its uniting better with the fluid, and working smoother. The thicker part of the varnish, which settles at the bottom, is used with the lamp-black for the first coatings, and the mixture applied at different times, in a hot room, one layer after another is dry, till a full body of colour is obtained: after which the piece is washed over in the same manner, several times, with the finer part of the varnish, just tinged with the black, so as to make a coating of sufficient thickness to bear polishing with tripoli.

3. *Amber Varnishes for Papier Maché, &c.* Papier maché is made of cuttings of white or brown paper, boiled in water, and beaten in a mortar, till they are reduced into a kind of paste; and then boiled with solution of gum-arabic or of size, to give tenacity to the paste, which is afterwards formed into different toys, &c. by pressing it into oiled moulds. When dry, it is done over with a mixture of size and lamp-black, and afterwards varnished. The black varnish for these toys is prepared as follows. Some colophony, or turpentine boiled down till it becomes black and friable, is melted in a glazed earthen vessel, and thrice as much amber in fine powder sprinkled in by degrees, with the addition of a little spirit or oil of turpentine now and then: when the amber is melted, sprinkle in the same quantity of sarcocolla, continuing to stir them, and to add more spirit of turpentine, till the whole becomes fluid; then strain out the clear through a coarse hair-bag, pressing it gently between hot boards. This varnish, mixed with ivory-black in fine powder, is applied, in a hot room, on the dried paper paste; which is then set in a gently heated oven, next day in a hotter oven, and the third day in a very hot one, and let stand each time till the oven is grown cold. The paste thus varnished is hard, durable, glossy, and bears liquors hot or cold.

A more simple amber-varnish, of great use for many purposes, and said to be the basis of the finer varnishes which we see on coaches, &c. is prepared, by gently melting the amber in a crucible till it becomes black; then reducing it into a powder, which looks brown; and boiling the powder in linseed oil, or in a mixture of linseed oil and oil of turpentine. Drying oil is commonly made choice of by the workmen; but it seems more eligible here to take the oil unprepared, that the boiling requisite for giving it the drying quality may be employed at the same time in making it act upon the amber.

By the previous melting of the amber, its nature is

changed, and part of its oily and saline matter expelled, as happens in the common distillation of it. When the distillation is not far protracted, the caput mortuum, or shining black mass which remains in the retort, answers as well as the amber melted on purpose. Hence some of our chemists, instead of urging the distillation to the utmost, by which the amber would be reduced to a mere coal, find it more advantageous to discontinue the process when the thinner oil and greater part of the salt have arisen, that the remaining mass may be in great measure soluble in oils, so as to supply the common demand of the varnish-makers.

It has generally been thought, that amber will not at all dissolve in oils till it has thus suffered a degree of decomposition by fire. Hoffmann relates an experiment in his *Observations Physico-chemicae*, which discovers the solubility of this concrete in its natural state. Powdered amber, with twice its quantity of oil-olive, was put in a wide-mouthed glass, and a digester, or strong copper vessel, being filled about one-third with water, the glass was placed in it, the cover of the digester screwed down tight, and a moderate fire continued an hour or more: when cold, the amber was found dissolved into a gelatinous transparent mass.

In Dr Stockar's very curious *Specimen inaugurale de succino*, printed at Leyden in 1760, there are sundry more important experiments on this subject, made by himself and Mr Ziegler of Winterthur. They found, that by continuing a simmering heat 12 hours, and confining the vapour as much as stone-ware vessels would bear without bursting (the danger of which was avoided by making a small notch in the cork-stoppers) powdered amber dissolved perfectly in expressed oils, in turpentine, and in balsam of copaiba: a strong copper vessel, with a cover screwed on it, seems most eligible, and for the greater security, a valve may be made in the cover, kept down by a spring that shall give way before the confined vapour is of sufficient force to be in any danger of bursting the vessel. Though such a heat as converts part of the oil into strong elastic vapours, and the forcible compressure of the vapour, are expedient for hastening the dissolution, they do not appear to be essentially necessary; for by digestion for a week in close-stopped glass-vessels, in which the compressure could not be very great, solutions equally perfect were obtained.

The solution in rape-seed oil, and in oil of almonds, was of a fine yellowish colour; in linseed-oil, gold-coloured; in oil of poppy-seeds, yellowish red; in oil olive, of a beautiful red; in oil of nuts, deeper coloured; and in oil of bays, of a purple red. It is observable that this last oil, which of itself, in the greatest common heat of the atmosphere, proves of a thick butyraceous consistence, continued fluid when the amber was dissolved in it. The solutions made with turpentine, and with balsam of copaiba, were of a deep red colour, and on cooling hardened into a brittle mass of the same colour. All the solutions mingled perfectly with spirit of turpentine. Those made with the oils of linseed, bays, poppy-seeds, and nuts, and with balsam of copaiba and turpentine, being diluted with four times their quantity of spirit of turpentine, formed hard, tenacious, glossy varnishes, which dried sufficiently quick, and appeared greatly preferable to those made in the common manner from melted amber.

Varnish.

Varnish.

See Gilding, n^o 5.

4. *Varnish for Metals.* Iron snuff boxes, mourning-buckles, &c. are coloured black, by making them considerably hot, and applying on them in this state a thick mixture of lamp black, with a certain varnish called *gold size*. There is a *gold size* used for gilding, or fixing gold leaf on wood, &c. † The size here meant is a composition of a different kind, consisting of drying oil, turpentine, and the pigment called *Naples yellow*; which last ingredient is used for giving a high gold colour to the mixture, to fit it for some of the other purposes for which it is employed.

The workmen are said frequently to employ for this purpose a mixture of lamp-black with the scummings, &c. of different oil-paints: the mixture is applied with a pencil, and the piece afterwards baked in an oven, with a heat somewhat greater than that used for the papier mache. Naples yellow, a superfluous ingredient in the black varnish, is the basis of the dark brown which we see on some iron snuff-boxes, this pigment changing to a brown in baking with the varnish.

Laying on of VARNISHES. 1. If you varnish wood, let your wood be very smooth, close-grained, free from grease, and rubbed with rushes. 2. Lay on your colours as smooth as possible; and if the varnish has any blisters in it, take them off by a polish with rushes. 3. While you are varnishing, keep your work warm, but not too hot. 4. In laying on your varnish, begin in the middle, and stroke the brush to the outside; then to another extreme part, and so on till all be covered; for if you begin at the edges, the brush will leave blots there, and make the work unequal. 5. In fine works, use the finest tripoli in polishing: do not polish it at one time only; but after the first time, let it dry for two or three days, and polish it again for the last time. 6. In the first polishing you must use a good deal of tripoli, but in the next a very little will serve: when you have done, wash off your tripoli with a sponge and water: dry the varnish with a dry linen-rag; and clear the work, if a white ground, with oil and whiting; or if black, with oil and lamp-black.

VARNISH also signifies a sort of shining coat, where-with potter's ware, delft-ware, china-ware, &c. are covered, which gives them a smoothness and lustre. Melted lead is generally used for the first, and smalt for the second. See GLAZING.

VARNISH, among medalists, signifies the colours antique medals have acquired in the earth.

The beauty which nature alone is able to give to metals, and art has never yet attained to counterfeit, enhances the value of them: that is, the colour which certain soils in which they have a long time lain tinges the metals withal; some of which are blue, almost as beautiful as the turquoise; others with an inimitable vermilion-colour; others with a certain shining polished brown, vastly finer than Brasil figures.

The most usual varnish is a beautiful green, which hangs to the finest strokes without effacing them, more accurately than the finest enamel does on metals.

No metal but brass is susceptible of this; for the green rust that gathers on silver always spoils it, and it must be got off with vinegar or lemon juice.

Falsifiers of medals have a false or modern varnish, which they use on their counterfeits, to give them the appearance or air of being antique. But this may be discovered by its softness; it being softer than the

natural varnish, which is as hard as the metal itself.

Some deposit their spurious metals in the earth for a considerable time, by which means they contract a sort of varnish, which may impose upon the less knowing; others use sal armoniac, and others burnt paper.

VARRO (MARCUS TERENTIUS), the most learned of all the Romans, was born 28 B. C. He was a senator of the first distinction, both for birth and merit; and bore many great offices. He was an intimate friend of Cicero; and this friendship was confirmed and immortalized by a mutual dedication of their learned works to each other. Thus Cicero dedicated his *Academic Questions* to Varro; and Varro dedicated his treatise on the Latin tongue to Cicero. In the civil wars he was zealously attached to Pompey; but after his defeat soon submitted to Cæsar, who was reconciled to him. From thence he applied his whole time to letters, and had the charge of the Greek and Latin libraries at Rome. He was above 70 when Antony proscribed him; however, he found means to escape and save his life, though he could not save some of his works and his library from being plundered by the soldiers. After this storm was over, he pursued his studies as usual; and Pliny relates, that he continued to study and to write when he was 88 years of age. He was 80 when he wrote his three books *De re Rustica*, which are still extant. Five of his books *De lingua Latina*, which he addressed to Cicero, are also extant. There remain, too, divers fragments of his works, particularly of his Menippean Satires, which are medleys of prose and verse; and Scaliger has collected some of his epigrams from among the *Catalecta Virgilii*. His books *De lingua Latina*, and *De re Rustica*, were printed with the notes of Joseph Scaliger, Turnebus, and Victorius, by Henry Stephens at Paris, 1573, in 8vo, and have been published separately since among the *Auctores de lingua Latina*, and the *Auctores de re Rustica*.

There was another Varro of antiquity, called *Atacinus*, who was born about ten years after the first, at a small town near Narbonne. Though infinitely below the Roman in learning, he was at least as good, if not a better, poet; which perhaps has made Lilius Gyraldus and other critics confound them. He composed many works in verse; some fragments of which were collected, and published with those of other ancient poets, at Lyons in 1603. His chief works were, *A poem on the war with the Sequani*, a people of Gaul; and the *Astronomics*, that went under the name of Planciades the grammarian. But the *Argonautics*, in four books, was what gained him the greatest reputation: and though indeed nothing but a translation of Apollonius Rhodius, yet was so well done, as to be commended by Quintilian.

VASCULAR, something consisting of divers vessels, as arteries, veins, &c.

VASE, a term frequently used for ancient vessels dug from under ground, or otherwise found, and preserved in the cabinets of the curious. In architecture, the appellation *vase* is also given to those ornaments placed on corniches, foehes, or pedestals, representing the vessels of the ancients, particularly those used in sacrifice, as incense-pots, flower-pots, &c.

VASSAL, in our ancient customs, signified a tenant or feudatory; or person who vowed fidelity and homage

Varro

Vassal.

Vedicam
||
Vedam.

homage to a lord, on account of some land, &c. held of him in fee; also a slave or servant, and especially a domestic of a prince. *Vassallus* is said to be *quasi inferior socius*; as the vassal is inferior to his master, and must serve him; and yet he is in a manner his companion, because each of them is obliged to the other. See *FEDAL System*.

VATICAN, a magnificent palace of the pope, in Rome, which is said to consist of several thousand rooms: but the parts of it most admired are the grand stair-case, the pope's apartment, and especially the library, which is one of the richest in the world, both in printed books and manuscripts.

VAUBAN (Sebastien le Prestre, seigneur de), marshal of France, and the greatest engineer that country ever produced, was born in 1633. He displayed his knowledge of fortification in the course of many sieges, and his services were rewarded with the first military honours. He was made governor of Lille in 1668, commissary-general of the fortifications of France in 1678, governor of the maritime parts of Flanders in 1689, and a marshal of France in 1703. He died in 1707, after having brought the arts of attacking and defending fortified places to a degree of perfection unknown before. His writings on these subjects are in the highest esteem.

VAULT, in architecture, an arched roof, so contrived that the stones which form it sustain each other.

Vaults are on many occasions to be preferred to soffits or flat ceilings, as they give a greater height and elevation, and are besides more firm and durable.

VAYER. See *MOTHE*.

UBES (St.), a sea-port town of Portugal, in the province of Estremadura, seated on a bay of the Atlantic Ocean, 21 miles south of Lisbon. It stands on an eminence, with a very strong castle built on a rock. The soil about it is fertile in corn, wine, and fruits; and it is furnished with good fish from the sea, and a small lake in the neighbourhood. Here they make great quantities of fine salt, which is carried to the American plantations. E. Long. 9. 30. N. Lat. 38. 36.

UBIQUITARIANS, in church-history, a sect of heretics who sprung up in Germany about the year 1590, and maintained that the body of Christ is *ubique*, "everywhere," or in every place, at the same time. However, they were not quite agreed among themselves; some holding that the body of Jesus Christ, even during his mortal life, was every where; and others dating the ubiquity of his body from the time of his ascension only.

UBIQUITY, OMNIPRESENCE; an attribute of the Deity, whereby he is always intimately present to all things; gives the *esse* to all things; knows, preserves, and does all in all things.

UDDER, in comparative anatomy, that part in brutes wherein the milk is prepared, answering to the mammae, or breasts, in women. See *COMPARATIVE Anatomy*, n° 42.

VEDAM, among the Indian Bramins or Brachmans, is the book of their law, containing all that they are to believe and practise. See *BRACHMANS*.

The vedam is written in what they call the *Samskrtan tongue*, which is understood by such of the Bramins as never traffic. It is divided into four parts; namely, 1st, *Rogo-Vedam*, which treats of the first cause, of

the first matter, of the angels, of the soul, of rewards and punishments, of the generation and corruption of creatures, of sin, and in what manner it may be re-mitted, &c. 2d, *Iffoure-Vedam*, which treats of the powers that prelide over and govern all things. 3d, *Sama-Vedam*, containing a system of morality. And, 4th, *Addaravana-Vedam*, which treated of the religious ceremonies, temples, sacrifices, and feasts: but this last part has been lost for many years; and to this the Bramins impute the diminution of their honours, and the powers they formerly enjoyed. This book is of indisputable authority among them: but as they used frequently to dispute about interpreting it, the sense of it has been fixed by the jastiras or declarations.

VEDETTE, in war, a sentinel on horseback, with his horse's head towards the place whence any danger is to be feared, and his carabine advanced, with the butt-end against his right thigh. When the enemy has encamped, there are vedettes posted at all the avenues, and on all the rising grounds, to watch for its security.

The vedettes to the out-posts should always be double, for the following reasons: First, that whenever they make any discovery, one may be detached to the commanding officer of the out-posts; secondly, that they may keep each other watchful; and thirdly, that the vigilance of both may render it impossible for any thing to come near them without being seen. They should be at no greater distance from their detachment than 80 or 100 paces.

To VEER and HAUL, to pull a rope tight, by drawing it in and slackening it alternately, till the body to which it is applied acquires an additional motion, like the increased vibrations of a pendulum, so that the rope is straitened to a greater tension with more facility and dispatch. This method is particularly used in hauling the bowlines.

The wind is said to veer and haul when it alters its direction, and becomes more or less fair. Thus it is said to veer ast and to haul forward.

VEER, *Ter-Veer*, anciently *Camp-Veer*, a town of Zealand in the United Provinces, standing at the mouth of the East Schelde, about four miles from Middleburgh, and eight from Flushing. Veer, in Dutch, signifies a passage or ferry over an arm of the sea or a river; and as there was once a ferry here over the Schelde to the village of Compen, on the island of North Beveland, the town thereby got the name of *Veer*, *Camp-Veer*, and *Ter-Veer*. It is well fortified, and enjoys a good trade, especially to Scotland; the natives of which enjoy particular privileges here. The harbour is very good, and the arsenal the best furnished in the world. The Calvinists alone are allowed the public exercise of their religion in this town. Hence the Veres, anciently earls of Oxford, are said to have derived both their origin and name.

VEERING, the operation by which a ship, in changing her course from one board to the other, turns her stern to windward. Hence it is used in opposition to *TACKING*, wherein the head is turned to the wind and the stern to leeward.

Thus a ship, having made the necessary dispositions to veer, bears away gradually before the wind, till it blows obliquely upon the opposite side, which was formerly to leeward; and as the stern necessarily yields to this impression of the wind, assisted by the force of the helm,

Veetie
||
Veering.

Veering,
Vegs.

helm, and the action of the waves upon the same quarter, the tide which was formerly to leeward soon becomes to windward.

Since by this movement a ship loses ground considerably more than by tacking, it is rarely practised except in cases of necessity or delay: as when the violence of the wind and sea renders tacking impracticable; or when her course is slackened to wait for a pilot, or some other ship in company, &c.

It has been observed in the article TACKLING, that the change of motion in any body will be in proportion to the moving force impressed, and made according to the right-line in which that force operates. Hence it is evident, that veering as well as tacking is a necessary consequence of the same invariable principle; for as in the latter, almost the whole force of the wind and of the helm are exerted on the hind-part of the ship, to turn the prow to windward; so in the former, the same impression, assisted by the efforts of the helm, falls upon the prow to push it to leeward; and the motion communicated to the ship must in both cases necessarily conspire with the action of the wind.

Thus, when it becomes necessary to veer the ship, the sails towards the stern are either furled or brailled up, and made to shiver in the wind; whilst those near the head are spread abroad, so as to collect the whole current of air which their surfaces can contain. Hence, while the whole force of the wind is exerted on the fore-part of the ship to turn her about, its effect is considerably diminished, or altogether destroyed, on the surfaces of the after-sails. The fore-part accordingly yields to the above impulse, and is put in motion; and this movement, conspiring with that of the wind, pushes the ship about as much as is necessary to produce the effect required. When she is turned so that the wind will act upon that quarter which was formerly to leeward, her circular motion will be accelerated by extending some of the sails near the stern, as the mizen, and by placing those at the prow more obliquely, which will wheel the vessel round with her bow to the windward; in the same situation, with regard to the wind, as when close-hauled or tacking.

When the tempest is so violent as to prevent the use of sails, the effort of the wind operates almost equally on the opposite ends of the ship, so that the masts and yards situated at the head and stern counterbalance each other. The effect of the helm is also considerably diminished, because the head-way, which gives life and vigour to all its operations, is at this time feeble and ineffectual. Hence it is necessary to destroy this equilibrium which subsists between the mast and yards afore and abaft, and to throw the balance forward, in order to prepare for veering. This is accordingly performed by bracing the foremost yards across the direction of the wind, and arranging those on the main-mast and mizen-mast directly in the line of the wind. If this expedient proves unsuccessful, and it is absolutely necessary to veer in order to save the ship from destruction, by oversetting or running ashore, the mizzen-mast must instantly be cut away, and even the main-mast, if she yet remains incapable of answering the helm by bearing away before the wind.

VEGA (Lopez de), a celebrated Spanish poet, also called *Lope Felix de Vega Carpio*, was born at Madrid in 1562; and became secretary to the bishop of Avila,

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and afterwards to the count of Lemos, the duke of Alva, &c. At length having embraced the ecclesiastical state, he received priests orders, and became knight of Malta. He died in 1635. He wrote in Spanish a great number of theatrical pieces and poems that are admired.

VEGETATION, in physiology, the act whereby plants receive nourishment and grow. See PLANT.

The process of nature in the vegetation of plants is very accurately delivered by the excellent Malpighi, to the effect following: The egg or seed of the plant being excluded out of the ovary, called *pod* or *hulk*, and requiring further fostering and brooding, is committed to the earth; which having received it into her fertile bosom, not only does the office of incubation by her own warm vapours and exhalation, joined with the heat of the sun, but by degrees supplies what the seed requires for its further growth; as abounding every where with canals and sinuses, wherein the dew and rain-water, impregnated with fertile salts, glide, like the chyle and blood in the arteries, &c. of animals. This moisture meeting with a new-deposited seed, is percolated, or strained through the pores or pipes of the outer rind or hulk, corresponding to the secundines of the fœtuses, on the inside whereof lies one or more, commonly two, thick seminal leaves, answering to the placenta in women, and the cotyledons in brutes.

These seed-leaves consist of a great number of little vesiculæ, or bladders, with a tube corresponding to the navel-string in animals. In these vesiculæ is received the moisture of the earth, strained through the rind of the seed; which makes a slight fermentation with the proper juice before contained therein. This fermented liquor is conveyed by the umbilical vessel to the trunk of the little plant; and to the germ or bud, which is contiguous thereto: upon which a vegetation and increase of the parts succeed.

Such is the procedure in the vegetation of plants; which the illustrious author exemplifies in a grain of wheat, as follows: The first day the grain is sown it grows a little turgid; and the secundine, or hulk, gapes a little in several places: and the body of the plant, being continued by the umbilical vessel to a conglobated leaf (which is called the *pulp* or *stess* of the seed, and is what constitutes the flower) swells; by which means, not only the germ or sprout (which is to be the future stem) opens, and waxes green, but the roots begin to bunch out; whence the placenta, or seed-leaf, becoming loose, gapes. The second day, the secundine, or hulk, being broke through, the stem, or top of the future straw, appears on the outside thereof, and grows upwards by degrees: in the mean time the seed-leaf guarding the roots, becomes turgid with its vesiculæ, and puts forth a white down. And the leaf being pulled away, you see the roots of the plant bare; the future buds, leaves, and rest of the stalk, lying hid. Between the roots and the ascending stem the trunk of the plant is knit by the navel knot to the flower-leaf, which is very moist, though it still retains its white colour and its natural taste. The third day, the pulp of the conglobated, or round leaf, becomes turgid with the juice which it received from the earth fermenting with its own.

Thus the plant increasing in bigness, and its bud or stem becoming taller, from whitish turns greenish; the

Vegetation. lateral roots also break forth greenish and pyramidal from the gaping sheath, which adheres chiefly to the plant; and the lower root grows longer and hairy, with many fibres shooting out of the same.

Indeed there are hairy fibres hanging all along on all the roots, except on their tips; and these fibres are seen to wind about the saline particles of the soil, little lumps of earth, &c. like ivy; whence they grow curled. Above the lateral roots there now break out two other little ones.

The fourth day, the stem mounting upwards, makes a right angle with the feminal leaf: the salt roots put forth more; and the other three growing larger, are clothed with more hairs, which strictly embrace the lumps of earth; and where they meet with any vacuity, unite into a kind of net-work.

From this time forward the root pulses with more regularity downward, and the stalk upward, than before. There is, however, this great difference in their growth, that the stalk and branches find no resistance to their shooting up, while the roots find a great deal to their shooting downward by means of the solidity of the earth, whence the branches advance much faster and farther in their growth than the roots; and these last often finding the resistance of a tough earth unformountable, turn their course, and shoot almost horizontally.

As to the manner in which vegetation is effected, very little can be said. That heat, air, and light are necessary for this purpose, is known to every one; but in what manner they act, seems to be totally undiscoverable by us. The lowest degree of vegetation seems to be that of the crystallization of salts. This indeed has scarce been allowed really to be a vegetation, tho' it certainly is owing to the same causes. Whether crystallization will succeed *in vacuo*, indeed, has not been determined; but it certainly may go on without light, and in much lower degrees of heat than those in which any vegetable will grow. Light indeed seems not absolutely necessary to vegetation; for the roots of all plants grow below ground, where they are very much deprived of light. This element seems only necessary for giving a green colour to the upper part of vegetables, and perhaps strengthening them, so that they can better bear the inclemency and changes of the weather. But whatever may be the differences between the powers which produce vegetation and those of crystallization, water is the medium by which only both can act; for if a salt is perfectly dry, it will not crystallize, more than a seed will grow in dry sand or dust. Some kinds of crystallization indeed resemble vegetation so much, that we can scarce avoid ascribing them to the same cause. Of these the most remarkable is the arbor Dianæ, or compound of nitrous acid and silver †. Several curious crystallizations, or vegetations as they are called, may also be formed with other metals; but that which most of all resembles a true vegetation, is the *caput mortuum* of Glauber's spirit of nitre. This is a combination of very pure vegetable fixed alkali with vitriolic acid. If a large quantity of the latter has been employed in the distillation, and the mass is exposed to a moist air, a great number of crystallizations will take place on the surface, exactly resembling the vegetations of some kinds of shrubs. See CRYSTALLIZATION, PLANTS; GERMINATION, &c.

† See *Chymistry*, no 198.

VEGETATIVE soul, among philosophers, denotes that principle in plants by virtue of which they vegetate, or receive nourishment and grow. See the preceding article.

VEHICLE, in general, denotes any thing that carries or bears another along; but is more particularly used in pharmacy for any liquid serving to dilute some medicine, in order that it may be administered more commodiously to the patient.

VEII (anc. geog.), a city of Etruria, the long and powerful rival of Rome; distant about 100 stadia, or 12 miles, to the north-west: situated on a high and steep rock. Taken after a siege of 10 years by Camillus, six years before the taking of Rome by the Gauls; and thither the Romans, after the burning of their city, had thoughts of removing; but were dissuaded from it by Camillus, (Livy). It remained standing after the Punic war; and a colony was there settled, and its territory assigned to the soldiers. But after that it declined so gradually, as not to leave a single trace standing. Famous for the slaughter of the 300 Fabii on the Cremera, (Ovid). The spot on which it stood lies near Isola, in St Peter's patrimony, (Hollstenius).

VEIL, a piece of stuff, serving to cover or hide any thing.

In the Romish churches, in time of Lent, they have veils or curtains over the altar, crucifix, images of saints, &c.

A veil of crape is wore on the head by nuns, as a badge of their profession: the novices wear white veils, but those who have made the vows black ones. See the article NUN.

VEIN, in anatomy, is a vessel which carries the blood from the several parts of the body to the heart. See ANATOMY, n° 387.

VEIN, among miners, is that space which is bounded with woughs, and contains ore, spar, canck, clay, chert, croil, brownhen, pitcher-chert, cur, which the philosophers call the *mother of metals*, and sometimes *soil of all colours*. When it bears ore, it is called a *quick vein*; when no ore, a *dead vein*.

VELA, a remarkable cape on the coast of Terra Firma, in South America. W. Long. 73. 20. N. Lat. 12. 0.

VELARIUS, in antiquity, an officer in the court of the Roman emperors, being a kind of usher, whose post was behind the curtain in the prince's apartment, as that of the chancellor's was at the entry of the balustrade; and that of the ostiarii at the door. The velarii had a superior of the same denomination, who commanded them.

VELEZ-DE-GOMERA, a town of Africa, in the kingdom of Fez, and in the province of Eriff. It is the ancient ACARTH; which see. With a harbour and a handsome castle, where the governor resides. It is seated between two high mountains, on the coast of the Mediterranean Sea. W. Long. 5. 0. N. Lat. 35. 0.

VELITES, in the Roman army, a kind of ancient soldiery, who were armed lightly with a javelin, a cast, cuirass, and shield.

VELITRÆ (anc. geog.), the first town of the Volsci, in Latium, beyond the Mons Albanus, 20 miles to the east of Rome: afterwards a colony, which was soon after increased. Of this place was the family of Augustus, and one of the principal in it; (Suetonius).

Now

Velleius
Venice.

Now *Velletri*, in the Campania of Rome. E. Long. 13. 20. N. Lat. 41. 40.

VELLEIUS PATERCULUS. See PATERCULUS.

VELLEITY, in the school-philosophy, is usually defined a languid, cold, and remiss will. Others lay it denotes an impotence of acquiring what we desire.

VELOCITY of a BODY, denotes the quantity of motion necessary to make it run over a certain space in a given time.

VELVET, a rich kind of stuff, all silk, covered on the outside with a close, short, fine, soft shag, the other side being a very strong close tissue.

The nap or shag, called also the *velveting*, of this stuff, is formed of part of the threads of the warp, which the workman puts on a long narrow-channelled ruler or needle, which he afterwards cuts, by drawing a sharp steel tool along the channel of the needle to the ends of the warp. The principal and best manufactories of velvet are in France and Italy; particularly in Venice, Milan, Florence, Genoa, and Lucca: there are others in Holland, set up by the French refugees; whereof that at Haarlem is the most considerable: but they all come short of the beauty of those in France, and accordingly are sold for 10 or 15 per cent. less. There are even some brought from China; but they are the worst of all.

VENAL, or VENOUS, in anatomy, something that bears a relation to the veins. This word is also used for something bought with money, or procured by bribes.

VENEERING, VANEERING, or *Finearing*, a kind of marquetry or inlaying, whereby several thin slices or leaves of fine woods, of different kinds, are applied and fastened on a ground of some common wood.

VENEREAL, something belonging to venery; as the lues venerea, &c.

VENERY, is used for the act of copulation, or coition, of the two sexes.

VENERY also denotes the act or exercise of hunting wild beasts, which are also called *beasts of venery*, and *beasts of the forest*.

VENESECTION, or PHLEBOTOMY, in surgery. See SURGERY, n° 346, *et seq.*

VENETIAN BOLE, a fine red earth used in painting, and called in the colour-shops *Venetian red*.—It is dug in Carinthia, and sent from Venice to all parts of the world; but the use of it here is very much superseded by a bright collioth of vitriol.

VENICE, a celebrated city of Italy, and capital of a republic of the same name, situated on the Lagoon or Small Islands, about five miles from the continent; in E. Long. 130. N. Lat. 45. 40.

The name of Venice is evidently derived from *Venetia*, one of the Roman provinces of Italy; and this again from the *Henetians*, a people of Paphlagonia, who settled in that part of the country. The city is said to have been founded about the year 451 or 452; when Attila, having destroyed the cities of Aquileia, Verona, Mantua, Treviso, &c. such of the inhabitants as escaped the slaughter, fled to the islands on their coast, and there took up their residence. Historians are profuse in their commendations of the virtue of the Venetians during the infancy of their city; and Cassiodorus informs us, that one would have taken the inhabitants rather for an assembly of philosophers, living at their ease and cultivating the

duties of religion, than for what they really were, a distressed and confused rabble who had escaped from the calamities of war. Nothing remarkable, however, occurs in the history of Venice for some time, excepting the change of government from the consular to the tribunitial form, which happened about 30 years after the building of the city. The republic first began to be of consequence after the destruction of Padua by the Lombards. About this time they were become masters of a fleet, and a body of land-forces. They engaged in a quarrel with the Lombards, of which we know not the particulars. In a short time, however, they distinguished themselves against the Istrian pirates, who had committed depredations on their coasts, and the Tergestines, or inhabitants of Trieste, who had suddenly carried off a number of the citizens of Venice. These exploits procured them a considerable degree of reputation and esteem among their neighbours; and by improving every opportunity of increasing their trade, and augmenting the number of manufactures, &c. the city very soon arrived at a high pitch of affluence and power. In the war carried on by Justinian with the Goths in Italy, the Venetians gave considerable assistance to Narles the Roman general, inasmuch that he expressed his gratitude by several rich presents, some high marks of distinction, and particularly by building two fine churches dedicated to the saints Theodore and Germanian; the oldest public buildings, beside St Mark's and St Peter's, in Venice.

From the time of Justinian to the year 697, historians are silent with regard to the Venetian affairs. A great revolution now took place in the government: the tribunaries having abused their power were abolished; and in their stead was elected a *doge* or duke, in whom was vested the supreme authority. He was to represent the honour and majesty of the state; to have respect and distinction paid him beyond what the tribunaries, or even the consuls, enjoyed: he was to assemble and preside at the great council; to have a casting-vote in all disputed points; to nominate to all offices, places, and preferments; and lastly, to enjoy the same authority in the church as in the state. This form of government was changed in 737, for what reason we govern-
ment.

Under the doges, the power and wealth of the Venetian republic continued to increase. In 764 the Heracleans and Jesulans, subjects to the republic, having formed some designs against the state, put themselves under the protection of Charlemagne. That conqueror, not finding it convenient to give them present assistance, settled them in Malamoc until he could give them more effectual succour. The Venetians, however, disregarding the protection of that powerful monarch, attacked and instantly drove them out of the place where he had settled them. Incensed at this, Charlemagne ordered his son Pepin to declare republic.

Venice.

When the republic began to make a figure.

Assists the Roman general Narles, and honoured by him on that account.

First election of a doge, or duke.

Changes of government.

Quarrel with Charlemagne.

Pepin declares war against the republic.

Derivation of the name.

Excellent character of the first inhabitants.

Venice.

war against the republic. This was immediately done; but the blow was for some time diverted by Astolphus king of the Lombards, who, committing great devastations in the territories of the pope, obliged Pepin to come to the assistance of his holiness. However, after having afforded the necessary succour to the pope, Pepin prosecuted the war with Venice. The event is uncertain: all we know is, that about this time the Venetians declared themselves a free and independent state; which makes it probable that his success had not been great. But in 804 the war was renewed with the utmost fury. Pepin having quarrelled with Nicephorus the Greek emperor, and finding Obelerio the Venetian doge inclined to favour his adversary, determined to exterminate the very name of the republic. After having laid waste the province of Venetia, he led his army directly to Venice, blocking the city up at the same time by his fleet. The Venetians were not disheartened at the number of their enemies, the reputation of Pepin, or the civil divisions among themselves; their animosities were laid aside, and a strict union formed against the common enemy: the chief command was given to Valentin, as Obelerio was supposed too nearly allied to Pepin to fight with that good-will and cheerfulness the service of his country required. The Venetians, notwithstanding the most obstinate defence, the most vigorous sallies, and their selling every inch of ground at an incredible expense of blood, were at length reduced to that part of the city south of the Rialto; this stream, and their own bravery, being now their only defence. While Pepin was preparing to lay a bridge over the canal, they resolved, as a last effort, to attack Pepin's fleet, and to vanquish or die in defence of their liberty. Embarking all the troops they could spare, they bore down, with the advantage of the wind and tide, upon the enemy, and began the attack with such fury, as obliged the French admiral to give way. The lightness of their ships, and their knowledge of the foundations, gave the Venetians every advantage they could wish: the enemy's fleet was run aground, and the greater part of their troops perished in attempting to escape; the ships were all, to a few, either taken or destroyed. During this action at sea, Pepin resolved to assault the city by land, not doubting but the garrison was so weakened by the number of forces they had sent on board the fleet, as to be able to make but a slight resistance. Having for this purpose thrown a bridge over the Rialto, he was marching his troops across it when he found himself attacked on every side by the Venetians from their boats, and others who had posted themselves on the bridge. The battle was long, bloody, and doubtful, until the Venetians employed all their power to break down the bridge; which at last yielding to their obstinate endeavours, a prodigious slaughter of the French ensued: however, they fought like men in despair, seeing no hopes of safety but in victory; but all communication being cut off with the troops on shore, they were to a man either killed or drowned. The number of slain was so great, that the space between the Rialto and Malamoc was covered with dead bodies, and has ever since gone by a name expressive of the prodigious slaughter. Pepin was so struck with the intrepidity of the Venetians, that he raised the siege,

abandoned the enterprise, and concluded a peace with the republic: he afterwards came to Venice to intercede for Obelerio, that he might be restored; which the Venetians granted, more out of respect to the request of so great a prince, than love to the unhappy Obelerio. The people had a notion that Obelerio had encouraged Pepin to declare war upon the republic, and that a correspondence between them was carried on during the siege; Pepin was therefore no sooner withdrawn, than the populace seizing upon Obelerio, tore his body in pieces, and scattered his limbs and bowels about the city. His wife shared the same fate; for as she was the sister of Pepin, it was not doubted but her influence was the cause of her husband's perfidy.

In 839 we find the Venetians engaged in an alliance offensive and defensive against the Saracens with Michael the Greek emperor. A fleet of 60 galleys was immediately equipped, who joined the Grecian fleet and engaged the enemy; but during the heat of their engagement, the Greeks having basely deserted their allies, the Venetians were so completely defeated, that scarce a single vessel remained to carry the news of their misfortune to Venice. This defeat threw the city into the utmost consternation, as it was not doubted that the Saracens would immediately lay siege to the capital; but from these fears they were soon relieved, by certain intelligence that the Saracens had gone to Ancona, which they had pillaged and destroyed. The Narentines, however, a piratical people, no sooner heard of the defeat of the Venetians, than they laid waste the coasts of Dalmatia, and ravaged the country for a considerable way; at the same time that the city was distracted by internal dissensions and tumults, in one of which the doge was murdered.

It was not till the year 881 that the Venetian affairs were thoroughly re-established. By the prudent and vigorous administration of Orso Participato the power of the Saracens was checked, the Narentines utterly defeated, and peace and domestic tranquillity restored. From this time the republic continued to flourish; and in 903 her reputation for arms became famous all over the world by a great victory gained over the Hungarians, who had invaded Italy, defeated Berengarius, and threatened the country with total destruction. For a long time after, we meet with no remarkable transactions in the Venetian history; but in general the republic increased in wealth and power by its indefeasible application to maritime affairs and to commerce. About the year 1040 it was ordained that no prince should associate a colleague with him in the supreme power, a statute which has ever since continued unaltered.

Towards the close of the 11th century, Venice began to make a very considerable figure among the Italian states, and to carry on wars with several of them. In 1084 the republic was by the emperor of Constantinople invested with the sovereignty of Dalmatia and Croatia, which, however, had been held long before by right of conquest. As soon as the Croisade was preached up, the Venetians fitted out a principal fleet of 200 sail against the infidels; but before this armament was in a condition to put to sea, war broke out with Pisa. The doge Vitalis Michael took upon him the command of the fleet, when, after having defeated the Pisans in a bloody action at sea, he set sail

for

Venice.

The siege raised.

The doge torn in pieces by the populace.

The Venetians defeated at sea by the Saracens.

Affairs of the republic restored.

A great victory gained over the Hungarians.

Venetians become powerful.

Take a principal share in the crusades.

The Venetians declare themselves independent.

The city besieged by Pepin.

The citizens reduced to great straits.

The French fleet entirely destroyed.

And great part of their army.

1 Venet. for Smyrna, from thence to Afcalon, at that time befiged by the Chriftians. To his valour was owing the conquest of this city, as well as thofe of Caipha and Tiberias; but before he had time to pufh his good fortune further, he was recalled on account of an invafion of the Normans in Dalmatia. Here he was equally fucccefsful: the Normans were every where defeated; and Michael returned home loaded with booty; but died foon after, to the great grief of all his fubjects. He was fucceeded by Ordelapho Faliero, under whom the Venetians affifted Baldwin in the fieve of Ptolemais, and are faid to have been the chief inftruments of its conquest; and Baldwin, in recompence for the fervices of the republic, invefted her with the fovereignty of that city, which he endowed with many extraordinary privileges, in order to render his prefent more valuable. This good fortune, however, was overbalanced by a rebellion in Dalmatia and Croatia. The former was reduced; but, in a battle with the Croats, the doge was killed, and his army entirely defeated: by which difafter the Venetians were fo much fpirited, that they clapped up a peace on the beft terms they could, giving up all thoughts of Croatia for the prefent.

22 The Venetians receive great defeat in Croatia. Under the government of Domenico Micheli, who fucceeded Ordelapho, the Pope's nuncio arrived at Venice, and excited fuch a fpirit of enthufiafm among all ranks and degrees of men, that they ftrve whole names fhould be firft enrolled for the holy war. The doge, having fitted out a fleet of 60 galleys, failed with it to Joppa, which place the Saracens were at that time befiging. The garrifon was reduced to the laft extremity when the Venetian fleet arrived, furprifed, and defeated that of the enemy with great flaughter; foon after which the Saracens raifed the fieve with precipitation. Tyre was next befiged, and foon was obliged to capitulate; on which occafion, as well as on the taking of Afcalon, the Venetians fliared two-thirds of the fpoils. But in the mean time the emperor of Conftantinople, jealous of the increafing power and wealth of the republic, refolved to make an attack upon Venice, now weakened by the abfence of the doge and fuch a powerful fleet. But the fenate, having timely notice of the emperor's intentions, recalled the doge, who infantly obeyed the fummons. Stopping at Rhodes, in his way home to refrefh and water the fleet, the inhabitants refufed to furnifh him with the neceffaries he demanded. Incenfed at this denial, he levelled their city with the ground; and from thence failing to Chios, he laid wafte and deftroyed the country, carrying off the body of St Ildore, in thofe days accounted an ineffimable treafure. After this he feized on the iflands of Samos, Lesbos, Andros, and all thofe in the Archipelago belonging to the emperor; and having reduced Zara, Spolara, and Trahu, places in Dalmatia which had revolted during his abfence, he returned in triumph to Venice, where he was received with great joy.

24 Emperor of Conftantinople refolves to attack Venice. The Venetians now became very formidable throughout all Europe. The Sicilians, Paduans, with the ftates of Verona and Ferrara, felt the weight of their power; and in 1173 they ventured to oppofe Frederic Barbaroffa emperor of Germany. The occafion of this quarrel was, that Pope Alexander had taken fhelter in Venice in order to avoid the refentment of Barbaroffa,

26 Quarrel with the emperor Barbaroffa. who had conceived an implacable averfion againft him. The Venetians difpatched ambaffadors to him; but he anfwered them in a rage, "Go tell your prince and people, that Frederic the Roman emperor demands his enemy, who is protected by them. If they fend him not inftantly bound hand and foot, he will overturn every law, human and divine, to accomplifh his revenge; he will bring his army before their city, and fix his victorious ftandards in the market-place, which fhall float in the blood of its citizens." On the return of the ambaffadors with this terrible menace, it was agreed to equip a fleet with all expedition, and prepare for repelling the attacks of fuch a formidable and haughty enemy. But before the armament could be prepared, Otho, the emperor's fon, arrived before the city with a fleet of 75 galleys. The doge Sebastianio Ziani failed out with the few veffels he had got together, to give the enemy battle. The fleets met off the coaft of Iftria, and a terrible engagement enfued, in which the imperial fleet was totally defeated, Otho himfelf taken prifoner, and 48 of his fhips deftroyed. On the doge's return, the pope went out to meet him, and prefented him with a ring, faying, "Take this, Ziani, and give it to the fea, as a testimony of your dominion over it. Let your fucceffors annually perform the fame ceremony, that pofterity may know that your valour has purchafed this prerogative, and fubjected this element to you, even as a husband fubjecteth his wife." Otho was treated with the refpect due to his rank; and foon conceived a great friendfhip for Ziani. At laft, being permitted to vifit the imperial court on his parole, he not only prevailed on his father to make peace with the Venetians, but even to vifit their city, fo famed for its commerce and naval power. He was received with all poffible refpect, and on his departure attended to Ancona by the doge, the fenate, and whole body of the nobility. During this journey he was reconciled to the pope; and both agreed to pay the higheft honours to the doge and republic.

27 Haughty meffenger of the emperor. In the beginning of the 13th century, the Venetians, now become exceedingly powerful and opulent, by reafon of the commerce which they carried on with the richeft countries of the world, were invited by young Alexis, fon to the emperor of Conftantinople, to his father's affiftance, who had been depofed and blinded by a rebellious faction. In conjunction with the French, they undertook to reftore him; and eafily fucceeded. But the old emperor dying foon after, his fon was elefted in his room, and a few days after murdered by his own fubjects; on which the empire was feized by Myrtillus, a man of mean birth, who had been raifed by the favour of old Alexis. As the allied army of French and Venetians was encamped without the city, Myrtillus refolved immediately to drive them out of his dominions, and for this purpofe attempted to furprife their camp; but being repulfed, he fhut himfelf up in the city, with a refolution to ftand a fieve. The allies afaulted it with fo much vigour, that the ufurper was obliged to fly; and though the citizens held out after his departure, they were obliged in lefs than three months to capitulate. This proved a fource of greater acquisition to Venice than all that had yet happened. All the chief offices of the city were filled up with Venetians, in recompence for their fervices.

28 His fon Otho defeated and taken prifoner by the Venetians. Peace concluded with the emperor. In the beginning of the 13th century, the Venetians, now become exceedingly powerful and opulent, by reafon of the commerce which they carried on with the richeft countries of the world, were invited by young Alexis, fon to the emperor of Conftantinople, to his father's affiftance, who had been depofed and blinded by a rebellious faction. In conjunction with the French, they undertook to reftore him; and eafily fucceeded. But the old emperor dying foon after, his fon was elefted in his room, and a few days after murdered by his own fubjects; on which the empire was feized by Myrtillus, a man of mean birth, who had been raifed by the favour of old Alexis. As the allied army of French and Venetians was encamped without the city, Myrtillus refolved immediately to drive them out of his dominions, and for this purpofe attempted to furprife their camp; but being repulfed, he fhut himfelf up in the city, with a refolution to ftand a fieve. The allies afaulted it with fo much vigour, that the ufurper was obliged to fly; and though the citizens held out after his departure, they were obliged in lefs than three months to capitulate. This proved a fource of greater acquisition to Venice than all that had yet happened. All the chief offices of the city were filled up with Venetians, in recompence for their fervices.

Venice.

services: the allies entered Thrace, and subdued it; Candia, and all the Greek islands, also fell under the dominion of the republic.

33 Wars between Venice and Genoa.

In the mean time the Genoese, by their successful application to commerce, having raised themselves in such a manner as to be capable of rivalling the Venetians, a long series of wars took place between the republic; in which the Venetians generally had the advantage, though sometimes they met with terrible overthrows. These expensive and bloody quarrels undoubtedly weakened the republic in the main, notwithstanding its successes. In the year 1348, however, the Genoese were obliged to implore the protection of Visconti duke of Milan, in order to support them against their implacable enemies the Venetians. Soon after this, in the year 1352, the latter were utterly defeated, with such loss, that it was thought the city itself must have fallen into the hands of the Genoese, had they known how to improve their victory. This was in a short time followed by a peace; but from this time the power of the republic began to decline. Continual wars with the states of Italy, with the Hungarians, and their own rebellious subjects, kept the Venetians employed so that they had no leisure to oppose the Turks, whose rapid advances ought to have alarmed all Europe. After the destruction of the eastern empire, the Turks came more immediately to interfere with the republic. The consequences are related under the article TURKEY. Whatever valour might be shown by the Venetians, or whatever successes they might boast of, it is certain that the Turks ultimately prevailed; so that for some time it seemed scarce possible to resist them. What contributed also greatly to the decline of the republic, was the discovery of a passage to the East Indies by the Cape of Good Hope in 1497. To this time the greatest part of the East India goods imported into Europe passed through the hands of the Venetians; but as soon as the above-mentioned discovery took place, the carriage by the way of Alexandria almost entirely ceased. Still, however, the Venetian power was strong; and in the beginning of the 16th century they maintained a war against almost the whole power of France, Germany, and Italy; but soon after we find them entering into an alliance with some Italian states and the king of France, against the emperor. These wars, however, produced no consequences of any great moment; and in 1573 tranquillity was restored by the conclusion of a peace with the Turks. Nothing of consequence happened in the affairs of the Venetian republic till the year 1645, when the Turks made a sudden and unexpected descent on the island of Candia.

34 The Genoese put themselves under the protection of the duke of Milan.

35 Causes of the decline of the Venetian power.

The senate of Venice did not display their usual vigilance on this occasion. They had seen the immense warlike preparations going forward, and yet allowed themselves to be amused by the grand seignior's declaring war against Malta, and pretending that the armament was intended against that island. The troops landed without opposition; and the town of Candia was taken, after an oblique defence.

36 Candia invaded by the Turks.

37 Extraordinary methods taken by the Venetians to carry on the war.

This news being brought to Venice, excited an universal indignation against the Turks; and the senate resolved to defend to the utmost this valuable part of the empire. Extraordinary ways and means of raising money were fallen upon: among others, it

was proposed to sell the rank of nobility. Four citizens offered 100,000 ducats each for this honour: and, notwithstanding some opposition, this measure was at last carried. Eighty families were admitted into the grand council, and to the honour and privileges of the nobility. What an idea does this give of the wealth of the inhabitants of Venice?

The siege of Candia, the capital of the island of that name, is, in some respects, more memorable than that of any town which history, or even which poetry, has recorded. It lasted 24 years. The amazing efforts made by the republic of Venice astonished all Europe; their courage interested the gallant spirits of every nation: volunteers from every country came to Candia to exercise their valour, to acquire knowledge in the military art, and assist a brave people whom they admired.

During this famous siege, the Venetians gained many important victories over the Turkish fleet. Sometimes they were driven from the walls of Candia, and the Turkish garrison of Candia was even besieged by the Venetian fleets. Great slaughter was made of the Turkish armies; but new armies were soon found to supply their place, by a government which boasts such populous dominions, and which has despotic authority over its subjects.

Mahomet the fourth, impatient at the length of this siege, came to Negropont, that he might have more frequent opportunities of hearing from the vizir, who carried on the siege. An officer, sent with dispatches, was directed by the vizir to explain to Mahomet the manner in which he made his approaches, and to assure him that he would take all possible care to save the lives of the soldiers. The humane emperor answered, That he had sent the vizir to take the place, and not to spare the lives of the soldiers; and he was on the point of ordering the head of the officer who brought this message to be cut off, merely to quicken the vizir in his operations, and to show him how little he valued the lives of men.

In spite of the vizir's boasted parsimony, this war is said to have cost the lives of 200,000 Turks. Candia capitulated in the year 1668. The conditions on this occasion were honourably fulfilled. Morini, the Venetian general, marched out of the rubbish of this well-disputed city with the honours of war.—The expence of such a tedious war greatly exhausted the resources of Venice, which could not now repair them so quickly as formerly, when she enjoyed the rich monopoly of the Asiatic trade.

This republic remained in a state of tranquillity, endeavouring, by the arts of peace and cultivation of that share of commerce which she still retained, to fill her empty exchequer, till she was drawn into a new war, in the year 1583, by the insolence of the Ottoman court. The Venetians had for some time endeavoured, by negotiation and many conciliatory representations, to accommodate matters with the Turks; and though the haughty conduct of her enemies afforded small hopes of success, yet such was her aversion to war on the present occasion, that she still balanced, whether to bear those insults or repel them by arms; when she was brought to decision by an event which gave the greatest joy to Venice, and astonished all Europe. This was the great victory gained

Venice.

38 Remarkable siege of Candia.

39 Desperate valour of the Venetians.

40 Cruelty of the Turkish sultan.

41 The city capitulated.

42 New war with the Turks.

Venice.

gained over the Turkish army before the walls of Vienna, by Sobieski king of Poland,

In this new war, their late General Morfini again had the command of the fleets and armies of the republic, and sustained the great reputation he had acquired in Candia. He conquered the Morea, which was ceded formerly to Venice, with some other acquisition, at the peace of Carlowitz, in the last year of the last century.

During the war of the succession, the state of Venice observed a strict neutrality. They considered that dispute as unconnected with their interests, taking care, however, to keep on foot an army on their frontiers in Italy, of sufficient force to make them respected by the contending powers. But, soon after the peace of Utrecht, the Venetians were again attacked by their old enemies the Turks; who, beholding the great European powers exhausted by their late efforts, and unable to assist the republic, thought this the favourable moment for recovering the Morea, which had been so lately ravished from them. The Turks obtained their object; and at the peace of Passarowitz, which terminated this unsuccessful war, the Venetian state yielded up the Morea; the grand seignior, on his part, restoring to them the small islands of Cerigo and Cerigotto, with some places which his troops had taken during the course of the war in Dalmatia. Those, with the islands of Corfou, Santa Maura, Zante, and Cephalonia, the remains of their dominions in the Levant, they have since fortified, at a great expence, as their only barriers against the Turk.

Since this period no essential alteration has taken place in the Venetian government, nor has there been any essential increase or diminution in the extent of their dominions. They have little to fear at present from the Turks, whose attention is sufficiently occupied by a more formidable enemy than the republic and the House of Austria united. Besides, if the Turks were more disengaged, as they have now stripped the republic of Cyprus, Candia, and their possessions in Greece, what remains in the Levant is hardly worth their attention.

The declension of Venice did not, like that of Rome, proceed from the increase of luxury, or the revolt of their own armies in the distant colonies, or from civil wars of any kind. Venice has dwindled in power and importance from causes which could not be foreseen, or guarded against by human prudence although they had been foreseen. In their present situation, there is little probability of their attempting new conquests; happy if they are allowed to remain in the quiet possession of what they have. Venice has a most formidable neighbour in the emperor, whose dominions border on those of this republic on all sides. The independency of the republic entirely depends on his moderation; or, in case he should lose that virtue, on the protection of some of the great powers of Europe.

VENICE, the capital of the republic, stands at least four miles from any part of the Terra Firma, upon a cluster of islands. Its appearance at a distance is very striking, looking like a great town half-floated by a deluge. Betwixt the city and the Terra Firma are a great many shallows, on which at low water you may

almost every where touch the bottom with a pole; but all possible care is taken to prevent their becoming dry land. On the south side of the city are also shallows; but on these there is a greater depth of water. The channels betwixt them are marked out by stakes or poles, which on the approach of an enemy would certainly be taken away. The city is divided by a vast number of canals, on which ply the gondoliers, or watermen, in their black gondolas or boats. The streets are very clean and neat, but narrow and crooked. There are no carriages, not so much as a chair, to be seen in them. Though the city, by its situation and the great number of steeples towering above the water, strikes one with admiration at a distance, yet when he is got into it, it does not answer his expectation; for excepting the square of St Mark, and a few other places, there is nothing grand or beautiful in it, at least in comparison of many other cities of Italy. Of the canals, that called *Il Canale Maggiore*, or the "great canal," is by far the largest and longest, and consequently the most beautiful. Here races are sometimes run for prizes in the gondolas. On its banks are also several stately houses. Over these canals are a great number of handsome bridges of one arch, but without any fence on either side: they are also built of white stone, with which the streets are all paved, except the Rialto over the great canal, which is all of marble, and cost the republic 250,000 ducats, the arch being 90 feet wide. The canals in summer emit a bad smell, from the great quantities of filth continually running into them. The finest gondolas are those in which the foreign ministers make their public entries, being richly decorated with gilding, painting, and sculpture. The number of islands on which the city stands, according to some, is 60; according to others, 72. The circumference is about six Italian miles; and it takes up about two hours to make the circuit of it in a gondola. The inhabitants are supposed to be about 200,000, including those of the islands Murano, La Giudexa, and those who live on board the barges. There are near 200 springs of fresh water in the city; but the water of many of them is so indifferent, that the principal families preserve rain-water in cisterns, or are supplied with water from the Brenta. The most remarkable places in the city are the ducal palace, the square, and church of St Mark, who is the tutelary saint of Venice; the mint, public library, grand arsenal, several of the palaces of the nobles, churches, convents, and hospitals. In these last is a prodigious collection of the finest paintings; Venice, in this respect, even surpassing Rome itself. The diversions of the Venetians are chiefly masquerading, especially during the carnival and other festivals; ridottos, operas, plays, which are generally wretched performances, and concerts of vocal and instrumental music. During their festivals, debauchery, riot, and licentiousness, are carried to the greatest height. The courtezans here, we are told, are absolutely lost to all sense of modesty and common decency. The grand scene of all the shows and follies of the festivals is the square of St Mark, in which bulls are sometimes baited. In the doge's palace all the high colleges hold their assemblies; but we are told by several travellers, which seems very strange, that the stairs are no better than a privy. In this palace is a small arsenal, furnished with arms against any sudden

Venice.

43
The Morea
conquered
by the Venetians.

44
They are
obliged to
relinquish it
again.

45
State of
Venice since
that time.

46
Description
of the capital.

Venice.

sudden insurrection of the people, together with a state-prison, a great many exquisite paintings, and several curiosities, among which are some *clausura castitatis*. One side of it is towards St Mark's square, and the lower gallery on that side, with the hall under the new procuratie facing it, are called the *Broglio*, where the nobility, and none else, at least while they are present, are allowed to walk. The square of St Mark is the greatest ornament of the city, and hath the form of a parallelogram. In this square, besides the church and palace of St Mark, are two towers, on one side of which is a curious clock; and the other has stairs so constructed, that one may ride up on horseback: the latter is also so high, that it is said, in a clear day, and when the gilding of the spire was fresh, it could plainly be discerned 100 miles from Venice. Opposite to the ducal palace is the public library of the commonwealth; containing a large collection of books and manuscripts, with some fine paintings, statues, and curiosities. Hard by St Mark's square is the zecca, or mint: from zecca the gold coin called *zecchino* takes its name. One of the smallest pieces of money at Venice is called *gazetta*; and the first newspapers published there, on a single leaf, having been sold for that a-piece, all kinds of newspapers were from thence styled *gazettes*. The grand arsenal is two and a half Italian miles in circuit, and contains vast quantities of naval and other warlike stores: some pretend that it could furnish arms for 10,000 horse and 100,000 foot: here are the trophies of Scanderberg and others, with the helmet of Attila, &c. The rope-walk is 444 common paces in length, and the ropes and cables are valued at 2,000,000 of silver ducats. In the foundry none but brass cannon are cast; and 100 men are generally at work in the forges. The salt-petre works here deserve a traveller's notice: there is a vessel filled with wine and water four times a-day, where the workmen, though 1000 or more, may drink as much and as often as they please. Close to the Rialto is the bank. The trade of the city at present is far short of what it was formerly. Their chief manufactures are cloth; especially scarlet, silks, looking-glasses, gold and silver stuffs, brocades, velvets, and paper, of which, and wine, oil, fruit, sweet-meats, anchovies, and several sorts of drugs used in physic and painting, the exports are still considerable. Venice has neither walls, gates, nor citadel, to defend it; its situation supplying the want of all these. In the treasury of relics is the protocol, or original manuscript, as they pretend, of St Mark's gospel: it is rarely shown; and the writing, by length of time, is so defaced, that the greatest connoisseurs in manuscripts cannot determine whether it was wrote in Greek or Latin. Besides what is properly called the city, there is a multitude of little islands lying round, which are covered with buildings, and make each of them a kind of separate town; the most considerable of which is that called *Giudecca*, or the "Jews Quarter," which is large and populous; with St Erosimo, St Helena, St Giorgio, Chioga, Il Lido de Palestrina, Il Lido de Malamocco, and Murano: these islands are a sort of fence to the city, breaking the violence of the waves. To distinguish them from others, the Jews here must wear a bit of red cloth in their hats. The gardens in this city are few and inconsiderable. In the island of Murano are made those beautiful looking-glasses, and other glass-

Venice.

works, for which Venice is so much noted: here the family of Cornaro hath a palace, with a gallery of paintings, little short of an Italian mile in length. The salt-works in the island of Chioga are of great benefit to the Venetians, and yield a very considerable revenue. There are several other small islands about Venice besides those we have mentioned; but they are inconsiderable.

As to the government of this state, it was, as above related, at first vested in consuls, afterwards in tribunes. About the beginning of the 8th century, a doge, or duke, was elected, and vested with unlimited power; but in 1171, the power of the doge was much abridged, and a council of 240 persons, composed of commons as well as nobles, was appointed. Soon after, under duke Marino Morosini, the present form of electing the doge was introduced. In 1296, the government became aristocratical; the privilege of sitting in the great council being then confined to the nobility, in whom alone the supreme authority at present is vested. The number of nobles amounts to about 2000. All those are members of the senate; but, according to their antiquity, some are accounted more honourable than others. One class, and that the lowest, consists of the posterity of those who, in the necessitous times of the commonwealth, purchased their nobility for 100,000 ducats. The nobles have the title of *Excellency*; and wear, at least when in the city, a black furred gown reaching to their heels, with long caps and periwigs. Some of them are so poor, that they are fain to beg of the rich. The nobility in their dominions on the continent, tho' some of them are of very ancient families, are excluded from all offices, and treated with great insolence and contempt by their haughty lords. At the head of the government is the doge, whose office was once hereditary and power absolute; but the former is now elective, and the latter very much circumscribed: indeed he is no more than a gaudy slave, loaded with fetters, which one would think could not be much the lighter for being gilt; yet so much is the human heart captivated with external pomp and pageantry, that the office, for the most part, is eagerly sought after: but should one otherwise inclined be chosen, he cannot decline it, without exposing himself to banishment and confiscation of his effects. Though the power of the doge is very small, his state and retinue are very splendid: his title is that of *Serenity*, and his office for life: he is said to be a king with regard to his robes, a senator in the council-house, a prisoner in the city, and a private man out of it. The yearly revenue of his office is about 4000*l.*; and though he may be deposed, he cannot resign his dignity. All the nobility have a seat in the great council, unless they are under 25 years of age. In this council the supreme authority and legislative power is vested. Next to it is the senate, or *pregradi*, which consists of about 250 members, who have the power of making peace or war, and foreign alliances; of appointing ambassadors; fixing the standard of the coins; imposing duties and taxes; and all offices by sea and land are in their gift. The third council consists of the doge and his six counsellors, in which all letters and instruments relating to the state are read, ambassadors admitted to audience, and other important affairs transacted. The other colleges are the council of ten; which decides all criminal

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cases without appeal, and to which even the doge himself is subject: the procurators of St Mark, whose office is very lucrative; and who decide with respect to wills, guardianships, and the making a proper provision for the poor; and the state-inquisition, whose business it is to provide for the public tranquillity. In the wall of the ducal palace are heads of lions and leopards, with open mouths, to receive informations of any plot or treason against the state. The ecclesiastical, or *holy inquisition* as it is called; but the power of this court, so formidable in other countries, is here under great restrictions. Here is also a particular college for the regulation of dress, but their jurisdiction does not extend to strangers. The method of electing the doge is no less singular than complicated; and effectually calculated to prevent all kind of bribery or corruption. All the members of the grand council who are past 30 years of age, being assembled in the hall of the palace, as many balls are put into an urn as there are members present; 30 of these balls are gilt, and the rest white. Each councillor draws one; and those who get the gilt balls go into another room, where there is an urn containing 30 balls, nine of which are gilt. The 30 members draw again; and those who by a second piece of good fortune get the gilt balls, are the first electors, and have a right to choose 40, among whom they comprehend themselves.

Those 40, by balloting in the same manner as in the former instances, are reduced to 12 second electors, who choose 25, the first of the 12 naming three, and the remaining 11 two a piece. All those being assembled in a chamber apart, each of them draws a ball from an urn containing 25 balls, among which are 9 gilt. This reduces them to 9 third electors, each of whom chooses five, making in all 45; who, as in the preceding instances, are reduced by ballot to 11 fourth electors, and they have the nomination of 41, who are the direct electors of the doge. Being shut up by themselves, they begin by choosing three chiefs, and two secretaries; each elector being then called, throws a little billet into an urn which stands on a table before the chiefs. On this billet is inscribed the person's name whom the elector wishes to be doge.

The secretaries then, in the presence of the chiefs, and of the whole assembly, open the billets. Among all the 41 there are generally but a very few different names; as the election for the most part balances between two or three candidates. Their names, whatever is the number, are put into another urn, and drawn out one after another. As soon as a name is extracted the secretary reads it, and if the person to whom it belongs is present, he immediately retires. One of the chiefs then demands with a loud voice, whether any crime can be laid to this person's charge, or any objection made to his being raised to the sovereign dignity? If any objection is made, the accused is called in and heard in his own defence; after which the electors proceed to give their decision, by throwing a ball into one of the two boxes, one of which is for the Ayes, the other for the Noes. The secretaries then count the balls; and if there are 25 in the first, the election is finished; if not, another name is read, and the same inquisition made as before, till there are 25 appearing balls.

The principal Venetian order of knighthood is that Vol. X.

of St Mark; the badge of which is a large gold medal dependent on the breast. The order of Constantine knights wear a cross hanging from a gold chain.

With respect to religion, that of the Venetians is the Roman Catholic; but they are no bigots. We have already observed, that the court of inquisition here is under very great restrictions; and the pope is considered as little more than a temporal prince, his supremacy being rejected.

The Venetians are still the greatest naval power in Italy. They pretend they could fit out, in case of necessity, 60 men of war, 100 galleys, and to galeasses; Military though one can hardly imagine how they could man force and half that number. The army is said to consist of between 20,000 and 30,000 men; the greatest part of which are Dalmatians and Switzers. The commander in chief, styled *Capitano*, is always a foreigner of distinction. General Græme, a Scotchman, lately enjoyed that honourable post. The ordinary revenues of the state are computed at about 1,200,000 l. sterling; but in time of war they can raise them greatly. A considerable part of the revenue arises from the customs, and the duty on salt made at Corfu and Chiozza.

VENIRE FACIAS, in law, is a judicial writ lying where two parties plead and come to issue; directed to the sheriff, to cause 12 men of the same neighbourhood to meet and try the same, and to say the truth upon the issue taken.

VENTER, signifies the belly; but it is also used for the children by a woman of one marriage: there is in law a first and second venter, &c. where a man hath children by several wives; and how they shall take in descents of lands.

VENTER *Inspicendo*, is a writ to search a woman that saith she is with child, and thereby withholdeth lands from the next heir: the trial whereof is by a jury of women.

VENTILATOR, a well known machine, by which the noxious air of any confined place, as an hospital, goal, ship, chamber, &c. may be changed for fresh air.

VENTRICLE, properly denotes any little cavity; but is more particularly used by physicians and anatomists, for the stomach, and certain cavities of the heart and brain.

VENTRILOQUOUS, a term applied to persons who speak inwardly; having a peculiar art of forming speech, by drawing the air into the lungs, so that the voice, proceeding out of the thorax, to a by-stander seems to come from a distance. The word is compounded of *venter*, "belly;" and *loquor*, "I speak."

VENUS, in pagan worship, the goddess of love and beauty. Cicero mentions two other deities of this name; Venus, styled *Urania* and *Celestis*; and the *Venus Pandemos*, or *Popularis*, the wife of Vulcan, and the goddess of wanton and effeminate love. To the first the Pagans ascribed no attributes but such as were agreeable to the strictest chastity and virtue; and of this deity they admitted no corporeal resemblance, the being only represented by the form of a globe, ending conically. Her sacrifices were termed *nephelia*, on account of their sobriety. To her honey and wine were offered, and no animal except the heifer; and on her altars the wood of figs, vines, or mulberries, were not suffered to be burnt. The Romans dedicated a temple to this goddess, to whom they gave the name of *Venturdia*;

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ficordia; because he turned the hearts of lewd women, and inspired modesty and virtue.

But the most famous of these goddesses is the wife of Vulcan; who is represented as springing from the froth raised by the genitals of Saturn, when cut off by Jupiter and thrown into the sea. As soon as she was formed, she was laid in a beautiful shell embellished with pearl, and wafted by gentle zephyrs to the isle of Cythera, whence she failed to Cyprus. At her landing, flowers rose beneath her feet: she was received by the Hours, who braided her hair with golden fillets; and then wafted her to heaven, where her charms appeared so attractive, that most of the gods desired her in marriage; but Vulcan, by the advice of Jupiter, gained possession by putting poppies into her nostrils. As Venus was the goddess of love and pleasure, the poets have been lavish in the description of her beauties; and the painters and statuary have endeavoured to give her the most lovely form. Sometimes she is represented clothed in purple, glittering with gems, her head crowned with roses, and drawn in an ivory car by swans, doves, or sparrows; at others, she stands attended by the Graces; but in all positions, her son Cupid is her inseparable companion. She was honoured as the mother of Hymeneus, Cupid, Æneas, and the Graces, and was passionately fond of Adonis and Anchises.

This goddess was principally worshipped at Paphos and Cyprus; and the sacrifices offered to her were white goats and swine, with libations of wine, milk, and honey. Her victims were crowned with flowers, or wreaths of myrtle.

Venus's Fly-Trap. See *DIONEÆ Muscipula*.

VENUS, in zoology, a genus of insects belonging to the order of vermes testacea. Its animal is a tethys; the hinge with three teeth near each other, one placed longitudinally and bent inwards. There are a great many species; of which the most remarkable is the merenaria, or commercial, with a strong, thick, weighty shell, covered with a brown epidermis; pure white within; slightly striated transversely. Circumference above 11 inches. These are called in North America *clams*; they differ from other species only in having a purple tinge within. Wampum, or Indian money, is made of them.

VEPRECLÆ, diminutive from *vepres*, a "briar, or bramble;" the name of the 31st order in Linnæus's Fragments of a Natural Method. See BOTANY, p. 1311.

VERA-CRUZ, a sea-port town of North America, in New Spain, with a very secure and commodious harbour, defended by a fort. Here the Flotilla annually arrives from Spain to receive the produce of the gold and silver mines of Mexico. And at the same time a fair is held here, for all manner of rich merchandize brought from China and the East Indies by way of the South Sea, and for the merchandize of Europe by the way of the Atlantic Ocean. This town is not two miles in circumference; and about it there is a wall of no great strength on the land-side. The air is unwholesome; and there are very few Spaniards here unless when the Flotilla arrives, and then it is crowded with people from all parts of Spanish America. It is 200 miles south-east of Mexico. W. Long. 102, 15. N. Lat. 18. 41,

Veratrum
Verd.

VERAGUA, a province of New Spain, bounded on the east by that of Costa Rica, on the west by Panama, on the north by Darien and the Gulph of Mexico, and on the south by the South Sea. It is about 125 miles in length from east to west, and 60 in breadth from north to south. It is a mountainous barren country; but has plenty of gold and silver. Concepcion is the capital town.

VERATRUM, WHITE HELLBORE; a genus of the monoclea order, belonging to the polygama class of plants. There are four species.

The root of the *album*, or white hellebore, promotes violent sneezing, and is mixed in ointments, to cure the itch. It is never now given inwardly. Boerhaave very justly observes, that it is a medicine much fitter for horses than men. It is administered as a sternutatory, with great success, in apoplexies and lethargic complaints.

VERB, in grammar. See GRAMMAR.

VERBASCUM, MULLEIN; a genus of the monogynia order, belonging to the pentandria class of plants. There are 12 species, of which the most remarkable are, 1. The thapsus or great mullein, with downy leaves running along the stem, and yellow blossoms, terminating in a long spike. It is a native of Britain, growing commonly on dry banks of ditches. Externally used it is an emollient, and its leaves are by some reckoned a specific for the piles. It is said to intoxicate fish so that they may be taken with the hand. In Norway it is given to cows that are consumptive. The down serves for tinder. Neither cows, goats, sheep, horses, nor swine, willingly eat of it. 2. The nigrum, or black mullein, having a stem beset with hairs that are beautifully branched; the blossoms yellow, with purple tips. This is also a native of Britain, growing under hedges, and by road-sides. It is a beautiful plant, and the flowers are grateful to bees: swine eat it; sheep are not fond of it; cows, horses, and goats, refuse it.

VERBENA, VERVAIN; a genus of the monogynia order, belonging to the diandria class of plants. There are 18 species; of which the most remarkable is the officinalis, or common vervain, growing on the road-sides near towns and villages. The leaves have many jagged clefts, the blossoms are pale blue. It manifests a slight degree of astringency, and was formerly much in vogue as a decoburent; but is now disregarded. Mr Millar says that it is never found above a quarter of a mile from a house; whence the common people in England call it *Simpler's joy*, because wherever it is found, it is a certain sign of a house being near. Sheep eat it; cows, horses, and goats, refuse it.

VERCELLÆ, (anc. geog.); a town of the Libici, in the Transpadana, on the right or west side of the river Sessile, near the Campi Raudii, where Marius gave a signal defeat to the Cimbrici, (Plutarch). Now *Vercelli* in Piedmont, situated on the river Sesia. E. Long. 8° 20', Lat. 45° 15'.

VERD (Cape), a promontory on the west coast of Africa, 40 miles north-west of the mouth of the river Gambia. W. Long. 17. 49. N. Lat. 15. 0.

VERD, the islands of Cape de Verd, are seated on the Atlantic Ocean, about 400 miles west of the Cape. They are between the 13th and 19th degree of latitude; and the principal are ten in number, lying in

Verden
Verdigrife.

Verdict.

a semi-circle. Their names are, *St Antony, St Vincent, St Lucia, St Nicholas, the Isle of Sal, Bona Vista, Mayo, St Jago, Fuego, and Brava.*

VERDEN, a considerable town of Germany, in the circle of Westphalia, and capital of a duchy of the same name, subject to the elector of Hanover. It is seated on the river Aller near the Wefer, in W. Long. 9. 10. N. Lat. 53. 30.

VERDUN, a town of France, in Lorraine, and capital of Verdunois, with a bishop's see. There are several abbeys, collegiate and parish churches; but the principal structures are the bishop's palace and the town-house. They make large quantities of sweetmeats here, which are exported to several places. E. Long. 5. 24. N. Lat. 49. 0.

VERDIGRISE, a kind of rust of copper, much used by painters as a green colour. It is chiefly manufactured at Montpellier; the vines of Languedoc being very convenient for this purpose.

The following process for making verdigrise is described by Mr Monet of the royal society of Montpellier, and is published among the memoirs of the academy for the years 1750 and 1753.

Vine-stalks well dried in the sun are steeped during eight days in strong wine, and afterwards drained. They are then put into earthen-pots, and upon them wine is poured. The pots are carefully covered. The wine undergoes the acetous fermentation, which in summer is finished in seven or eight days; but requires a longer time in winter, although this operation is always performed in cellars. When the fermentation is sufficiently advanced, which may be known by observing the inner surface of the lids of the pots, which during the progress of the fermentation is continually wetted by the moisture of the rising vapours, the stalks are then to be taken out of the pots. These stalks are by this method impregnated with all the acid of the wine, and the remaining liquor is but a very weak vinegar. The stalks are to be drained during some time in baskets, and layers of them are to be put into earthen-pots with plate of Swedish copper, so disposed that each plate shall rest upon and be covered with layers of stalks. The pots are to be covered with lids; and the copper is thus left exposed to the action of the vinegar, during three or four days or more, in which time the plates become covered with verdigrise. The plates are then to be taken out of the pots, and left in the cellar three or four days; at the end of which time they are to be moistened with water, or with the weak vinegar above-mentioned, and left to dry. When this moistening and drying of the plates has been thrice repeated, the verdigrise will be found to have considerably increased in quantity; and it may then be scraped off for sale.

A solution or erosion of copper, and consequently a verdigrise, may be prepared by employing ordinary vinegar instead of wine, as is directed in the above process. But it would not have the usefulness of ordinary verdigrise, which quality is necessary in painting. Good verdigrise must be prepared by means of a vinous acid, or solvent, half acid and half spirituous. Accordingly, the success of the operation depends chiefly on the degree of fermentation to which the wine employed has been carried: for this fermentation must not have been so far advanced that

no sensibly vinous or spirituous parts remained in the liquor.

Verdigrife taken internally is a very violent emetic, and is reckoned among the poisons, though it is certainly the mildest of that pernicious tribe. It seems to act less as a corrosive than as a violent allstringent, which renders it so disagreeable to the stomach that it is almost instantly evacuated by vomit.—In very small doses it has been given as an emetic, and in this intention it operates most powerfully and speedily. Many pernicious consequences have been attributed to the gradual introduction of small quantities of verdigrise or copper into the human body: but it is much to be doubted whether this would certainly be accounted the cause of them; since copper, either by itself or dissolved either in acid or alkali, when it does not prove emetic, always acts as a tonic.

VERDICT, (*Vere dictum*), is the answer of the jury given to the court concerning the matter of fact, in any case civil or criminal, committed by the court to their trial and examination. See LAW, N^o clxxxvi. 51.

In the law of England, a verdict is either *privy* or *public*. A *privy verdict* is either when the judge hath left or adjourned the court; and the jury, being agreed in order to be delivered from their confinement, obtain liberty to give their verdict privily to the judge out of court: which *privy verdict* is of no force, unless afterwards affirmed by a public verdict given openly in court; wherein the jury may, if they please, vary from their *privy verdict*. So that the *privy verdict* is indeed a mere nullity; and yet it is a dangerous practice, allowing time for the parties to tamper with the jury, and therefore very seldom indulged. But the only effectual and legal verdict is the public verdict; in which they openly declare to have found the issue for the plaintiff, or for the defendant; and if for the plaintiff, they assess the damages also sustained by the plaintiff, in consequence of the injury upon which the action is brought.

Sometimes, if there arises in the case any difficult matter of law, the jury, for the sake of better information, and to avoid the danger of having their verdict attained, will find a special verdict; which is grounded on the statute Westm. 2. 13 Edw. I. c. 30. § 2. And herein they state the naked facts, as they find them to be proved, and pray the advice of the court thereon; concluding conditionally, that if upon the whole matter the court shall be of opinion that the plaintiff had cause of action, they then find for the plaintiff; if otherwise, then for the defendant. This is entered at length on the record, and afterwards argued and determined in the court at Westminster, from whence the issue came to be tried.

Another method of finding a species of special verdict, is when the jury find a verdict generally for the plaintiff, but subject nevertheless to the opinion of the judge or the court above, on a special case stated by the counsel on both sides with regard to a matter of law: which has this advantage over a special verdict, that it is attended with much less expence, and obtains a much speedier decision; the *poslea* being stayed in the hands of the officer of *nisi prius* till the question is determined, and the verdict is then entered for the plaintiff or defendant as the case may happen. But as nothing appears upon the record but the general verdict, the parties are precluded hereby from the bene-

fit of a writ of error, if dissatisfied with the judgment of the court or judge upon the point of law. Which makes it a thing to be wished, that a method could be devised of either lessening the expence of special verdicts, or else of entering the case at length upon the *posse*. But in both these instances the jury may, if they think proper, take upon themselves to determine, at their own hazard, the complicated question of fact and law; and, without either special verdict or special case, may find a verdict absolutely either for the plaintiff or defendant.

In criminal cases, the jury deliver in their verdict with the same forms as in civil causes: only they cannot, in a criminal case which touches life or member, give a privy verdict. But an open verdict may be either general, guilty, or not guilty; or special, setting forth all the circumstances of the case, and praying the judgment of the court, whether, for instance, on the facts stated, it be murder, manslaughter, or no crime at all. This is where they doubt the matter of law, and therefore choose to leave it to the determination of the court; though they have an unquestionable right of determining upon all the circumstances, and finding a general verdict, if they think proper so to hazard a breach of their oaths: and, if their verdict be notoriously wrong, they may be punished and the verdict set aside by attain at the suit of the king; but not at the suit of the prisoner. But the practice, heretofore in use, of finding, imprisoning, or otherwise punishing jurors, merely at the discretion of the court, for finding their verdict contrary to the direction of the judge, was arbitrary, unconstitutional, and illegal; and is treated as such by Sir Thomas Smith 200 years ago; who accounted "such doings to be very violent, tyrannical, and contrary to the liberty and custom of the realm of England." For, as Sir Matthew Hale well observes, it would be a most unhappy case for the judge himself, if the prisoner's fate depended upon his directions:—unhappy also for the prisoner; for if the judge's opinion must rule the verdict, the trial by jury would be useless. Yet in many instances, where, contrary to evidence, the jury have found the prisoner guilty, their verdict hath been mercifully set aside, and a new trial granted by the court of king's bench; for in such case, as hath been said, it cannot be set right by attain. But there hath yet been no instance of granting a new trial, where the prisoner was acquitted upon the first.

VERDITER, or VERDATER, a kind of mineral substance, sometimes used by the painters, &c. for a blue; but more usually mixed with a yellow for a green colour. See CHEMISTRY, n° 201.

VERE (Sir Francis), a renowned English general, was the second son of Geoffrey de Vere, a branch of the ancient family of that name, earls of Oxford, and was born in the year 1554. Concerning his education we are uninformed. About the age of 31 he embarked with the troops sent by queen Elizabeth, under the command of the earl of Leicester, to the assistance of the states of Holland; in which service his courage and military genius became immediately conspicuous: but his gallant behaviour in the defence of Berghen-op-Zoom, in the year 1588, when besieged by the prince of Parma, established his reputation. After the siege

was raised, he received the honour of knighthood from lord Willoughby, who succeeded the earl of Leicester in the command. He continued in the service of the states till about the year 1595; during which time, namely, in 1593, he was elected member of parliament for Leominster in Herefordshire. The famous expedition against Cadiz being resolved upon, Sir Francis Vere was called home, and appointed to a principal command under the earl of Essex. The success of this enterprise is universally known. In 1597 we find him again in Holland, present at the battle of Turnhout, of which he has given a particular description in his commentaries. In the same year he embarked, with the earl of Essex, in the expedition to the Azores; and at his return was appointed governor of the Briel in Holland, with the command of the English troops in the service of the states. In 1600 he was one of the three generals at the battle of Newport, and had the honour of having the victory universally ascribed to his conduct and resolution. The states of Holland, then at war with Spain, marched their army with an intention to besiege Newport in Flanders. The commanders were, count Ernest of Nassau, count Somes, and Sir Francis Vere. The Spaniards marched to intercept them, and this battle ensued. Sir Francis was shot first through the leg, and then through the same thigh; notwithstanding which, he rallied the flying army, and led them on to victory. The Spaniards lost 120 ensigns, and most of their foot were slain. Queen Elizabeth on this occasion declared him the *worthiest captain of her time*. See *Letters of the Sidney family*, vol. ii. p. 104.—But the last and most glorious achievement of his life was his gallant defence of Ostend, with about 1600 men against an army of 12,000, from July 1601 until March 1602, when he resigned the government, and returned to Holland. An account of this memorable siege, which lasted above three years, to the destruction of the best troops of Holland, Spain, France, England, Scotland, and Italy, the reader may see in *Vere's Commentaries*, with the Continuation at the end. Queen Elizabeth died in the year 1603: the peaceful James acceded to the throne; and Sir Francis Vere, with all the heroes of his time, sheathed his sword. He died in 1608, in the 54th year of his age; and was buried in St John's chapel in Westminster abbey, where a splendid monument was erected to his memory. He married the daughter of — Dent, a citizen of London, by whom he had three sons and two daughters, none of which survived him. He will ever be remembered by posterity as one of our greatest heroes of our most heroic age.—The work above-mentioned is intitled, "The commentaries of Sir Francis Vere, being diverse pieces of service wherein he had command; written by himself in way of commentary." Cambridge 1657, folio. It is elegantly printed, and adorned with prints of Sir Francis, Sir Horace Vere, Sir John Ogle, maps, and plans of battles, &c.

VERGE, (*Virgata*), in law, signifies the compass of the king's court, which bounds the jurisdiction of the lord steward of the household; and which is thought to have been 12 miles round.

The term verge is also used for a stick or rod, whereby one is admitted tenant to a copyhold estate, by

Vergers
Veronica.

by holding it in his hand, and swearing fealty to the lord of the manor.

VERGERS, certain officers of the courts of king's bench, and common-pleas, whose business it is to carry white wands before the judges.

There are also vergers of cathedrals, who carry a rod tipped with silver before the bishop, dean, &c.

VERGIL (Polydore). See **VIRGIL**.

VERJUICE, a liquor obtained from grapes or apples, unfit for wine or cyder; or from sweet ones, whilst yet acid and unripe. Its chief use is in sauces, ragouts, &c, tho' it is also an ingredient in some medicinal compositions, and is used by the wax-chandlers to purify their wax.

VERMEYEN (John Cornelius), a Dutch historian, and portrait-painter. He attended the emperor Charles V. and drew his encampments, sieges, and battles, on the spot, from which designs the famous tapestries at the Escorial at Madrid were made. He died in 1559.

VERMICELLI, or **VERMICHELLY**, a composition of flour, cheese, yolks of eggs, sugar, and saffron, reduced to a paste, and formed into long slender pieces like worms, by forcing it with a piston thro' a number of little holes.

It was first brought from Italy, where it is in great vogue: it is chiefly used in soups and pottages, to provoke venery, &c.

VERMICULAR, an epithet given to any thing that bears a relation or resemblance to worms.

VERMIFORMIS, in anatomy, a term applied to various parts in the human body, bearing some resemblance to worms.

VERMILION, a very bright and beautiful red colour, composed of quicksilver and sulphur, in great esteem among the ancients under the name of *minium*; but what goes by the name of minium amongst us, is a preparation of lead, known also by the name of *red-lead*. See **CHEMISTRY**, n° 474.

VERMIN, a collective name, including all kinds of little animals or insects, which are hurtful or troublesome to mankind, beasts, or fruits, &c. as worms, lice, fleas, caterpillars, ants, flies, &c.

VERNACULAR, a word applied to something that is peculiar to any one country.

VERNAL, something belonging to the spring-season.

VERONA, a city of Italy, capital of the Veronese in the territory of Venice, situated near the mountains on the river Adige, in E. Long. 11. 15. N. Lat. 45. 20. It is seven miles in compass; and has been so fortified by the Venetians, that it is now looked upon as impregnable.

VERONESE, a territory of Italy, in the republic of Venice, bounded on the north by the Trentino, on the east by the Vicentino and Paduano, on the south by the Mantuano, and on the west by the Bresciano. It is about 35 miles in length, and 27 in breadth; and is one of the most fertile countries in Italy, abounding in corn, wine, fruits, and cattle.

VERONESE. See **CAGLIARI**.

VERONICA, **MALE SPEEDWELL**; a genus of the monogynia order, belonging to the diandria class of plants. There are a great number of species, of which the most remarkable are, 1. The officinalis, com-

mon male speedwell, or fluellin; a native of Britain, growing on heaths and barren grounds. The blossoms are blue, the leaves elliptical, serrated, and hairy. The leaves have a small degree of astringency, and are somewhat bitter. An infusion of them is recommended by Hoffman as a substitute for tea; but is more astringent and less grateful. The herb was formerly esteemed in medicine for various disorders, but is now almost totally disused. Cows, sheep, goats, and horses, eat it; swine refuse it. 2. The beccabunga, or common brook-lime, found in ditches and rivulets. The leaves are mild and succulent, and are eaten in salads along with other early springing plants. Cows, goats, and horses, eat it; swine refuse it.

VERROCHIO (Andrea), a Florentine, born in 1432. He was well skilled in mathematics, music, architecture, sculpture, and painting; and was the first who discovered the art of moulding off the features of the face in plaster of Paris. He died in 1488.

VERSAILLES, a town situated four leagues from Paris to the south-west. Here Lewis XIV. built a most magnificent palace, and adorned it with noble gardens: it stands on a rising ground, in the middle of a valley surrounded with hills, having, on the side towards Paris, a fine avenue leading to it through the town, which it divides into the Old and New. To give a particular account of this palace would exceed our limits; suffice it to say, that it consists of several courts embellished (both within and without) in the most sumptuous manner. The grove here is exceedingly beautiful, and the water-works very grand. The menagerie consists of seven courts, and contains a vast number of rare animals. In the palace, all the parts in the inside, that are not hung with tapestries, are lined with marble; and the nearer you come to the king's apartments, the more costly is the marble, and the finer the sculpture and painting. It would require volumes to describe the various paintings and antique statues with which all the apartments abound. The chapel is an exquisite piece of architecture, sculpture, and painting. Of all the apartments, the king's bed-chamber is the most magnificent; the bed, which is of crimson velvet, embroidered with gold, standing in a kind of alcove, where are two figures of Fame represented sitting. The canal in the garden, by which the river Eure is conveyed to it, is a very noble one: the orangery or green-house is accounted a fine piece of architecture, and indeed a master-piece of its kind; the parterre before it also is very beautiful, being adorned with a great number of orange and lemon trees, myrtles, laurels, &c. The labyrinth or maze is a fine grove, so called, because its several walks are so interwoven with each other, that it would be a difficult matter for a person to find his way out of it without a guide: in short, the garden, for statues, canals, groves, grottos, fountains, and every thing that can render it delightful, is superior to any thing of the kind in Europe. The royal cabinet contains the choicest medals, coins, paintings, &c. that Italy could afford. The stables, for proportion, convenience, beauty, and architecture, far exceed many royal palaces. In the same park stands the fine palace of Trianon; the outside of which consists wholly of variegated marble, of exquisite workmanship. The gardens

Verrochio
Versailles.

Verse
||
Vertue.

dens are large, and abound in statues and water-works. E. Long. 2. 12. N. Lat. 48. 48.

VERSE, in poetry, a line consisting of a number of long and short syllables, which run with an agreeable cadence.

VERSE is also used for a part of a chapter, section, &c.

VERSIFICATION, the art or manner of making verse; also the tune and cadence of verse. See POETRY, Part III.

VERSION, a translation of some book or writing out of one language into another.

VERT, in heraldry, the term for a green colour. It is called *vert* in the blazon of the coats of all under the degree of nobles; but in coats of nobility it is called *emerald*; and in those of kings, *verus*. In engraving it is expressed by diagonals, or lines drawn athwart from right to left, from the dexter chief corner to the sinister base.

VERTEBRÆ, in anatomy. See there, n^o 29—33.

VERTEX, in anatomy, denotes the crown of the head. Hence vertex is also used figuratively for the top of other things: thus we say, the vertex of a cone, pyramid, &c.

VERTEX, is also used in astronomy for the point of the heaven directly over our heads, properly called the *zenith*.

VERTICILLATÆ, the name of a class in Ray's and Boerhaave's Methods, consisting of herbaceous vegetables, having four naked seeds, and the flowers placed in whorls round the stalk. The term is synonymous to the labiati, or lip-flowers of Tournefort; and is exemplified in mint, thyme, and savory.

VERTICILLATÆ is also the name of the 42d order in Linnæus's Fragments of a Natural Method, consisting of plants which answer the above description.

VERTICILLUS, a mode of flowering, in which the flowers are produced in rings at each joint of the stem, with very short foot-stalks. The term is exemplified in mint, hore-hound, and the other plants of the natural order described above.

VERTICITY, is that property of the loadstone whereby it turns or directs itself to one particular point.

VERTIGO, in medicine. See there, n^o 182.

VERUMONTANUM, in anatomy. See there, n^o 371, m.

VERVAIN, in botany. See VERBENA.

VERTOT d'AUBOEF (René Aubert de), a celebrated historian, was descended from a noble and ancient family in Normandy, and born in 1655. At 16 years of age he became a Franciscan friar; afterwards he entered into the order of the Premonstratenses, in which he had several benefices; and at length was a secular ecclesiastic. He became secretary to the dukes of Orleans, member of the Academy of Inscriptions, and historiographer of Malta. He died at Paris in 1735. His principal works are, 1. The History of the Revolutions of Sweden. 2. The Revolutions of Portugal. 3. The Revolutions of the Romans. 4. The History of Malta. These works are written in elegant French, and translated into most of the languages of Europe.

VERTUE (George), an eminent engraver, was born in London in the year 1684, where he was put apprentice to an engraver of arms; but his genius and

spirit prompting him to appear in a higher sphere, he applied himself with great assiduity to learn the art of drawing, in which he became a good proficient. He afterwards commenced engraver; and though greatly restrained by the native modesty of his temper, made a considerable figure in that business, particularly in engraving of portraits, in which he carried the art to greater perfection than any English engraver had done before him, and for the greatest part of his life had no equal in this kingdom. Sir Godfrey Kneller was his first patron; and he was afterwards encouraged by lord Somers, the earl of Winchester, the lord Colemaine, the lord Oxford, &c. and the late prince of Wales. His works are numerous. They are generally faithfully copied, and highly finished; and though they are far from equalling the works of some of our present engravers, they are not destitute of merit. Vertue was an antiquarian; and has redeemed from obscurity many valuable remains of antiquity. He died in 1756, and was buried in the cloisters of Westminster abbey. He was a very amiable man in private life; and was much esteemed by his friends for his piety, modesty, simplicity, and candour.

VERULAM. See BACON.

VESALIUS (Andreas), a celebrated physician and anatomist, was born at Brussels about the year 1512. He studied physic at Paris under James Sylvius; but applied himself chiefly to anatomy, which was then very little known, dissections being esteemed unlawful and impious: and it appears from his work *De humana corporis fabrica*, that he perfected himself in this useful knowledge very early. About the year 1537, the republic of Venice made him professor in the university of Padua, where he taught anatomy for seven years; Charles V. called him to be his physician, as he was also to Philip II. king of Spain. Vesalius was now at the height of his glory, when all of a sudden he formed the design of taking a journey to Palestine; concerning which journey we are told the following story. A young Spanish nobleman he attended being believed to be dead, Vesalius obtained leave to open him to explore the true cause of his illness; but when he opened the breast, he perceived symptoms of life, and saw the heart beat. The parents, not satisfied with prosecuting him for murder, accused him of impiety to the inquisition, in hopes that tribunal would punish him with greater rigour; but the king interposing, saved him on condition of his making a pilgrimage to the Holy Land. He was shipwrecked on his return, and thrown upon the island of Zante, where he perished, in 1564. He was the author of several works, the principal of which is *De humani corporis fabrica*.

VESICATORIUM, a BLISTER; an application of an acrid nature made to any part of the body, in order to draw a flux of humours to that part, and thus elevate the scarf-skin into a blister.

VESPA, the wasp; a genus of insects belonging to the order of hymenoptera. The mouth consists of two jaws without any proboscis; the superior wings are plaited; the eyes are lunar; and there is a sharp sting in the tail. There are 28 species.

The crabro, or large wasp, makes its nest in the trunks of hollow trees, and in the timber work of lofts. Its cakes or combs are composed of a substance like unto coarse paper, or rusty parchment.

Verulam
||
Velpa.

Vespa.

It is very voracious, devouring other insects, and even bees.

Of these insects, some live in society, others are solitary. A distinguishing character of this genus of flies is, their bodies being smooth and apparently without hairs. Their upper wings, when at rest, are folded in two, the whole length of them. At the rise of each of these wings is situated a scaly part, which performs the office of a spring to hinder the upper wing from rising too high, in the flapping of their wings; a caution very important to those carnivorous insects, who pursue their prey on full stretch of wing.

The common domestic or subterraneous wasps, raise buildings, live in associations, feed on plunder, and commit great outrages on our wall-fruit. This numerous commonwealth is founded by a single female impregnated during the autumn, and that has weathered out the severity of the winter. It digs a hole in a dry soil, contrives itself a sinuous inlet, or else it takes up with the dwelling place of a mole, where it hastily builds a few cells and deposits its eggs. Within the space of 20 days, they have gone through the different states of larvæ, chrysalids, and turned to wasps. Nature all-wise provides for every thing. The mule-wasps, or that are of no sex, are the only ones that labour at laying the foundation of the republic. The first eggs that are hatched prove to be neuter-wasps. No sooner are they come into existence, than they fall to work, enlarge the hole, and go about upon wood, lattice-work, and window sashes, in search of materials for building. With their teeth they cut, hack, and tear off small fibres of wood, which they moisten with a liquor they disgorge, and then convey them to the work-shop. Other labourers are in waiting for them, who with those materials set about the construction of the wasp-nest, an edifice outwardly composed of sheets of paper, which not being in contact with each other, dampness cannot penetrate to the inside. This latter part consists of 12 or 15 stories, and between each runs a colonnade formed by the fastenings which connect the cakes one to the other. Every story is as it were a market-place, where the citizens may take their walks. Their cells are hexagonal, and form the cradle in which the mother continues to lay eggs of neuter-wasps to the number of 15,000 or 16,000; after which it deposits 300 eggs of females, and as many of males. The elder brothers, or first-hatched insects, take amazing care of those born after them, by proportioning their food to the delicacy of their stomach. First, it consists of the juice of fruits and meats; afterwards it is the carcases of insects. The caterers provide for the labourers. Each one takes his own portion; there is no dispute, no fighting. The republic grows daily more numerous, living in profound peace. Every individual, as soon as he has acquired sufficient strength, flies away to the fields. They then become a gang of banditti; they pillage our wall-trees, break into our fruit before its maturity, dart with the fierceness of hawks upon our bees, cut their throats to possess themselves of their honey, plunder and lay waste their commonwealth, riot on the fruits of their labour, and oblige them to remove. During the period of plenty, the wasps bring all the booty to the nest, and share it amongst them. There is nothing then goes forwards but feasting, rioting, and good fellowship; but concord

cannot be lasting among robbers. Towards the month of October, provisions begin to run short; when this lively, this amiable young brood is fired with a kind of rage, and the nest is now nothing but a scene of horror. The neuters and males tear from their cradles the eggs, the larvæ, the chrysalids, and the new-born insects, without showing mercy to any. They next fight against one another; tho' their duels seldom proceed to death as those do of the bees. The males alone are destitute of stings. The hopes of the state, the solicitude for posterity, the love of their native place, no longer exist; the whole commonwealth is overturned to the very foundation. Frosts and rains throw the citizens into a state of languor. They almost all perish; luckily for us and our bees. Some few females escape the disasters of intestine war, and the severity of winter, which in the ensuing spring become founders of new republics. One robber is sometimes useful in bringing another to punishment. Some butchers hang up before their shop a calf's liver, or any other tender meat. The wasps come in quest of this delicate food; and, fond of enjoying it to themselves, they pursue the blue-bottle flies from whose eggs are produced the maggots that spoil meat; and this is the only advantage we can reap from wasps.

Aërial wasps are the smallest species of them; nor is their society numerous. Their history, as well as their manners, are the same as those of the common wasp; but their buildings are on a different construction. Their nest is fastened to the branch of a tree with a kind of band; and is in bigness from the size of an orange down to that of an egg. Wood reduced to paper is the material part of it; which if it were of a ruddy colour, might be taken for a large opening rose. It is covered over with a varnish impenetrable by water. One of those nests was neither mollified nor impaired by that element.

VESPASIANS, the 10th emperor of Rome; remarkable for his clemency and other virtues. See *ROME*, n° 332—339.

VESPER, in the church of Rome, denote the afternoon service; answering in some measure to the evening prayers of the church of England.

VESPERTILIO, the BAT; a genus of quadrupeds, belonging to the order of primates. All the teeth are erect, pointed, near each other; and the first four are equal. The fore-feet have the toes connected by a membrane expanded into a kind of wings, by which the creature is enabled to fly. There are many species; of which the most remarkable are,

1. The vampyrus, vampire, or Ternate bat, with large canine teeth; four cutting teeth above, the same below; sharp black nose; large naked ears; the tongue is pointed, terminated by sharp aculeated papillæ; talons very crooked, strong, and compressed sidewise; no tail: the membrane divided behind quite to the rump: head of a dark ferruginous colour; on the neck, shoulder, and under-side, of a much lighter and brighter red; on the back the hair shorter, dusky, and smooth: the membranes of the wings dusky. They vary in colour; some being entirely of a reddish brown, others dusky.

These monsters inhabit Guinea, Madagascar, and all the islands from thence to the remotest in the Indian Ocean. They fly in flocks, and perfectly obscure the

Vespa

Vespertilio.

Vespertilio. air with their numbers; they begin their flight from one neighbouring island to another immediately on sunset, and return in clouds from the time it is light till sun-rise. They live on fruits; and are so fond of the juice of the palm-tree, that they will intoxicate themselves with it till they drop on the ground. It is most likely, from the size of their teeth, they are carnivorous. Mr Edwards relates, that they will dip into the sea for fish. They swarm like bees; hanging by one another from the trees in great clusters. The Indians eat them, and declare the flesh to be very good: they grow excessively fat at certain times of the year. The French who live in the *Île de Bourbon*, boil them in their bouillon, to give it a relish. The negroes have them in abhorrence. Many are of an enormous size: Beckman measured one, whose extent from tip to tip of the wings was five feet four inches; and Dampier another, which extended further than he could reach with out-stretched arms. Their bodies are from the size of a pullet to that of a dove: their cry is dreadful, their smell rank, their bite, resistance, and fierceness great, when taken.

The ancients had some knowledge of these animals. Herodotus mentions certain winged wild beasts like bats, that molested the Arabs who collected the cassia, to such a degree, that they were obliged to cover their faces, all but their eyes, with skins. It is very probable, as M. de Buffon remarks, it was from such relations that poets formed their fictions of Harpies.

Linnaeus gives this species the title of *vampyre*; conjecturing it to be the kind which draws blood from people in their sleep. M. de Buffon denies it; ascribing that faculty only to a species found in South America. But there is reason to imagine that this thirst after blood is not confined to the bats of one continent, nor to one species: for Bontius and Nieuhoff informs us, that the bats of Java seldom fail attacking persons who lie with their feet uncovered, whenever they can get access; and Gumilla, after mentioning a greater and lesser species found on the banks of the *Oronoque*, declares them to be equally greedy after human blood. Persons thus attacked have been known to be near passing from a sound sleep into eternity. The bat is so dexterous a bleeder, as to insinuate its aculeated tongue into a vein without being perceived, and then suck the blood till it is satiated; all the while fanning with its wings, and agitating the air in that hot climate in so pleasing a manner, as to lull the sufferer into a still sounder sleep. It is therefore very unsafe to rest either in the open air, or to leave open any entrance to these dangerous animals: but they do not confine themselves to human blood; for M. Condaminé says, that in certain parts of America they have destroyed all the great cattle introduced there by the missionaries.

2. The *Spixtrum*, or *spixtre*, with a long nose; large teeth; long, broad, and upright ears; at the end of the nose a long conic erect membrane, bending at the end, and flexible: hair on the body cinerous, and pretty long: wings full of ramified fibres: the membrane extends from hind leg to hind leg; no tail; but from the rump extend three tendons, terminating at the edge of the membrane. By Seba's figure the extent of the wings are two feet two inches; from the end of the nose to the rump, seven inches and an half.

Inhabits South America; lives in the palm-trees;

grows very fat; called *vampyre* by M. de Buffon, who supposes it to be the species that sucks human blood: but neither Piso, nor any other writer who mentions the fact, gives the least description of the kind.

3. The Peruvian bat hath a head like a pug-dog; large straight-pointed ears; two canine teeth, and two small cutting teeth between each, in each jaw: the tail is inclosed in the membrane which joins to each hind-leg, and is also supported by two long cartilaginous ligaments involved in the membrane: colour of the fur, iron grey: body equal to that of a middle-sized rat: extent of wings two feet five inches.

4. The noctule hath the nose slightly bilobated; ears small and rounded; on the chin a minute verruca; hair reddish ash-colour: length of the rump two inches eight-tenths; tail one inch seven-tenths; extent of wings 13 inches. Inhabits Great Britain and France; flies high in search of food, not skimming near the ground. A gentleman informed Mr Pennant of the following fact relating to those animals, which he was witness to: That he saw taken under the eaves of Queen's College, Cambridge, in one night, 185; the second night, 63; the third night, 2; and that each that was measured had 15 inches extent of wings.

Bats appear abroad in this country early in the spring; sometimes they are tempted by a warm day to fall out in the winter. They fly in the evenings, and live on moths and other nocturnal insects. They fly by jerks, not with the regular motion of birds, for which the ancients mistook them. They frequent glades and shady places: will go into larders, and gnaw any meat they find. They bring two young at a time, which they suckle at their breast. They retire at the end of summer into caves, the caves of houses, and into ruined buildings, in vast multitudes, where they generally remain torpid, suspended by the hind-legs, enveloped in their wings. They are the prey of owls. Their voice is weak. Ovid takes notice both of that and the origin of the Latin name:

*Minimum pro corpore vocem
Emitunt; peraque leve fridore querelas.
Tæque, non silvas celebrant; lucenque perosa
Noctæ volant: siroque trahunt a vespere nomen.*

VESSEL, a general name given to the different sorts of ships which are navigated on the ocean, or in canals and rivers. It is, however, more particularly applied to those of the smaller kind, furnished with one or two masts. See *SHIP*; and Plate CCLXIV. and CCLXV.

VESTA, in pagan worship, the same with Cybele. See *CYBELE*.

VESTA the *Younger*, in pagan worship, the goddess of Fire, was the daughter of Saturn and Cybele, and the sister of Ceres. She was so much in love with chastity, that on Jupiter's ascending the throne and offering to grant whatever she asked, she only desired the preservation of her virginity, which she obtained.—Vesta was not represented in her temple by any image.

VESTALIA, in Roman antiquity, a festival celebrated in honour of the goddess Vesta, on the 5th of the ides of June; that is, on the ninth of the month.

VESTALS, among the ancient Romans, were priestesses of the goddess Vesta, and had the perpetual fire committed to their charge: they were at first only four in number, but afterwards increased to six; and it does

Vespertilio
||
Vestals.

does not appear that their number ever exceeded six, among whom was one superior to the rest, and called *vestalis maxima*.

The vestals were chosen from six to ten years of age, and obliged to strict continency for 30 years; the first 10 of which were employed in learning the ceremonies of religion, the next 10 in the performance of them, and the 10 last in teaching them to the younger vestals.

The habit of the vestals consisted of an head-dress, called *infula*, which sat close to the head, and from whence hung certain laces called *vitæ*; a kind of surplice made of white linen, and over it a purple mantle with a long train to it.

VESTIBLE, in architecture, a kind of entrance into a large building; being an open place before the hall, or at the bottom of the stair-case.

VESTRY, a place adjoining to a church, where the vestments of the minister are kept; and also a meeting at such place, consisting of the minister, church-wardens, and chief men of most parishes, who make a parish vestry or meeting. By custom there are select vestries, being a certain number of persons chosen to have the government of the parish, make rates, and take the accounts of church-wardens, &c.

VESUVIUS, a famous burning mountain situated six miles east from the city of Naples in Italy.

One side of this volcano is well cultivated and fertile, producing great plenty of vines; but the south and west sides are entirely covered with cinders and ashes; while from the top a sulphureous smoke, and sometimes most violent flames, &c. as in other volcanoes. From the foot of the mountain to the top is about three Italian miles, but the perpendicular height is only 3700 feet. The ascent on these sides, by reason of the steepness of the mount, is very difficult and tedious; but there are some peasants who live about the mountain, and for a small consideration assist travellers in clambering up. They wear leathern belts, of which the strangers take hold in order to render their ascent more easy. The mountain has two tops, one of which only is properly called *Vesuvius*: the other goes by the name of *Somma*; and Sir William Hamilton is of opinion that it is the latter which the ancients called *Vesuvius*.

The first remarkable eruption of *Vesuvius* happened in the year 79, in the reign of the emperor Titus, when the cities of Pompeii and Herculaneum were entirely buried by the stones and ashes thrown out. Incredible mischief also was done to the neighbouring country, and numbers of people lost their lives, among whom was Pliny the Elder, whose curiosity having induced him to approach too near, he was suffocated by the noxious steams. This eruption appears to have been very violent; but though it is the first on record, it is the opinion of the best judges, that it was by no means the first which had happened. Since that time, however, they have been much more frequent, and we have accounts of 29 different eruptions. Of these a very remarkable one happened in 1767; of which some particulars are related under the article *Ætna*, for the sake of illustrating the history of that mountain. But by far the most remarkable which is recorded either of *Vesuvius* or any other mountain, happened in the year 1779, and is particularly related by Sir William Hamilton in the Philosophical

Transactions for 1780; to which we beg leave to refer the reader, as the detail would be here improper after the full account given of volcanic phenomena under the article above-mentioned. See also *VOLCANO*.

VETCH, in botany. See *VICIA*.

VETERAN, among the ancient Romans, an appellation given to a *soldier* grown old in the service, or who had made a certain number of campaigns.

VEXILLUM, in botany; the upper petal of a pea-bloom, or butterfly-shaped flower, which is generally larger than any of the others.

VIALES, in mythology, a name given among the Romans to the gods who had the care and guard of the roads and high-ways.

VIATICUM, in Roman antiquity, an appellation given in common to all officers or any of the magistrates; as *littors*, *accessit*, *scribes*, *criers*.

VIBEX, is sometimes used, by physicians, for a black and blue spot in the skin occasioned by an afflux or extravasation of blood.

VIBRATION, in mechanics, a regular, reciprocal motion of a body, as a pendulum,

VIBURNUM, in botany, a genus of the trigynia order, belonging to the pentandria class of plants. There are nine species, of which the most remarkable are, 1. The *lantana*, common *viburnum*, wayfaring, or plant mealy tree, rises with a woody stem, branching twenty feet high, having very pliant shoots covered with a lightish-brown bark; large heart-shaped, veined, serrated leaves, white and hoary underneath; and the branches terminated by umbels of white flowers, succeeded by bunches of red berries. It grows naturally in England in hedges, &c. 2. The *opulus*, or *gelderrose*; consisting of two varieties, one with flat-flowers, the other globular. The former grows eighteen or twenty feet high, branching opposite, of an irregular growth, and covered with a whitish bark; large lobed or three-lobed leaves on glandulose foot-stalks, and large flat umbels of white flowers at the ends of the branches, succeeded by red berries. Grows naturally in England in marshy places. The latter grows fifteen or eighteen feet high, branching like the other, garnished with large lobed or three-lobed leaves, on glandular foot-stalks; and large globular umbels of white flowers at the ends of the branches, in great abundance. This tree when in bloom exhibits a singularly fine appearance: the flowers, though small, are collected numerously into large globular umbels round like a ball; hence, it is sometimes called *snowball-tree*. 3. The *tinus*, common *laurostinus*, or *evergreen viburnum*; grows eight or ten feet high or more, branching numerously from the bottom upwards, assuming a close bushy growth, with the branches somewhat hairy and glandulous; very closely garnished with oval, wholly entire leaves, of a strong green colour, placed in pairs opposite; and whitish and red flowers, collected numerously in large umbellate clusters all over the plant, at the sides and ends of the branches, from January until March or April, exhibiting a most beautiful appearance. There are a great many varieties; narrow-leaved—broad-leaved—shining-leaved—hairy-leaved—white-striped leaved—yellow-striped leaved; all of which are of shrubby, bushy growth, closely garnished with leaves all the year, and producing a great profusion of

Vicar
||
Victor.

umbellate flowers in winter and spring. All the different species of viburnum, both deciduous and evergreen kinds, being of the tree kind, are woody and durable in root, stem, and branches. They may all be propagated by layers; and are of such hardy temperature, as to grow freely in the open ground all the year, in shrubberies, and other hardy plantations.

VICAR, a person appointed as deputy to another, to perform his functions in his absence, and under his authority.

VICAR, in the canon-law, denotes a priest of a parish, the predial tithes whereof are impropriated or appropriated; that is, belong either to a chapter, religious house, &c. or to a layman who receives them, and only allows the vicar the small tithes, or a convenient salary. See the article PARSON and Vicar.

VICE, in ethics, is ordinarily defined an elective habit, denoting either an excess or defect from the just medium wherein virtue is placed.

VICE, in smithery and other arts conversant in metals, a machine or instrument serving to hold fast any thing they are at work upon, whether it is to be beat, filed, or rivetted.

VICE is also used in the composition of divers words to denote the relation of something that comes instead or in the place of another; as vice-admiral, vice-chancellor, &c. are officers who take place in the absence of admirals, &c.

VICEROY, a governor of a kingdom, who commands in the name and instead of a king, with full and sovereign authority. See KING.

VICIA, the TARE or VETCH; a genus of the decandria order, belonging to the diadelphia class of plants. There are 18 species, the most remarkable of which is the fativa or common tare. This is so well known, that no description needs be given. It is known to be an excellent fodder for horses. In some parts of England the crop is ploughed in to answer the purposes of manure to the land. Pigeons are very fond of the seeds; and in some parts of Sweden, &c. they enter into the composition of bread, either alone, or mixed with the flour of rye.—A decoction of them in water is sometimes given by the common people in England to expel the small-pox and measles.

VICISSITUDE, the regular succession of one thing after another; as the vicissitude of day and night, of the seasons, &c.

VICTIM, denotes a bloody sacrifice offered to some deity, of a living creature, as a man or beast, which is slain to appease his wrath, or obtain some favour.

VICTOR (Sextus Aurelius), a Roman historian, who flourished under the emperors Constantine and Julian; as we learn from many passages in his own writings, and also from Ammianus Marcellinus. This historian relates, that Constantine made him consul, and honoured him with a brazen statue, on account of his excellent qualifications; although, as he owns of himself, he was born in an obscure village, and of poor and illiterate parents. It is commonly believed that he was an African: it is certain, that he dwells much upon the praises of that country, which he calls the glory of the earth; *decus terrarum*. Two books of his are extant in the historical way: one *De viris*

illustribus urbis Romæ; the other, *De Cæsaribus*; to which is prefixed *Libellus de origine gentis Romanæ*. The whole makes an abridged history of Rome, from its foundation down to the reign of Julian inclusive.

VICTORY, the overthrow or defeat of an enemy in war or combat.

VICTORY, in pagan worship, is represented by Hefiod as the daughter of Siyx and Pallas; and Varro calls her the daughter of Heaven and Earth. The Romans erected a temple to her, where they prayed to the gods to give success to their arms. They painted her in the form of a woman, clad in cloth of gold. In some medals, she is represented with wings flying through the air, holding a laurel crown in one hand and a palm in the other; but in other medals, she is seen standing upon a globe, with the same crown and branch of palm.

VIDA (Marcus Hieronymus), bishop of Alva, in Mountferrat, and one of the most excellent Latin poets that have appeared since the Augustan age, was born at Cremona in 1470. Having distinguished himself by his learning, and taste for literature, he was made bishop of Alva in 1552. After continuing two years with pope Clement VII. at Rome, he went to reside upon his see; where, for 30 years, he performed all the offices of a good bishop and a good man; and though he was mild, gentle, and full of goodness, he was so far from wanting spirit, that when the city of Alva was besieged by the Gauls, he used all possible means to prevent its being given up, by strenuously exhorting the people, and, when provisions were scarce, by supplying them at his own expence. His poetics, and poem on the silk-worm, pass for his masterpiece; his poem on the game of chess is also greatly admired. He also wrote hymns, bucolics, eclogues, and a poem entitled *Christiadas* in six books; all which are in Latin, and have gained him a great reputation. His works in prose consist of dialogues, synodical constitutions, letters, and other pieces. He died in 1566, soon after his being made bishop of Cremona.

VIENNA, a large and celebrated city of Germany, in the circle of Austria, and capital of the Hungarian dominions. It stands on the south side of the Danube, 40 miles west of Presburg, 40 east of Lintz, 100 north-west of Buda, 180 south-west of Cracow, 450 north of Rome, 560 east of Rotterdam, 500 from Paris, 600 from London, and 570 west of Constantinople. The Turks call it *Beez*, the natives *Wien*, and the Poles *Wieden*. The ancient Vindobona stood in the neighbourhood. The Danube is here pretty wide, forming several beautiful islands well stocked with woods. The country to the east and north is level; but to the west and south there is a range of mountains, clothed with trees and vines. It seems to have been a considerable place in the time of the Romans: for it was the station of their *Classis Iſtrica*, or navy on the Danube; and here the emperor Marcus Aurelius is said to have died. In 1192 it was enlarged, beautified, and walled round, with the ransom-money which the marquis of Austria obliged Rich. I. of England to pay when he made him prisoner in his return from the Holy Land, because he took down the Austrian banner at Joppa, and threw it into the house of office. The city itself is of no great extent, contain-

Victory
||
Vienna

containing, besides churches and cloisters which have generally extensive gardens and walks, about 1200 houses from four to seven stories high, 80 streets, and 15 principal squares. There are many magnificent palaces in it; and in the burghers houses the second story is allotted for the residence of the imperial court officers. It is well fortified after the modern way; and, including the suburbs, may be about a quarter as big as London and Westminster. It is very populous, having always great numbers of strangers in it, of most European nations, in their proper habits, and may contain generally about 180,000 souls. The streets are narrow and dirty; and the air would be very unwholesome, were it not for the high winds which blow here most part of the year: whence the proverb, *Vienna vel ventosa, vel venenosa*. In most of the squares are beautiful fountains and magnificent monuments, erected by the emperors. The metropolitan church of St Stephen is a large magnificent Gothic building, with a tower 460 Austrian feet high, and a bell upwards of 10 feet in height and 32 in circumference. The bowels of the archducal family at their deaths are deposited in a vault of this church; but their hearts in the cloister church of the bare-footed Augustines, which is the imperial abbey-church, and their bodies in that of the capuchin-cloister. The archbishop's revenue is near 30,000 imperial florins per annum. Among the cloisters, of which there are a great number here, both in the city and suburbs, one of the principal is the Schotten, or Scottish Benedictine abbey, whose abbot is mitred, and to whose jurisdiction the populous suburb of St Ulrich, together with the Neubau, is subject. This abbey was founded for the Scots, in honour of their countryman St Colman, who was formerly reckoned the patron of Austria. At the entrance of St Stephen there is a stone placed in the wall, and held in great veneration by the Papists, being supposed to be one of those with which St Stephen was stoned to death. It looks like a pebble, and is worn very smooth, in consequence of the superstition of the people, who are continually touching it out of devotion. From the spire of the church is a most noble prospect of the city and adjacent country, and of the Danube, almost to Presburgh in Hungary. In the tower there is a case of wooden hammers, with which they call the people to church from Good-Friday to Easter-Sunday, because they will not suffer the bells to ring out during the time that our Saviour is supposed to have lain in the grave. Here are many hospitals; one in particular called the *Burgher-spital*, in which near 3000 persons are maintained. The imperial palace is a mean old building, consisting of two courts; the inner for the imperial family; and the outer, which is the largest, for lodging the courtiers and guards. The imperial cabinet of coins and medals is the largest and grandest in Europe; and the imperial library equals, if not exceeds, that of the Vatican, and the royal library at Paris, being supposed to contain near 100,000 volumes. Among other curious manuscripts is one of Livy, above 1000 years old; a Greek manuscript of Dioscorides, above 1100; a Greek manuscript of the book of Genesis above 1300, containing many curious draughts and representations in miniature or water-colours; Luther's Bible, with a great many notes in his own hand-writing; a

Greek manuscript of the New Testament, above 1500 years old, in gold letters on purple. Here is a noble university, endowed with large revenues and privileges; and divided into four classes, having each of them peculiar rules and immunities; namely, the Austrian class for the students of Austria, Italy, and other countries beyond the Alps; that of the Rhine, for the western parts of the empire, France, Spain, and the Netherlands; that of the Hungarians, for Hungary, Bohemia, with other countries, which speak Slavonic, and some parts of Germany, with Great Britain and Ireland. The principal, or chancellor, with the other masters of the university, have the power of life and death over the scholars: but the establishments for painting, sculpture, and the other fine arts, are on a much better footing here than those for the sciences, especially in respect to philosophy and divinity, which are little better than a heap of scholastic chimeras. However, in the year 1752, an imperial ordinance was issued, with a view to improve the method of teaching. Vienna is divided into four quarters, one of which is called the *Schotten*, that is, the Scots quarter. One of the gates also is called the *Scots gate*, in remembrance of some noble exploit performed there by the troops of that nation. The ministers of the Protestant crowned heads have chapels here, as in other Roman Catholic countries; and some Protestants held offices, both civil and military, under the late emperor Charles VI. The suburbs are much larger than the city itself. To ride round the line which incloses them, at an ordinary pace, would take up about four hours. The largest of them is called *Leopold stadt*, from the emperor Leopold. In that of Rouslau, is the grand palace of Lichtenstein. In that of Wieden, is the new imperial favourite, or summer-palace. In that called *Reunweg*, is the cloister of the female Salesians or English nuns, with the grand palaces of the late prince Eugene of Savoy, and of the prince of Schwarzenberg. In that called *Landstrasse*, is a fine cloister of hermits of the order of St Augustine, who wear white ermine. The city, by means of the Danube, is well supplied with provisions, and everything else useful, necessary, or agreeable. As it is the seat of the court, and the supreme colleges and tribunals, there is a prodigious resort to it, especially of the noblesse, from all the hereditary countries, and others, particularly those of the empire. The grandeur of this court exceeds that of most others. All or most of the officers of state and of the household, of the horse and foot guards, and above 100 gentlemen of the bed-chamber, who wear golden keys at their breasts, are either princes, counts, or barons; but the etiquette, that is, ancient forms and usages which are rigidly observed, though universally exclaimed against, gives it an air of constraint, that is no where else to be seen. Days of Gala, i. e. festivals and holidays, are very welcome to both the court and city. They are of three sorts, the court-gala, the grand-gala, and little-gala. The first are the birth-days, name-days, &c. of the emperor and empress. The second, those of some minister, which are kept in the city. And the third, when any piece of good fortune happens to a family of rank and distinction.

VIGIL, in church-history, is the eve or next day before any solemn feast; because then Christians were

Vigl's. wont to watch, fast, and pray, in their churches.

VIGILS of Plants, a term under which botanists comprehend the precise time of the day in which the flowers of different plants open, expand, and shut.

As all plants do not flower in the same season, or month; in like manner, those which flower the same day, in the same place, do not open and shut precisely at the same hour. Some open in the morning, as the lily flowers, and compound flowers with flat spreading petals; others at noon, as the mallows; and a third set in the evening, or after sun-set, as some geraniums and opuntias: the hour of shutting is equally determined. Of those which open in the morning, some shut soon after, while others remain expanded till night.

The hours of opening, like the time of flowering, seem to vary, according to the species of the plant, the temperature of the climate, and that of the season. Flowers, whose extreme delicacy would be hurt by the strong impressions of an ardent sun, do not open till night; those which require a moderate degree of heat to elevate their juices, in other words, whose juices do not rise but in the morning or evening, do not expand till then; whilst those which need a more lively heat for the same purpose, expand at noon, when the sun is in his meridian strength. Hence it is, that the heat of the air being greater betwixt the tropics than elsewhere, plants which are transported from those climates into the cold or temperate climates of Europe, expand their flowers much later than in their native soil. Thus, a flower which opens in summer at six o'clock in the morning at Senegal, will not open at the same season in France and England till eight or nine, nor in Sweden till ten; that which opens at ten at Senegal, does not open in France and England till noon; and, in Sweden, the plant does not flower, or, at least, loses its petals, and frequently bears no fruit: lastly, a plant which opens its flowers, in Senegal, at noon, or at one or two hours after noon, bears neither flowers nor fruit in France, England, and Sweden. The same thing happens to most plants of temperate countries, when removed to Senegal, or other sultry climes.

Linnaeus distinguishes by the general name of *solar* (*flores solares*) all those flowers which observe a determinate time in opening and shutting. These flowers are again divided, from certain circumstances, into three species, or kinds:

Equinoctial flowers (*flores aequinoctiales*) are such as open and shut at all seasons, at a certain fixed or determinate hour.

Tropical flowers (*flores tropici*) are such whose hour of opening is not fixed at all seasons, but accelerated or retarded according as the length of the day is increased or diminished.

Meteorous flowers (*flores meteorici*) are such whose hour of expansion depends upon the dry or humid state of the air, and the greater or less pressure of the atmosphere. Of this kind is the Siberian fow-thistle, which shuts at night if the ensuing day is to be clear and serene, and opens if it is to be cloudy and rainy. In like manner the African marigold, which in dry serene weather opens at six or seven in the morning, and shuts at four o'clock in the afternoon, is a sure indication that rain will fall during the course of the day, when it continues shut after seven.

VIGNOLA (James Barozzio de), a learned architect of the 16th century, was born at Vignola a small town in the marquise of that name, and became esteemed at Rome and in France for his taste and skill in the art of building and casting statues. He composed a book on the five orders of architecture, which is esteemed; and died at Rome in 1573, aged 66.

VIGO, a sea-port town of Spain, in Galicia, with an old castle and a fort. It is seated in a fertile country by the sea-side. It was rendered famous by a sea-fight between the confederate fleet commanded by Sir Geo. Rooke, and a squadron of French men of war, while the duke of Ormond with a body of land-forces drove the Spaniards from the castles which defended the harbour. Admiral Hopson having with infinite danger, broke thro' the boom, made across the mouth of the harbour, the English took four galleons and five large men of war, and the Dutch five galleons and one man of war. Four galleons, with 14 men of war, were destroyed, with abundance of plate and other rich effects. W. Long. 8. 21. N. Lat. 42. 3.

VILLA FRANCA, the name of several towns; one in Piedmont, three miles east of Nice; another of Catalonia, 18 miles west of Barcelona; a third, the capital of St Michael, one of the Azores; and a fourth, a town of Eltreadura in Spain, 57 miles south-east of Salamanca.

VILLAGE, an assemblage of houses inhabited chiefly by peasants and farmers, and having no market, whereby it is distinguished from a town. The word is French, formed of *vil*, or *villu*, "low, mean, contemptible;" or rather, from the Latin *villa*, a country-house or farm.

VILLAIN, or **VILLEIN**, in our ancient customs, denotes a man of servile or base condition, viz. a bond-man or servant.

VILLARS (Lewis Hector, duke de) marshal of France, grandee of Spain, &c. and a very brave general in the 18th century, was the son of Peter marquis de Villars, of a noble and ancient family. He was at first aid-de-camp to marshal de Bellefons, his cousin; and distinguished himself in several sieges and battles till the year 1702, when having obtained the victory at Fredlinghem from the prince of Baden, he was made marshal of France. The marshal de Villars took the fort of Kell the year following, and gained the battle of Hochstet. In 1707 he forced the lines of Stolhoffen, and raised large contributions from the enemy: but in 1709, he, in conjunction with marshal Boufflers, was entirely defeated by the duke of Marlborough, at the battle of Malplaquet, when marshal Villars was wounded at the beginning of the action. In 1712, he gained much glory by forcing the intrenchments at Denain on the Scheld; which was followed by the taking of Marchiennes, Douay, Bouchain, Landau, Friburg, &c. and by the peace concluded at Rastat between the emperor and France in 1714. The marshal de Villars, who had been plenipotentiary at the treaty of Rastat, was made president of the council of war in 1715, then counsellor of the regency, and minister of state. In 1733, he was nominated to command in Italy under the king of Sardinia, and the French king declared him marshal-general of his camps and armies; a title which had not been granted to any one since the marshal Turenne, who

Villanage. who appears to have been the first who was ever honoured with it. The marshal de Villars made himself master of P.ighitona, Milan, Novare, and Tortona. But having opened the following campaign, he fell sick, and died at Turin, in 1734, aged 82. The Memoirs of M. de Villars have been published in Holland, the first volume of which was written by himself.

VILLENAGE, in law. The folk-land or estates held in villanage, was a species of tenure neither strictly feudal, Norman, or Saxon; but mixed, and compounded of them all; and which also, on account of the heriots that usually attend it, may seem to have somewhat Danish in its composition. Under the Saxon government there were, as Sir William Temple speaks, a sort of people in a condition of downright servitude, used and employed in the most servile works, and belonging, both they, their children, and effects, to the lord of the soil, like the rest of the cattle or flock upon it. These seem to have been those who held what was called the *folkland*, from which they were removeable at the lord's pleasure. On the arrival of the Normans here, villeins seem improbable, that they, who were strangers to any other than a feudal state, might give some sparks of enfranchisement to such wretched persons as fell to their share, by admitting them, as well as others, to the oath of fealty; which conferred a right of protection, and raised the tenant to a kind of estate superior to downright slavery, but inferior to every other condition. This they called *villanage*, and the tenants *villeins*, either from the word *villus*, or else, as Sir Edward Coke tells us, from *villa*; because they lived chiefly in villages, and were employed in rustic works of the most lordly kind: like the Spartan *hektes*, to whom alone the culture of the lands was confided; their rugged masters, like our northern ancestors, esteeming war the only honourable employment of mankind.

These villeins, belonging principally to lords of manors, were either villeins *regardant*, that is, annexed to the manor or land: or else they were *in gross*, or at large; that is, annexed to the person of the lord, and transferable by deed from one owner to another. They could not leave their lord without his permission; but, if they ran away, or were purloined from him, might be claimed and recovered by action, like beasts or other chattels. They held indeed small portions of land by way of sustaining themselves and families; but it was at the mere will of the lord, who might dispossess them whenever he pleased; and it was upon villein services, that is, to carry out dung, to hedge and ditch the lord's demesnes, and any other the meanest offices: and their services were not only bad, but uncertain both as to their time and quantity.

A villein could acquire no property either in lands or goods: but, if he purchased either, the lord might enter upon them, oust the villein, and seize them to his own use; unless he contrived to dispose of them again before the lord had seized them, for the lord had then lost his opportunity.

In many places also a fine was payable to the lord, if the villein presumed to marry his daughter to any one without leave from the lord: and, by the common law, the lord might also bring an action against the husband for damages in thus purloining his property.

For the children of villeins were also in the same state of bondage with their parents; whence they were called in Latin, *nativij*, which gave rise to the female appellation of a villein, who was called a *neise*. In case of a marriage between a freeman and a neise, or a villein and a freewoman, the issue followed the condition of the father, being free if he was free, and villein if he was villein; contrary to the maxim of the civil law, that *partus sequitur ventrem*. But no bastard could be born a villein, because by another maxim of our law he is *nullius filius*; and as he can gain nothing by inheritance, it were hard that he should lose his natural freedom by it. The law, however, protected the persons of villeins, as the king's subjects, against atrocious injuries of the lord: for he might not kill or maim his villein; though he might beat him with impunity, since the villein had no action or remedy at law against his lord, but in case of the murder of his ancestor or the maim of his own person. Neise indeed had also an appeal of rape, in case the lord had violated them by force.

Villeins might be enfranchised by manumission. In process of time they gained considerable ground on their lords; and in particular strengthened the tenure of their estates to that degree, that they came to have in them an interest in many places full as good, in others better than their lords. For the good-nature and benevolence of many lords of manors having, time out of mind, permitted their villeins and their children to enjoy their possessions without interruption, in a regular course of descent, the common law, of which custom is the life, now gave them title to prescribe against their lords; and, on performance of the same services, to hold their lands, in spite of any determination of the lord's will. For, though in general they are still paid to hold their estates at the will of the lord, yet it is such a will as is agreeable to the custom of the manor; which customs are preserved and evidenced by the rolls of the several courts-baron in which they are entered, or kept on foot by the constant immemorial usage of the several manors in which the lands lie. And, as such tenants had nothing to show for their estates but these customs, and admissions in pursuance of them, entered on those rolls, or the copies of such entries witnessed by the steward, they now began to be called *tenants by copy of court-roll*, and their tenure itself a *copyhold*.

Privileged VILLENAGE, a species of tenure otherwise called *villein-sage*. See **TENURE**.

Ancient demesne consists of those lands or manors which, though now perhaps granted out to private subjects, were actually in the hands of the crown in the time of Edward the confessor, or William the conqueror; and so appear to have been by the great survey in the exchequer called *demefay book*. The tenants of these lands, under the crown, were not all of the same order or degree. Some of them, as Britton testifies, continued for a long time pure and absolute villeins; dependent on the will of the lord: and common copyholders in only a few points. Others were in great measure enfranchised by the royal favour: being only bound in respect of their lands to perform some of the better sort of villein-services; but those determinate and certain; as, to plough the king's land for so many days, to supply his court with

such

such a quantity of provisions, and the like; all of which are now changed into pecuniary rents: and in consideration hereof they had many immunities and privileges granted to them; as, to try the right of their property in a peculiar court of their own, called a *court of ancient demesne*, by a peculiar process denominated a writ of right close: not to pay toll or taxes; not to contribute to the expenses of knights of the shire; not to be put on juries, and the like.

These tenants therefore, though their tenure be absolutely copyhold, yet have an interest equivalent to a freehold: for, though their services were of a base and villainous original, yet the tenants were esteemed in all other respects to be highly privileged villeins; and especially for that their services were fixed and determinate, and that they could not be compelled (like pure villeins) to relinquish those tenements at the lord's will, or to hold them against their own: *et ideo*, says Bracton, *dicuntur liberi*.

Lands holding by this tenure are therefore a species of copyhold, and as such preserved and exempted from the operation of the statute of Charles II. Yet they differ from common copyholds, principally in the privileges before-mentioned: as also they differ from freeholders by one especial mark and tincture of villenage, noted by Bracton, and remaining to this day; viz. that they cannot be conveyed from man to man by the general common law conveyances of feoffment, and the rest; but must pass by surrender to the lord or his steward, in the manner of common copyholds: yet with this difference, that, in the surrenders of these lands in ancient demesne, it is not used to say, "to hold at the will of the lord," in their copies; but only, "to hold according to the custom of the manor."

VILLI, among botanists, a kind of down like short hair, with which some trees abound.

VILLIERS (George duke of Buckingham), an ingenious and witty nobleman, whose mingled character rendered him at once the ornament and disgrace, the envy and ridicule, of the court he lived in, was son to that famous statesman and favourite of king Charles I. who lost his life by the hands of Lieutenant Felton. He was born in 1627, the year before the fatal catastrophe of his father's death. The early parts of his education he received from various domestic tutors, after which he was sent to the university of Cambridge. Having here completed a course of studies, he, with his brother Lord Francis, went abroad under the care of one Mr Aylebury.—Upon his return, which was not till after the breaking out of the civil wars, the king being at Oxford, his grace repaired thither, was presented to his majesty, and entered of Christ-church college. Upon the decline of the king's cause, he attended prince Charles into Scotland, and was with him at the battle of Worcester in 1661; after which, making his escape beyond sea, he again joined him, and was soon after, as a reward for this attachment, made knight of the garter.

Desirous, however, of retrieving his affairs, he came privately to England; and in 1657 married Mary, the daughter and sole heiress of Thomas lord Fairfax, through whose interest he recovered the greatest part of the estate he had lost, and the assurance of succeeding to an accumulation of wealth in the right of his wife.

We do not find, however, that this step lost him the royal favour; for after the restoration, at which time he is said to have possessed an estate of L. 20,000 *per annum*, he was made one of the lords of the bed-chamber, called to the privy-council, and appointed lord lieutenant of Yorkshire and master of the horse. All these high posts, however, he lost again in the year 1666. For having been refused the post of president of the north, he became disaffected to the king; and it was discovered that he had carried on a secret correspondence by letters and other transactions with one Dr Heydon, tending to raise mutinies among his majesty's forces, particularly in the navy, to stir up sedition among the people, and even to engage persons in a conspiracy for the seizing the tower of London. Matters were ripe for execution; and an insurrection, at the head of which the duke was openly to have appeared, was on the very eve of breaking out, when it was discovered by means of some agents whom Heydon had employed to carry letters to the duke. The detection of this affair so exasperated the king, who knew Buckingham to be capable of the blackest designs, that he immediately ordered him to be seized; but the duke finding means, having defended his house for some time by force, to make his escape, his majesty struck him out of all his commissions, and issued a proclamation requiring his surrender by a certain day.

This storm, however, did not long hang over his head; for, on his making an humble submission, king Charles, who was far from being of an implacable temper, took him again into favour, and the very next year restored him both to the privy-council and bed-chamber. But the duke's disposition for intrigue and machination could not long lie idle; for having conceived a resentment against the duke of Ormond for having acted with some severity against him in regard to the last-mentioned affair, he, in 1670, was supposed to be concerned in an attempt made on that nobleman's life by the same Blood who afterwards endeavoured to steal the crown. Their design was to have conveyed the duke to Tyburn, and there to have hanged him; and so far did they proceed towards the putting it in execution, that Blood and his son had actually forced the duke out of his coach in St James's street, and carried him away beyond Devonshire house, Piccadilly, before he was rescued from them. See BLOON.

It does not appear, however, that this transaction hurt the duke's interest at court; for in 1671 he was installed chancellor of the university of Cambridge, and sent ambassador to France. Here he was very nobly entertained by Lewis XIV. and presented by that monarch at his departure with a sword and belt set with jewels, to the value of 40,000 pistoles; and the next year he was employed in the second embassy to that king at Utrecht. However, in June 1674, he resigned the chancellorship of Cambridge, and about the same time became a zealous partizan and favourite of the Nonconformists. On the 16th of February 1676, his grace, with the earls of Salisbury and Shaftesbury and Lord Warton, were committed to the tower by order of the house of lords, for a contempt in refusing to retract the purport of a speech which the duke had made concerning a dissolution of the parliament. This confinement did not last long,

Villose,
Vinca.

yet we find no material transaction of this nobleman's life recorded after it, till the time of his death, which happened in 1687. Wood tells us that died at his house in Yorkhire; but Mr Pope, who must certainly have had very good information, and it is to be imagined would not have dared to advance an injurious falsehood of a person of his rank, has, in his epistle to Lord Bathurst, given us a most affecting account of the death of this ill-fated nobleman, whom, after having been master of near £ 50,000 *per annum*, he describes as reduced to the deepest distress by his vice and extravagance, and breathing his last moments in a mean apartment at an inn.

As to his personal character, it is impossible to say any thing in its vindication; for though his severest enemies acknowledge him to have possessed great vivacity and a quickness of parts peculiarly adapted to the purposes of ridicule, yet his warmest advocates have never attributed to him a single virtue. His generosity was profuse, his wit malevolence, the gratification of his passions his sole aim through life, his very talents caprice, and even his gallantry the mere love of pleasure. But it is impossible to draw his character with equal beauty, or with more justice than in that given of him by Dryden, in his *Abraham and Achitophel*, under the name of *Zimri*, to which the reader is referred.

As a writer, however, he stands in a quite different point of view. There we see the wit, and forget the libertine.—His poems, which indeed are not very numerous, are capital in their kind; but what will immortalize his memory while language shall be understood, or true wit relished, is his celebrated comedy of *The Rehearsal*.

VILLOSE, or VILLOUS, something abounding with villi or fibres like short hair; such is one of the coats of the stomach.

VINCA, PERIWINKLE; a genus of the monogynia order, belonging to the pentandria class of plants. There are four species, three of which are commonly cultivated in our gardens, viz. 1. The minor, or smaller periwinkle, hath slender, ligenous, trailing, green stalks, branching and running considerably along the ground, emitting roots at the joints; garnished with oval, spear-shaped, thick, smooth, shining-green leaves, in pairs opposite; and flowers growing singly on proper peduncles at the sides of the branches, of different colours in the varieties.

2. The major, or large green periwinkle, rises with shrubby, somewhat erect, green stalks, a foot or two high, with tops inclining to the ground; large, oval, shining-green leaves, in pairs opposite; and large blue flowers singly on foot-stalks at the axillae of the branches. There is a variety with white flowers.—Both the species are perennial in root, stem, and branches, with leaves in perpetual verdure, and begin flowering in the spring, about March and April; the flowers moderately large, each being of one salver-shaped petal, spreading at the brim, and cut into five parts; generally continue flowering in succession several months, and even sometimes in winter, in mild seasons, especially the vinca major.

3. The rosea, or rose periwinkle of Madagascar, rises with an upright, shrubby, smooth, branching stem, a yard or more high; having a brownish bark; ob-

long-oval, smooth, firm leaves, placed opposite; and large beautiful, rose-like, crimson, and pale-red flowers, singly and in pairs at the sides of the branches, being large, spreading above, and divided into five segments; appearing very ornamentally from the spring till winter, succeeded by ripe seeds in the autumn.

The two former kinds may be propagated by layers, cuttings, and suckers; and will thrive any where; but the last being tender, must be constantly kept in a stove.

St VINCENT, one of the Caribbee islands, which received its name from being discovered on the 22d of January, the feast of that Saint. It lies from 13° to 13° 20' of north latitude, and in longitude 59° 40' west from London. At the distance of between 5 and 6 leagues south-west from St Lucia, 23 south-west from Martinico, 36, or, as some compute, 40 south of Dominica, 20 west-by-south from Barbadoes, and 17 or 18 north-east from Grenada. Being thus situated directly to the leeward of Barbadoes, it may in a few hours be reached from thence; and is at the same time so seated as to cover and connect the small islands that lie between it and Grenada. It stretches in length from south to north about 25 miles, and is about 13 in breadth; in circumference between 60 and 70. In point of size therefore it differs but little from Barbadoes. The climate is very warm; at least in the judgment of Europeans. The country is in general hilly, in some places mountainous; but interspersed with a variety of pleasant valleys, and some luxuriant plains, the soil being every where very fertile, and the high grounds are at least in general easy of ascent. Few islands of its extent are so well watered: for several rivers run down from the mountains, and smaller streams from almost every hill; there are likewise several fine springs at a little distance from the sea. The inhabitants raise all kinds of ground provisions in plenty, and with little trouble. The rivers supply them with a variety of fish; and the fame may be said of the sea that washes their coasts. They have abundance of excellent fruits, and very fine timber fit for almost every use; and with which they formerly supplied their neighbours.

The French, though they did not venture to raise sugars, had several spacious plantations at the mouths and on the sides of the rivers, planted with cacao trees, coffee, indigo, and fine tobacco. There are several commodious bays on the north-west and south-west sides; and at the southern extremity there is the deep spacious sandy bay, formerly styled the *Bay of St Antonio*, but now *Kingston Bay*, where large ships may ride commodiously: and there is said to be good anchoring ground round the whole island. It remained, for a long space of time after it was discovered by the Europeans, the head-quarters and general rendezvous of the Caribs and Caribs, who from thence made expeditions to the continent, and were also sometimes very troublesome to the adjacent islands. Besides these there are another race of people generally, though very improperly, styled *Black Caribs*, but who are in reality negroes descended, as is generally believed, from some who escaped out of a Guinea ship wrecked upon the coast, and gradually augmented by such as from time to time fled thither from Barbadoes. These nations were often at war; but when their quarrels were composed,

posed, they had a strength sufficient to prevent strangers from settling by force.

The French, about half a century ago, at the request of the Caribs, made a descent from Martinico, and attacked the negroes, but were repulsed with loss; and found it their interest to conciliate a friendship with both nations by means of presents, and furnishing them with arms and ammunition, which procured them the means of making those plantations that have been before-mentioned. At the treaty of Paris this island was given up to Britain, but has since been taken by the French. In 1770 its exports were, cotton, 284 bags, at 10*l.* *per* bag; 284*ol.* Coffee, 4818 hundred weight one quarter, six pound, at 3*l.* 5*s.* *per* hundred weight, 15,659*l.* 9*s.* 8*d.* Cacao, 1000 hogheads and one barrel, at 25*l.* *per* hoghead, and 12*l.* *per* barrel, 25,012*l.* Rum, 346 hogheads, at 10*l.* *per* hoghead, 3460*l.* Sugar, 2866 hogheads, at 17*l.* 10*s.* *per* hoghead, 50,155*l.* In all to Great Britain, 97,126*l.* 9*s.* 8*d.* To North America, 13,375*l.* Total 110,501*l.* 9*s.* 8*d.*

VINCENT (Nathaniel), an eminent dissenting minister, received his education at Christ Church in Oxford. He became a member of that university at 11 years of age, and when he was about 18 he took the degree of master of arts. He soon became a very famous preacher and writer; but refusing to comply with the act of uniformity, was not only one of the most assiduous, but one of the most unfortunate, of his non-conforming brethren. He was several times imprisoned, and heavily fined; for holding conventicles; and was once sentenced to suffer three years imprisonment, and then banishment, in pursuance of an act made in the 25th of Elizabeth; but his counsel finding a flaw in the indictment, the sentence was never carried into execution. He distinguished himself by preaching amidst the ruins after the fire of London, where multitudes assembled to hear him, many of whose consciences were awakened by that dreadful calamity. He was the author of many sermons, and other practical pieces of divinity; and died in 1679.

Thomas Vincent, his brother, a man of a similar character, exerted himself on the same occasion, as he did also in the time of the pestilence, when he constantly preached in London, and visited the sick, but escaped the distemper himself. He was the author of "God's terrible Voice to the City by Fire and Plague, 8vo;" and published another of the like kind, occasioned by an eruption of Mount *Ætna*, intitled *Fire and Brimstone*, 1. From heaven, in the burning of Sodom and Gomorrah formerly; 2. From earth, in the burning of Mount *Ætna* lately; 3. From hell, in the burning of the wicked eternally. He wrote several other works.

VINCI (Leonardo da), an illustrious Italian painter, descended from a noble Tuscan family, was born in the castle of Vinci near Florence in 1445. He was placed under Andrea Verocchio, a celebrated painter in that city; but soon surpassed him and all his predecessors so much, as to be reputed the master of the third or golden age of modern painting. But his studies were far from terminating here; no man's genius was more universal: he applied himself to arts, to literature, and to the accomplishments of the body; and he excelled in every thing he attempted. Lewis Sforza duke of Milan, prevailed on him to be director of the academy for architecture he had just established; where

Leonardo soon banished all the Gothic fashions, and reduced every thing to the happy simplicity of the Greek and Roman style. By the duke's order he constructed the famous aqueduct that supplies the city of Milan with water: this canal goes by the name of *Mortefiana*, being above 200 miles in length; and conducts the water of the river Adda quite to the walls of the city. In 1479, he was desired to construct some new device for the entertainment of Lewis XII. of France, who was then to make his entrance into Milan. Leonardo accordingly made a very curious automaton in the form of a lion, which marched out to meet the king, reared up on its hinder legs before him, and opening its breast, displayed an escutcheon with *fleur de lys* quartered on it. The disorders of Lombardy, with the misfortunes of his patrons the Sforzi, obliging Leonardo to quit Milan, he retired to Florence, where he flourished under the Medici: here he railed the envy of Michael Angelo, who was his cotemporary; and Raphael, from the study of his works, acquired his best manner of designing. At length, on the invitation of Frances I. he removed to France when above 70 years of age; where the journey and change of climate threw him into his last sickness: he languished for some months at Fontainebleau, where the king came frequently to see him; and one day rising up in his bed to acknowledge the honour done him, he fainted, and Francis supporting him, Leonardo died in his arms. His death happened in 1520. Some of his paintings are to be seen in England and other countries, but the greatest part of them are in Florence and France. He composed a great number of discourses on curious subjects; but none of them have been published but his treatise on the Art of Painting.

VINE, in botany. See VITIS.

VINEGAR, ACETUM, an agreeable acid and penetrating liquor, prepared from wine, cyder, beer, and others liquors; of considerable use, both as a medicine and a sauce. The word is French, *vinagre*; formed from *vin*, "wine;" and *aigre*, "sour." See ACETUM and WINE.

Wine and other vinous liquors are said to gain a grateful sharpness, *i. e.* to become vinegar, by having their salts extraded by insolation or other means, and their sulphurs weakened or depressed.

Others ascribe the conversion of vinous liquors into vinegar, to the grinding or sharpening of the longitudinal particles thereof; by which means they become more sharp and pungent.

The method of making vinegar has long been kept a secret among the people of that profession; who, it is said, oblige themselves to each other by an oath not to reveal it: but notwithstanding this, the Philosophical Transactions, and some other late writings, furnish us with approved accounts thereof.

Method of making Cyder VINEGAR.—The cyder (the meanest of which will serve the purpose) is first to be drawn off fine into another vessel, and a quantity of the must of apples to be added: the whole is set in the sun, if there be convenience for it; and at a week or nine days end it may be drawn off. See CYDER.

Method of making Beer VINEGAR.—Take a middling sort of beer, indifferently well hopped; into which, when it has worked well and grown fine, put some rape,

Vinegar.

rape, or husks of grapes, usually brought home for that purpose: mash them together in a tub; then letting the rape settle, draw off the liquid part, put it into a cask, and set it in the sun as hot as may be; the bung being only covered with a tile, or slate-stone: and in about 30 or 40 days it will become a good vinegar, and may pass in use as well as that made of wine, if it be refined, and kept from turning musty.

Or thus:—To every gallon of spring-water add three pounds of Malaga raisins; which put into an earthen jar, and place them where they may have the hottest sun from May till Michaelmas; then pressing all well, tun the liquor up in a very strong iron-hooped vessel, to prevent its burbling: it will appear very thick and muddy when newly pressed; but will refine in the vessel, and be as clear as wine.—Thus let it remain untouched for three months before it is drawn off, and it will prove excellent vinegar.

To make Wine VINEGAR.—Any sort of vinous liquor being mixed with its own feces, flowers, or ferment, and its tartar first reduced to powder; or else with the acid and anther stalks of the vegetable from whence the wine was obtained, which hold a large proportion of tartar; and the whole being kept frequently stirring in a vessel which has formerly held vinegar, or set in a warm place full of the fumes of the same, will begin to ferment anew, conceive heat, grow four by degrees, and soon after turn into vinegar.

The remote subjects of acetous fermentation are the same with those of vinous; but the immediate subjects of it, are all kinds of vegetable juices, after they have once undergone that fermentation which reduces them to wine: for it is absolutely impossible to make vinegar of must, the crude juice of grapes, and other ripe fruits, without the previous assistance of vinous fermentation.

The proper ferments for this operation, whereby vinegar is prepared, are, 1. The feces of all acid wines. 2. The lees of vinegar. 3. Pulverized tartar, especially that of Rhenish wine, or the cream or crystals thereof. 4. Vinegar itself. 5. A wooden vessel well drenched with vinegar, or one that has long been employed to contain it. 6. Wine that has often been mixed with its own feces. 7. The twigs of vines, and the stalks of grapes, currants, cherries, or other vegetables of an acid anther taste. 8. Bakers leaven, after it is turned acid. 9. All manner of ferments, compounded of those already mentioned.

Vinegar is no production of nature, but a creature of art: for verjuice, the juices of citrons, lemons, and the like native acids, are improperly said to be *natural vinegars*; because, when distilled, they afford nothing but rapid water: whereas it is not the property of vinegar to yield an acid spirit by distillation.

Method of making VINEGAR in France.—The French use a method of making vinegar different from that above described.—They take two very large oaken vessels, the larger the better, open at the top; in each whereof they place a wooden grate, within a foot of the bottom; upon these grates they first lay twigs or cuttings of vines, and afterwards the stalks of the branches, without the grapes themselves, or their stones, till the whole pile reaches within a foot of the brim of the vessels; then they fill one of these vessels with wine to the very top, and half fill the other; and with li-

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quor drawn out of the full vessel, fill up that which was only half full before; daily repeating the same operation, and pouring the liquor back from one vessel to the other; so that each of them is full and half-full by turns.

When this process has been continued for two or three days, a degree of heat will arise in the vessel which is then but half full, and increase for several days successively, without any appearance of the like in the vessel which happens to be full during those days, the liquor whereof will still remain cool: and as soon as the heat ceases in the vessel that is half full, the vinegar is prepared: which, in the summer, happens on the 14th or 15th day from the beginning; but in the winter, the fermentation proceeds much slower, so that they are obliged to forward it by artificial warmth or the use of stoves.

When the weather is exceeding hot, the liquor ought to be poured off from the full vessel into the other twice a-day; otherwise the liquor would be over-heated, and the fermentation prove too strong: whence the spirituous parts would fly away, and leave a rapid wine instead of vinegar behind.

The full vessel is always to be left open at the top; but the mouth of the other must be cloisted with a cover of wood, in order the better to keep down and fix the spirit in the body of the liquor; for otherwise it might easily fly off in the heat of fermentation. The vessel that is only half full seems to grow hot rather than the other, because it contains a much greater quantity of the vine-twigs and stalks, than that in proportion to the liquor; above which the pile rising to a considerable height, conceives heat the more, and so conveys it to the wine below.

VINEGAR Concentrated. See CHEMISTRY, n° 287.

VINEGAR, (Salt of.) See CHEMISTRY, n° 288.

Eels in VINEGAR. See ANIMALCULE, n° 8.

VINEYARD, a plantation of vines. The best situation of a vineyard is on the declivity of a hill facing the south.

VIO (Thomas de). See CAJETAN.

VIOL, a musical instrument of the same form with the violin, and, like that, struck with a bow.

VIOLA, the VIOLET; a genus of the monogynia order, belonging to the lyngensia class of plants. There are many species. The odorata, odoriferous, or common sweet-scented March violet, with the flowers of different colours in the varieties, appearing in March. The flowers impart a fine sweet odour, and are used in medicine. It grows naturally in woods, and under hedges, &c. in most parts of Europe; but has been a long resident of gardens as a flowery plant, and for its use in medicine.

2. The tricolor, or three-coloured violet, commonly called *heart's-ease*, or *passey*, assumes a bushy, tufted growth; and at the axillas of the branches are numerous variegated, three-coloured flowers, yellow, purple, and white, appearing in constant succession all summer and autumn. It grows naturally in cultivated places in the north of England, &c.

This elegant little plant merits culture in every garden, for the beauty and great variety of its three-coloured flowers; and it will succeed anywhere where in the open borders, or other compartments, disposed in patches towards the front; either by sowing the seed at once to remain,

Vinegar
of
Viola.

Violation
||
Virgil.

Virgil.

remain, or by putting in young plants previously raised in a feed-bed: they will begin flowering early in summer, and will continue shooting and flowering in succession till winter; and even during part of that season in cold weather.

The common violet is propagated by parting the roots, sometimes by seed.

VIOLETION, the act of violating, that is, forcing a woman, or committing a rape upon her.—This term is also used in a moral sense, for a breach or infringement of a law, ordinance, or the like.

VIOLET, in botany. See VIOLA.

VIOLET-Grab, in zoology. See CANCER.

VIOLIN, or FIDDLE, a musical instrument mounted with four strings or guts, and struck or played with a bow. The style and sound of the violin is the gayest and most sprightly of all other instruments; and hence it is of all others the fittest for dancing. Yet there are ways of touching it, which render it grave, soft, languishing, and fit for church or chamber music.—It generally makes the treble, or highest parts in concerts. Its harmony is from fifth to fifth. Its play is composed of bass, counter-tenor, tenor, and treble; to which may be added, a fifth part: each part has four fifths, which rise to a greater seventeenth.

VIOLONCELLO, of the Italians, is properly our fifth violin; which is a little bass violin half the size of the common bass violin, and the strings bigger and longer in proportion: consequently its sound is an octave lower than our bass violin; which has a noble effect in concerts.

VIPER, in zoology. See COLUBER.

VIRAGO, a woman of extraordinary stature and courage; and who, with the female sex, has the mien and air of a man, and performs the actions and exercises of men.

VIRGIL, or PUBLIUS VIRGILIUS MARO, the most excellent of all the Latin poets, was the son of a potter of Andes, near Mantua, where he was born, 70 years B. C. He studied first at Mantua; then at Cremona, Milan, and Naples; whence going to Rome, he acquired the esteem of the greatest wit and most illustrious persons of his time; and among others, of the emperor Augustus, Mæcenas, and Pollio. He was well skilled not only in polite literature and poetry, but also in philosophy, the mathematics, geography, medicine, and natural history. Though one of the greatest geniuses of his age, and the admiration of the Romans, he always preserved a singular modesty, and lived chaste at a time when the manners of the people were extremely corrupt. He carried Latin poetry to such an high perfection, that he was justly esteemed the prince of Latin poets. He first turned himself to pastoral; and being captivated with the beauty and sweetness of Theocritus, was ambitious to introduce this new species of poetry among the Romans. His first performance in this way is supposed to have been written U. C. 709, the year before the death of Julius Cæsar, when the poet was in his 25th year: it is intitled *Alexis*. Possibly *Palemon* was his second: it is a close imitation of the fourth and fifth Idylls of Theocritus. Mr Warton places *Silenus* next; which is said to have been publicly recited on the stage by Cytheris, a celebrated comedian. Virgil's fifth eclogue is composed in allusion to the death and deifi-

cation of Cæsar. The battle of Philippi in 712 having put an end to the Roman liberty, the veteran soldiers began to murmur for their pay; and Augustus, to reward them, distributed among them the lands of Mantua and Cremona. Virgil was involved in this common calamity; and applied to Varus and Pollio, who warmly recommended him to Augustus, and procured for him his patrimony again. Full of gratitude to Augustus, he composed the *Tityrus*, in which he introduces two shepherds: one of them complaining of the distraction of the times, and of the havoc the soldiers made among the Mantuan farmers; the other rejoicing for the recovery of his estate, and promising to honour as a God the person who restored it to him. But our poet's joy was not of long continuance; for we are told, that when he returned to take possession of his farm, he was violently assaulted by the intruder, and would certainly have been killed by him if he had not escaped by swimming hastily over the Mincio. Upon this unexpected disappointment, he returned to Rome to renew his petition; and during his journey seems to have composed his ninth eclogue. The celebrated eclogue, intitled *Pollio*, was composed U. C. 714, upon the following occasion. The consul Pollio on the part of Antony, and Mæcenas on the part of Cæsar, had made up the differences between them; by agreeing, that Octavia, half-sister to Cæsar, should be given in marriage to Antony. This agreement caused an universal joy; and Virgil, in his eclogue, testified his. Octavia was with child by her late husband Marcellus at the time of this marriage; and whereas the Sybilline oracles had foretold, that a child was to be born about this time, who should rule the world, and establish perpetual peace, the poet ingeniously supposes the child in Octavia's womb to be the glorious infant, under whose reign mankind was to be happy, the golden age to return from heaven, and fraud and violence to be no more. In this celebrated poem, the author with great delicacy at the same time pays his court to both the chiefs, to his patron Pollio, to Octavia, and to the unborn infant. In 715, Pollio was sent against the Parthini, a people of Illyricum; and during this expedition, Virgil addressed to him a beautiful eclogue, called *Pharmacutria*. His tenth and last eclogue was addressed to Gallus. These were our poet's first productions; and we have been the more circumstantial in our account of some of them, as many particulars of his life are intimately connected with them.

Being in his 34th year, he retired to Naples, and laid the plan of his inimitable *Georgics*; which he undertook at the intreaties of Mæcenas, to whom he dedicated them: not to rival and excel Hesiod, as he had lately done Theocritus, but on a noble political motive, and to promote the welfare of his country. Great was the desolation occasioned by the civil wars: Italy was almost depopulated; the lands were uncultivated and unstocked; a famine and insurrection ensued; and Augustus himself hardly escaped being stoned by the people, who attributed this calamity to his ambition. His wife and able minister therefore resolved, if possible, to revive the decayed spirit of husbandry; to introduce a taste for agriculture, even among the great; and could not think of a better method to effect this, than to recommend it by the insinuating charms of poetry. Virgil fully answered the expectations of his polite patron, by

by his Georgics. They are divided into four books. Corn and ploughing are the subject of the first, vines of the second, cattle of the third, and bees of the fourth.

He is supposed to have been in his 45th year when he began to write the *Æneid*; the design of which is thus explained by Mr Spence in his *Polymetis*. Augustus being freed from his rival Antony, the government of the Roman empire was to be wholly in him; and though he chose to be called their father, he was, in every thing but the name, their king. But the monarchical form of government must naturally displease the Romans; and therefore Virgil, like a good courtier, seems to have laid the plan of his poem to reconcile them to it. He takes advantage of their religious turn, and of some old prophecies that must have been very flattering to the Roman people, as promising them the empire of the whole world. He weaves this in with the most probable account of their origin; that of their being descended from the Trojans. He shows, that *Æneas* was called into their country by the express order of the gods; that there was an uninterrupted succession of kings from him to *Romulus*; that *Julius Cæsar* was of the royal race, and that *Augustus* was his sole heir. The result of all this was, that the promises made to the Roman people in and through this race, terminating in *Augustus*, the Romans, if they would obey the gods, and be masters of the world, were to yield obedience to the new establishment under that prince. *Augustus* was eager to peruse this poem before it was finished; and intreated him by letters to communicate it. *Macrobius* has preferred to us part of one of Virgil's answers to the emperor, in which the poet excuses himself: who, however, at length complied, and read himself the sixth book to the emperor; when *Octavia*, who had just lost her son *Marcellus*, the darling of Rome, and adopted son of *Augustus*, made one of the audience. Virgil had artfully inserted that beautiful lamentation for the death of young *Marcellus*, beginning with—*O nate, ingentem luctum ne quæreaturum*—but suppressed his name, till he came to the line—*Tu Marcellus eris*: upon hearing which, *Octavia* could bear no more, but fainted away; overcome with surprise and sorrow. When she recovered, she made the poet a present of ten sesterces for every line, which amounted in the whole to above 2000*l*.

The *Æneid* being brought to a conclusion, but not to the perfection our author intended to give it, he resolved to travel into Greece to correct and polish it at leisure. It was probably on this occasion that *Horace* addressed that affectionate ode to him, *Sic te Divæ potens Cypris, &c.* *Augustus* returning victorious from the east, met with Virgil at Athens, who thought himself obliged to attend the emperor to Italy: but the poet was suddenly seized with a fatal distemper, which being increased by the agitation of the vessel, put an end to his life as soon as he landed at Brundisium, in his 52d year. He had ordered in his will, that the *Æneid* should be burnt as an unfinished poem; but *Augustus* forbid it, and had it delivered to *Varius* and *Tucca*, with the strict charge to make no additions, but only to publish it correctly. He died with such steadiness and tranquillity, as to be able to dictate his own epitaph in the following words:

*Mantua me genuit: Calabri rapuere, tenet nunc
Parthenope: cecini Pæsiua, Rura, Duces.*

His bones were carried to Naples, according to his earnest request; and a monument was erected at a small distance from the city.

Virgil was of a swarthy complexion, tall, of a sickly constitution, and afflicted with frequent head-achs and spitting of blood. He was so very bashful, that he often ran into the shops to prevent being gazed at in the streets; yet was so honoured by the Roman people, that once coming into the theatre, the whole audience rose up out of respect to him. He was of a thoughtful and melancholy temper; he spoke little, and loved retirement and contemplation. His fortune was affluent; he had a fine house and well-furnished library near *Mæcenas's* gardens, on the *Esquiline* mount at Rome, and also a delightful villa in Sicily. He was so benevolent and inoffensive, that most of his contemporaries poets, though they envied each other, agreed in loving and esteeming him. He revised his verses with prodigious severity; and used to compare himself to a she-bear, which licked her cubs into shape.

The best edition of Virgil's works are those of *Mosvicius*, with the notes of *Servius*, printed at *Lewarden* in 1717, 2 vols. 4to; and that of *Burman*, at *Amsterdam*, 1746, in 4 vols. 4to. There are several English translations, which are well known.

VIRGIL (*Polydore*), an English historian, born at *Urbino* in Italy, was sent in the beginning of the 16th century, by pope *Alexander VI.* as sub-collector of the Papal tax, called *Peter-pence*, in this kingdom. He had not been long in England before he obtained preferment in the church; for in 1503 he was presented to the rectory of *Church-Langton* in the archdeaconry of *Leicester*. In 1507, he was collated to the prebend of *Scamlesby* in the church of *Lincoln*; and in the same year was made archdeacon of *Wells*, and prebendary of *Hereford*. In 1513, he resigned his prebend of *Lincoln*, and was collated to that of *Osgate*, in *St Paul's*, London. We are told, that on his preferment to the archdeaconry of *Wells*, he resigned the office of sub-collector to the pope, and determined to spend the remainder of his life in England, the History of which kingdom he began in the year 1505, at the command of *Henry VII.* That work cost him 12 years labour. In 1526, he finished his treatise on *Prodigies*. *Polydore* continued in England during the whole reign of *Henry VIII.* and part of that of *Edward VI.* whence it is concluded that he was a moderate Papist. In 1550, being now an old man, he requested leave to revisit his native country. He was accordingly dismissed with a present of 300 crowns, together with the privilege of holding his preferments to the end of his life. He died at *Urbino* in the year 1555. As an historian, he is accused by some as a malignant slanderer of the English nation; yet *Jovius* remarks, that the French and Scotch accuse him of having flattered that nation too much: see his *Elog.* cap. 135. p. 179. Besides the above, he wrote, 1. *De rerum inventoriis*; of which an English translation was published by *Langley* in 1663. It was also translated into French and Spanish. 2. *De prodigiis et fortibus*. 3. *Episcoporum Angliæ catalogus*. Manuscript. 4. *De vita perfecta*. Bais, 1546, 1553, 8vo. 5. *Epistolæ crudite*; and some other works.

VIRGIN, a female who has had no carnal commerce with man.

VIRGIN is also figuratively applied to several things that retain their absolute purity, and have never been made use of.

VIRGINIA, late one of the British colonies, now one of the United States of North America; bounded on the south by Carolina, on the north-east by the river Patowmack which divides it from Maryland, on the east by the Atlantic Ocean, and on the west by the Apalachian mountains; extending about 240 miles in length, and 200 in breadth.

The air and seasons here depend very much upon the wind, as to heat and cold, dryness and moisture. The north and north-west winds are piercing cold, and clear, or else stormy; the south-east and south, lazy and sultry hot. In winter they have a fine clear air, and dry, which renders it very pleasant. Their frosts are short; but sometimes so very sharp, that rivers three miles broad will be frozen over. Snow falls sometimes in pretty large quantities, but rarely lies above a day or two. Their spring is about a month earlier than in England; in April they have frequent rains; in May and June the heat increases; and the summer is much like our's, being mitigated with gentle breezes that rise about nine o'clock, and decrease and increase as the sun rises or falls. In July and August these breezes cease, and the air becomes sultry and hot: in September the weather generally changes suddenly, and heavy rains fall, and then the inhabitants are generally very sickly. It is to be observed, however, that here, and in all the other states, as the cultivation and population of them advances, the air grows better, to which the cutting down of the woods greatly contributes.

As to the face of the country in Virginia, it is generally low and flat towards the sea-coast, and for 100 miles up the country; so that there is hardly a hill or stone to be seen, except here and there some rocks of iron ore, and some banks of a kind of petrified oyster-shells. The whole country, before it was planted, was one continued forest, interspersed with marshes, which in the West Indies they call *savamps*. No country now produces greater quantities of excellent tobacco; and the soil is generally so sandy and shallow, that after they have cleared a fresh piece of ground out of the woods, it will not bear tobacco after two or three years, unless covered-penned and well dunged.

The forests here yield oaks, poplars, pines, cedars, cypresses, sweet myrtles, chestnuts, hickory, live oak, walnut, dog-wood, alder, hazel, chinkapins, locust-trees, saltstems, elm, ash, beech, with a great variety of sweet gums and incense, which distil from several trees; pitch, tar, rosin, turpentine, plank-timber, masts, and yards. Virginia yields also rice, hemp, Indian corn, plenty of pasture, with coal, quarries of stone, and lead and iron ore.

Of spontaneous flowers there are a great variety here, particularly the flaxen crown-imperial in the world, and the cardinal-flower so much extolled for its scarlet colour; almost the whole year round the plains and valleys are adorned with flowers of one kind or another. In this country also is found the tulip bearing laurel-tree, which has the pleasantest smell in the world, and keeps seeds and blossoms several months together.

Silk-grass grows spontaneous in many places; the fibres of which are as fine as flax, and much stronger than hemp. Their trees are much softer than our's,

and no underwood or bushes grow beneath; so that people travel with ease through the forests on horse-back, and never want a fine shade to defend them from the summer heats.

Among other animals in Virginia are elks, but not common; red deer in great plenty; musk rats, racoons, beavers, and wolves. As for reptiles, they have lizards, with several kinds of snakes, particularly the rattle-snake. Of birds, they have several sorts of eagles, hawks, and owls, mocking-birds, and humming-birds.

Besides the animals that are natives of the country, most of the quadrupeds of Europe have been introduced here; such as horses, cows, sheep, and hogs, which are prodigiously multiplied, great numbers running wild in their forests, besides what they have tame in their plantations. In February, March, April, and May, shoals of herrings come up into their very brooks; some of the size of ours, but for the most part much larger. They have great quantities in summer of those destructive worms that eat into the bottoms of ships, wherever they find the coat of pitch, tar, or lime, worn off the timber; these worms have a kind of horn or scrow in their head, with which they force a passage through any wood to which they stick.

Four great rivers, namely James River, York River, Rappahannock, and Patowmack, which rise in the Apalachian mountains, run through this province, or along its borders, from the north-west to the south-east, and fall into the bay of Chesapeake. James River is generally about two miles over, and navigable at least 80. York and Rappahannock are not so large; but Potowmack is navigable for near 200 miles, being generally seven miles broad, and in some places nine. The great bay of Chesapeake runs up through Virginia and Maryland, almost due north, 300 miles and upwards, being navigable most part of the way for large ships. The two promontories that form the mouth of the bay, are called *Cape Charles* and *Cape Henry*.

VIRGINITY, the test or criterion of a virgin; or that which entitles her to the denomination. See *HYMEN*.

VIRGO, in astronomy, one of the signs or constellations of the zodiac. See *ASTRONOMY*, n° 110.

VIRILE, something that belongs, or is peculiar, to a man, or the male sex.

VIRTUAL, or POTENTIAL; something that has a power or virtue of acting or doing. The term is chiefly understood of something that acts by a secret invisible cause, in opposition to actual and sensible.

VIRTUE, a term used in various significations. In the general it denotes power, or perfection of any thing, whether natural or supernatural, animate or inanimate, essential or accessory. But, in its more proper or restrained sense, virtue signifies a habit, which improves and perfects the possessor and his actions. See *MORALS*, n° 27, 28, 72, 73, &c. and *METAPHYSICS*, n° 119—137.

VIRTUOSO, an Italian term lately introduced into the English, signifying a man of curiosity and learning, or one who loves and promotes the arts and sciences. But among us the term seems to be appropriated to those who apply themselves to some curious and quaint, rather than immediately useful art, or study; as antiquaries, collectors of rarities of any kind, microscopical observers, &c.

VIRULENT, a term applied to any thing that yields a virus; that is, a contagious or malignant pus.

VISCERA, in anatomy, a term signifying the same with entrails; including the heart, liver, lungs, spleen, intestines, and other inward parts of the body.

VISCIDITY, or **VISCOSITY**, the quality of something that is viscid or viscous; that is glutinous, and sticky like bird-lime, which the Latins call by the name of *viscus*.

VISCOUNT (*Vice Comes*), was anciently an officer under an earl, to whom, during his attendance at court, he acted as deputy to look after the affairs of the country. But the name was afterwards made use of as an arbitrary title of honour, without any shadow of office pertaining to it, by Henry VI.; when, in the 18th year of his reign, he created John Beaumont a peer, by the name of *viscount Beaumont*; which was the first instance of the kind.

A viscount is created by patent as an earl is; his title is *Right Honourable*; his mantle is two doublings and a half, of plain fur; and his coronet has only a row of pearls close to the circle.

VISIBLE, something that is an object of sight or vision; or something whereby the eye is affected so as to produce this sensation.

VISIER, an officer or dignitary in the Ottoman empire, whereof there are two kinds; one called by the Turks *Vizier-azem*, that is, "grand vizier," is the prime minister of state in the whole empire. He commands the army in chief, and presides in the divan or great council. Next to him are six other subordinate viziers, called *viziers of the bench*; who officiate as his counsellors or assessors in the divan.

VISION, in optics, the art of seeing or perceiving external objects by means of the organ of sight, the eye. See **ANATOMY**, 1^o 466, and *Index* subjoined to **OPTICS**.

VISTULA, or **WEISSEL**, a large river of Poland, which taking its rise in the mountains south of Silesia, visits Cracow, Warsaw, &c. and continuing its course northward, falls into the Baltic sea below Danzig.

VISUAL, in general, something belonging to vision.

VITAL, in physiology, an appellation given to whatever ministers principally to the constituting or maintaining life in the bodies of animals: thus the heart, lungs, and brain, are called *vital parts*; and the operations of these parts by which the life of animals is maintained are called *vital functions*.

VITELLUS, the yolk of an egg. See **EGG** and **YOLK**.

VITIS, the **VINE**; a genus of the angiosperma order, belonging to the didynamia class of plants. There are seven species, and a great many varieties, the enumeration of all which would be too tedious to insert here. Mr Millar enumerates the following, which are easily propagated and ripen well in this country. 1. The July grape, called by the French *Morillon noir batif*, is a small, round, black berry, growing loose on the bunches. The juice is sugary; but has little flavour, and has no merit but that of ripening early. It ripens the beginning of August. 2. The black sweet-water, is a small roundish berry, growing close in the bunches, which are short. The skin is thin, the juice very sweet, and the birds and flies are very apt to devour them if they are not

guarded. It ripens soon after the other. 3. The white sweet-water, is a large round berry when in perfection; but these are very different in size on the same bunch; some of them will be of a large size, and others extremely small, for which reason it is not much esteemed. The juice is sugary, but not vinous. This ripens about the same time with the former. 4. The Chasselas blanc, or royal Muscadine, as it is called by some, is an excellent grape; the bunches are generally large, and at the upper part divided with two smaller side bunches or shoulders. The berries are round; and, when perfectly ripe, turn of an amber colour. The juice is rich and vinous: it ripens in September; but, if carefully preserved, they will hang very late, and become excellent. 5. The Chasselas musque, or *le cour grape*, as it is here called, by some called the *Frankindal*, is an excellent grape, and generally ripens well in England, if it has a good aspected wall. The berries are very like those of the former in shape, size, and colour; but are fleshy, and have a little musky flavour. It ripens at the same time with the former. 6. The black cluster, or *Manier* grape, as it is called by the French, from the hoary down of the leaves in summer, is a good fruit, and ripens well here. The bunches are short, the berries are oval, and are very close to each other; so that many of those which grow on the inside continue green when the outer are perfectly ripe. It ripens in September, and is by some called the *Burgundy* grape. 7. The aubern, or true Burgundy grape, sometimes called *black morillon*, is an indifferent fruit for the table; but is esteemed one of the best sorts for making wine. The berries of this are oval, and hang looser on the bunches than those of the cluster grape; so ripen equally, which gives it the preference. 8. The Corinth, or as it is vulgarly called the *currant grape*, is a small roundish berry, generally without stones, of a deep black colour, and much clustered on the bunches, which are short; it has a sugary juice, and ripens in September, but will not last long. 9. The red Chasselas, is very like the white in size and shape; but is of a dark red colour: it is a very good grape; but ripens later than the white, and is pretty rare in England. 10. The white muscadine, is something like the chasselas; but the berries are smaller, and hang looser on the bunches, which are longer, but not so thick as those of the chasselas. The juice is sweet, but not so rich as the chasselas. 11. The black frontinac, or muscat noir, is a round berry of good size; they grow loose on the bunches, yet do not ripen equally. The bunches are short; the berries, when fully ripe, are very black; and are covered with a meal or flue, like the black plums. The juice of this is very rich and vinous. It ripens in the end of September, or the beginning of October. 12. The red frontinac, or muscat rouge, is an excellent grape when fully ripe; but unless the season proves very warm, they rarely ripen without artificial heat in England. The bunches of this sort are longer than those of the former: the berries are large and round: when they are fully ripe, they are of a brick colour; but before, they are gray, with a few dark stripes: and this is frequently taken for a different kind, and is commonly called *grisley frontinac*; but I am convinced it is the same grape. The juice of

this has the most vinous flavour of all the sorts, and is greatly esteemed in France. 13. The white frontinac, has larger bunches than either of the former: the berries are round, and are so closely clustered on the bunches, that unless they are carefully thinned early in the season, when the berries are very small, the sun and air will be excluded from many of them, so that they will not ripen, and the moisture will be detained in the autumn, which will cause them to rot. The juice of this is excellent; and, if the fruit is perfectly ripe, is inferior to none. The French call it *muscat blanc*. 14. The Alexandrian frontinac, or muscat d'Alexandre, is by some called *muscat of Jerusalem*. The berries of this are oval, and hang loose on the bunches; these are long, and are not shouldered. There are two sorts, one with white and the other with red berries; their juice is very rich and vinous, but they seldom ripen in England without artificial heat. 15. The red and black Hamburg, by some called the *Warner grape*, from the person who brought it into England. These have middle-sized berries inclining to an oval shape. The bunches are large; and their juice, when ripe, is fugary, with a vinous flavour. This ripens in October. 16. The St Peter's grape has a large oval berry, of a deep black colour when ripe. The bunches are very large, and make a fine appearance at the table; but the juice is not rich, and it ripens late in the year. The leaves of this sort are much more divided than those of the other sorts, approaching to those of the parsley-leaved grape, so it may be distinguished before the fruit is ripe.

All the sorts of grapes are propagated either from layers or cuttings, the former of which is greatly practised in England, but the latter is much preferable.

In choosing the cuttings, you should always take such shoots as are strong and well ripened of the last year's growth; these should be cut from the old vine, just below the place where they were produced, taking a knot, or piece of the two-years wood to each, which should be pruned smooth; then you should cut off the upper part of the shoots, so as to leave the cutting about sixteen inches long. When the piece or knot of old wood is cut at both ends, near the young shoot, the cutting will resemble a little mallet; from whence Columella gives the title of *malleolus* to the vine-cuttings. In making the cuttings after this manner, there can be but one taken from each shoot; whereas most persons cut them into lengths of about a foot, and plant them all: which is very wrong, for various reasons too tedious to mention.

When the cuttings are thus prepared, if they are not then planted, they should be placed with their lower part in the ground in a dry soil, laying some litter upon their upper parts to prevent them from drying: in this situation they may remain till the beginning of April, (which is the best time for planting them); when you should take them out, and wash them from the filth they have contracted; and if you find them very dry, you should let them stand with their lower parts in the water six or eight hours, which will distend their vessels, and dispose them for taking root. Then the ground being before prepared where the plants are designed to remain (whether against walls or for standards, (for they should not be removed again), the cuttings should be planted. But

in preparing the ground, you should consider the nature of the soil; which if strong, and inclinable to wet, is by no means proper for grapes: therefore, where it so happens, you should open a trench where the cuttings are to be planted, which should be filled with lime rubbish, the better to drain off the moisture: then raise the borders with fresh light earth about two feet thick, so that it may be at least a foot above the level of the ground: then you should open the holes at about six feet distance from each other, putting one good strong cutting into each hole, which should be laid a little sloping, that their tops may incline to the wall; but it must be put in so deep, as that the uppermost eye may be level with the surface of the ground; for when any part of the cutting is left above ground, most of the buds attempt to shoot, so that the strength of the cuttings is divided to nourish so many shoots, which must consequently be weaker than if only one of them grew; whereas, on the contrary, by burying the whole cutting in the ground, the sap is all employed on one single shoot, which consequently will be much stronger; besides, the sun and air are apt to dry that part of the cutting which remains above ground, and so often prevents their buds from shooting.

Then having placed the cutting into the ground, you should fill up the hole gently, pressing down the earth with your foot close about it, and raise a little hill just upon the top of the cutting, to cover the upper eye quite over, which will prevent it from drying. This being done, there is nothing more necessary but to keep the ground clear from weeds until the cuttings begin to shoot; at which time you should look over them carefully, to rub off any small shoots, if such are produced, fastening the first main shoot to the wall, which should be constantly trained up, as it is extended in length, to prevent its breaking or hanging down. You must continue to look over these once in about three weeks during the summer season, constantly rubbing off all lateral shoots which are produced; and be sure to keep the ground constantly clear from weeds, which, if suffered to grow, will exhaust the goodness of the soil and starve the cuttings. The Michaelmas following, if your cuttings have produced strong shoots, you should prune them down to two eyes. In the spring, after the cold weather is past, you must gently dig up the borders to loose the earth; but you must be very careful, in doing this, not to injure the roots of your vines: you should also raise the earth up to the stems of the plants, so as to cover the old wood, but not so deep as to cover either of the eyes of the last year's wood. After this they will require no farther care until they begin to shoot; when you should look over them carefully, to rub off all weak dangling shoots, leaving no more than the two shoots, which are produced from the two eyes of the last year's wood, which should be fastened to the wall. And so from this, until the vine have done shooting, you should look them over once in three weeks or a month, to rub off all lateral shoots as they are produced, and to fasten the main shoots to the wall as they are extended in length; which must not be shortened before the middle or latter end of July, when it will be proper to nip off their tops, which will strengthen the lower eyes; and during the summer

mer season you must constantly keep the ground clear from weeds : nor should you permit any sort of plants to grow near the vines, which would not only rob them of nourishment, but shade the lower parts of the shoots, and thereby prevent their ripening; which will not only cause their wood to be spongy and luxuriant, but render it less fruitful.

As soon as the leaves begin to drop in autumn, you should prune these young vines again, leaving three buds to each of the shoots, provided they are strong : otherwise it is better to shorten them down to two eyes if they are good; for it is a very wrong practice to leave much wood upon young vines, or to leave their shoots too long, which greatly weakens the roots: then you should fasten them to the wall, spreading them out horizontal each way, that there may be room to train the new shoots the following summer, and in the spring the borders must be digged as before.

The uses of the fruit of the vine for making wine, &c. are well known. However, the number of vines cultivated in this country is by no means sufficient to supply the consumption. The plant was introduced by the Romans, and appears formerly to have been very common. From the name of vineyard yet adhering to the ruinous sites of our castles and monasteries, there seem to have been few in the country but what had a vineyard belonging to them. The county of Gloucester is particularly commended by Malmesbury in the twelfth century, as excelling all the rest of the kingdom in the number and goodness of its vineyards. In the earlier periods of our history, the Isle of Ely was expressly denominated the Isle of Vines by the Normans. Vineyards are frequently noticed in the descriptive accounts of doomsday. And those of England are even mentioned by Bede, as early as the commencement of the eighth century.

That the Romans were the original introducers of the plant, we need no other testimony than the British appellations of it. Being brought by them into Gaul, it was denominated the *vigne* by the natives. And, being carried by them into Britain, it was similarly called by the inhabitants the *guin-nyden*, the *guin-bren*, the *guin-ien*, or *fin-ras*, as it is still denominated in the Welsh, Cornish, Armorican, and Irish dialects. These appellations, like the Gaelic, do not directly signify the vine, and only speak of it characteristically as the wine-tree. And, as they show the Romans to have been the first planters of it in both kingdoms; so this little peculiarity pretty plainly intimates the natives of both to have been acquainted with the liquor, some time before they cultivated the tree. Such would naturally be the case of both. Such appears to have been actually the case with the Gauls. And the Caledonian Britons, who were strangers to the plant, were conversant with its produce before the middle of the third century.

The former was not brought into Britain in the first, but was introduced before the close of the third. And, confined as it would for ages be within the pale of the Roman government, it was transplanted into Ireland before the beginning of the eighth. But the grape, or, as with an agreeable simplicity it was called by the Britons, the *corne of the tree*, the *wine-grape*, and the *apple of the vine*, was not, as it now is, merely raised for the uses of the table. All the arts

of the vignerons would naturally be introduced with the plant. They were carried with it into Gaul. And, that they came together into Britain, the good knowledge which the Caledonians appear to have had of the liquor is a presumptive evidence, and the British appellation of the wine-tree for the vine seems a strong argument. But doomsday exhibits to us a particular proof made in England, during the period preceding the conquest. And, after it, the bishop of Ely appears to have received at least three or four tuns of wine annually, as tythe, from the produce of the vineyards in his diocese; and to have made frequent reservations in his leases of a certain quantity of wine for rent. A plot of land in London, which now forms East-Smithfield and some adjoining streets, was withheld from the religious house within Aldgate by four successive countesses of the Tower, in the reigns of Rufus, Henry, and Stephen, and made by them into a vineyard to their great emolument and profit. In the old accounts of rectorial and vicarial revenues, and in the old registers of ecclesiastical suits concerning them; the title of wine is an article that frequently occurs in Kent, Surry, and other counties. And the wines of Gloucestershire, within a century after the conquest, were little inferior to the French in sweetness. The beautiful region of Gaul, which had not a single vine in the days of Cæsar, had numbers so early as the time of Strabo. The south of it was particularly stocked with them; and they had even extended themselves into the interior parts of the country: But the grapes of the latter did not ripen kindly. And France was even famous for its vineyards in the reign of Vespasian, and even exported its wines into Italy. The whole province of Narbonne was then covered with vines: and the wine-merchants of the country were remarkable for all the knavish dexterity of our modern brewers, tinging it with smoke, colouring it (as was suspected) with herbs and noxious dyes, and even adulterating the taste and appearance with aloe. And, as our first vines would be transplanted from Gaul, so were in all probability those of the Allobroges in Franche Compté. These were peculiarly fitted for cold countries. They ripened even in the frosts of the advancing winter. And they were of the same colour, and seem to have been of the same species, as the black Mulcadesins of the present day, which have lately been tried in the island, I think, and found to be fittest for the climate. These were pretty certainly brought into Britain a little after vines had been carried over all the kingdoms of Gaul, and about the middle of the third century; when the numerous plantations had gradually spread over the face of the latter, and must naturally have continued their progress into the former.

The Romans, even nearly to the days of Lucullus, were very seldom able to regale themselves with wine. Very little was then raised in the compass of Italy. And the foreign wines were so dear, that they were rarely produced at an entertainment; and, when they were, each guest was indulged only with a single draught. But in the seventh century of Rome, as their conquests augmented the degree of their wealth, and enlarged the sphere of their luxury, wines became the object of particular attention. Many vaults were constructed, and good stocks of liquor deposited in them.

Vitiosus
||
Viverra.

them. And this naturally gave encouragement to the wines of the country. The Falernian rose immediately into great repute; and a variety of others, that of Florence among the rest, succeeded it about the close of the century. And the more westerly parts of the European continent were, at once, subjected to the arms and enriched with the vines of Italy.

But the scarcity of the native, and dearth of the foreign wines in that country, several ages before the conquest of Lancashire, had called out the spirit of invention, and occasioned the making of spurious wines. These were still continued by the Romans, and naturally taught to the Britons. And they were made of almost all the products of the orchard and garden, the pear, the apple, mulberry, service, and rose. Two of them, therefore, were those agreeable liquors which we still denominate *cyder* and *perry*. The latter would be called *pyrum* by the Romans, and is therefore called *perry* or *pear-water* by us. And the former assumed among the Romans the appellation of *sicera*, which was colloquially pronounced by them *sidera*, as the same pronunciation of it among the present Italians shows; and retains therefore the denomination of *cyder* among ourselves.

VITREOUS HUMOUR *of the Eye*. See ANATOMY, n° 406, p.

VITRIFICATION, in chemistry, the conversion of a body into glass by means of fire. See GLASS.

VITRIOL, a compound imperfect salt, formed by the union of certain metals with the sulphureous acid. It is of three colours, white, blue, and green. See CHEMISTRY, n° 110. 142. 157.

VITRIOLATED, among chemists, something impregnated, or supposed to be so, with vitriol or its acid.

VITRIOLIC, an appellation given to whatever abounds with, or partakes of the nature of, vitriol: thus such fossil bodies as contain vitriol are called *vitriolic minerals*, or *ores of vitriol*.

VITRUVIUS POLLIO (Marcus), a very celebrated Roman architect, was, according to the common opinion, born at Verona, and lived in the reign of Augustus, to whom he dedicated his excellent treatise on architecture, divided into ten books. William Philander's edition of this celebrated work is esteemed. Claudius Perrault has given an excellent translation of it in French, with learned notes. There are also several English translations of Vitruvius.

VITUS'S DANCE. See MEDICINE, n° 391, and p. 470.

VIVERRA, the WEASEL: a genus of quadrupeds belonging to the order of feræ. They have six fore-teeth, the intermediate ones being shorter, and more than three grinders, and the claws are exerted. The species are,

1. The ichneumon, with the tail tapering to a point, and the toes distant from each other; inhabits Egypt, Barbary, India and its islands. It is there a most useful animal; being an inveterate enemy to the serpents and other noxious reptiles which infest the torrid zone: it attacks without dread that most fatal of serpents the Naja, or Cobra de Capello; and should it receive a wound in the combat, instantly retires, and is said to obtain an antidote from a certain herb; after which it returns to the attack, and seldom fails of

victory: it is a great destroyer of the eggs of crocodiles, which it digs out of the sand; and even kills multitudes of the young of those terrible reptiles: it was not therefore without reason, that the ancient Egyptians ranked the ichneumon among their deities. This animal is at present domesticated and kept in houses in India and in Egypt, for it is more useful than a cat, in destroying rats and mice; and grows very tame. It is very active; springs with great agility on its prey; will glide along the ground like a serpent, and seem as if without feet. It fits up like a squirrel, and eats with its fore-feet, catching any thing that is flung to it. It is a great enemy to poultry; and will feign itself dead, till they come within reach: loves fish; draws its prey, after sucking the blood, to its hole. Its excrements are very fetid; when it sleeps, it brings its head and tail under its belly, appearing like a round ball, with two legs sticking out. Rumphius observes how skillfully it seizes the serpents by the throat, so as to avoid receiving an injury; and Lucan beautifully describes the same address of this animal, in conquering the Egyptian asp.

*Aspidæ ut Phariæ cando silestior hostis
Ladit, et iratas incerta prævolat umbræ
Obliquansque caput vanas serpenti in auras
Effusa toto comprehendit gurgula morsæ
Lacerat citra suncion: tunc irrita postis
Exprimitur, faucibus suavit percutit venæ*

2. The yzquepatl, or flitting weasel, has a short slender nose; short ears and legs; black body, full of hair; the tail long, of a black and white colour; length from nose to tail, about eighteen inches. It inhabits Mexico, and perhaps other parts of America. This and some other species are remarkable for the pestiferous, suffocating, and most fetid vapour, they emit from behind, when attacked, pursued, or frightened: it is their only means of defence. Some turn their tail to their enemy, and keep them at a distance by a frequent creptus; and others ejaculate their urine, tainted with the horrid effluvia, to the distance of eighteen feet. The pursuers are stopped with the terrible stench. Should any of this liquor fall into the eyes, it almost occasions blindness: if on the cloaths, the smell will remain for several days, in spite of all washing; they must even be buried in fresh soil, in order to be sweetened. Dogs that are not true bred, run back as soon as they perceive the smell: those that have been used to it, will kill the animal; but are often obliged to relieve themselves by thrusting their noses into the ground. There is no bearing the company of a dog that has killed one, for several days. Professor Kalm was one night in great danger of being suffocated by one that was pursued into a house where he slept; and it affected the cattle so, that they bellowed through pain. Another, which was killed by a maid-servant in a cellar, so affected her with its stench, that she lay ill for several days; all the provisions that were in the place were so tainted, that the owner was obliged to throw them away. Notwithstanding this, the flesh is reckoned good meat, and not unlike that of a pig; but it must be skinned as soon as killed, and the bladder taken carefully out. The Virginian species is capable of being tamed, and will follow its master like a dog: it never emits its vapour, except terrified. It breeds in hollow trees, or holes under ground, or in clefts

Viverræ

Vives
Ulcetæ.

clefs of rocks; climbs trees with great agility; kills poultry; eats eggs, and destroys young birds.

Another species resembling this, inhabits Peru and other parts of South America; its pestilential vapour overcomes even the panther of America, and stupifies that formidable enemy.

3. The zibetha, or civet-cat, has short rounded ears; the back and sides cinereous, tinged with yellow, marked with large dusky spots disposed in rows; the hair coarse; that on the top of the body longest, standing up like a mane; the tail sometimes wholly black; sometimes spotted near the base; length, from nose to tail, about two feet three inches; the tail fourteen inches; the body pretty thick. It inhabits India, the Philippine isles, Guinea, Ethiopia, and Madagascar. The famous drug musk, or civet, is produced from an overture between the privities and the anus, in both sexes, secreted from certain glands. The persons who keep them procure the musk by scraping the inside of this bag twice a week with an iron spatula, and get about a dram each time: but it is seldom sold pure; being generally mixed with suet or oil, to make it more weighty. The males yield the musk; especially when they are previously irritated. They are fed, when young, with pap made of millet, with a little flesh or fish; when old, with raw flesh. In a wild state, they prey on fowl. These animals seem not to be known to the ancients: it is probable the drug was brought without their knowing its origin; for it is certain the fine gentlemen in Rome use perfume.

VIVES, in farriery. See there, § x.

VIVIPAROUS, in natural history, an epithet applied to such animals as bring forth their young alive and perfect; in contradistinction to them that lay eggs, which are called *oviparous* animals.

UKRAINE, a large country of Europe, bounded on the north by Poland and Muscovy, on the east by Muscovy, on the south by Tartary, and on the west by Moldavia. This province is one continued plain, interspersed with several fine rivers and agreeable forests. It is exceedingly fertile, and produces all the necessities of life. The rivers swarm with all sorts of fish, and game is also very plenty. There are no brick buildings, all the houses being of wood after the Russian manner. It belongs to the Poles and Muscovites; but these last possess the greatest part. The people that now inhabit it are called *Chacks*.

ULCER, in surgery. See there, § iv. p. 849.

ULCER, farriery. See there, § xxv.

ULEX, FURZE, GORSE, or WHINS; a genus of the decandria order, belonging to theadelphia class of plants. There are two species; of which the most remarkable is the *Europæus*, or common furze. This is so well known as to need no description. It is frequently cut to make faggots for heating ovens, which it does very soon, burning rapidly and with a great degree of heat. The ashes yield an alkaline salt. For its uses as a fence, and food for horses, see AGRICULTURE, n° 46. and FENCE.

ULIETEA, one of the Society islands. This island is about 21 leagues in circuit. Its productions are plantains, cocoa-nuts, yams, hogs, and fowl; the two latter of which are scarce. The soil on the top of one of the hills was found to be a kind of stone

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marle; on the sides were found some scattered hints, and a few small pieces of a cavernous or spongy stone lava, of a whitish colour, which seemed to contain some remains of iron, so that it may possibly be here lodged in the mountains in a great quantity. Nothing was seen on this island to distinguish either its inhabitants, or their manners, from the other neighbouring islands. The first Europeans who landed on this shore, were Mr Banks and Dr Solander; they were received by the natives in the most courteous manner, reports concerning them having been their harbingers from O-Taheitee. Every body seemed to fear and respect them, placing in them at the same time the utmost confidence; behaving, as if conscious, that their visitors possessed the power of doing them mischief without a disposition to make use of it.

ULIGINOUS, in agriculture, an appellation given to a moist, moorish, and fenny soil.

ULLAGE, in gauging, is so much of a cask or other vessel as it wants of being full.

ULM, a free and imperial city of Germany, in the circle of Swabia, seated on the river Iller. It is a pretty large place, defended by fortifications; and the inhabitants are protestants. Here the archives of the circle are deposited, and it carries on a very great trade. The elector of Bavaria became master of it, in 1702, by a stratagem; but, in 1604, the French being vanquished at the battle of Hochlitz, the Bavarians surrendered it by capitulation. The Roman Catholics have but two churches, all the rest belonging to the Protestants. E. Long. 10. 5. N. Lat. 48. 30.

ULMUS, the Elm; a genus of the digynia order, belonging to the pentandria class of plants. There are six species; of which the most remarkable are, 1. The campestria, or common rough broad-leaved witch elm, is very common in the north-west counties of England, where it is generally believed to grow naturally in the woods; this grows to a very large size. The bark of the young branches is smooth and very tough, but that of the old trees cracks and is rough. The leaves are rough, and are doubly sawed on their edges. Their base is unequal, standing on short foot-stalks. The flowers come out in March upon slender twigs in clusters, of a deep red colour; and are succeeded by oval bordered capsules, containing one roundish compressed seed, which ripens in May. The wood of this tree is very good for all the purposes of any kind of elm, and the trees grow to a very large size; but as the leaves do not come out till late in the spring, there are few persons who plant these trees for ornament. 2. The scaber, or witch-hazel, grows naturally in some of the northern counties in England, where it has its name from the resemblance of the young shoots and leaves to those of hazel. This grows to a tree of great magnitude. The bark of the young shoots is very smooth and tough; it is of a yellowish brown colour, with spots of white. The flowers grow in clusters toward the end of the twigs; they have long leafy envelopments, of a green colour, appearing in the spring before their leaves, and the seeds ripen the latter end of May. The wood of this tree is not so good for use as that of the first sort. Formerly, when long bows were in use, many of them were made of the boughs of this tree. 3. The fativa, improperly called *English elm*, is not a native of Eng-

Uliginosus
Ulmus

Ulms,
Ulster.

land, and is only found in plantations where the young trees were procured from the neighbourhood of London. Where this tree grows naturally, is not easy to determine; some persons have supposed it was brought from Germany. As this tree is well known, it requires no description. The flowers are of a purplish red colour, and generally appear the beginning of March, but Mr Miller says he could never observe any seed from this sort. 4. The glaber, or smooth-leaved witch-elm, is very common in several parts of Hertfordshire, Essex, and other north-east counties of England; this grows to a large tree, and is much esteemed. The branches spread out like those of the first sort. The leaves are sharply sawed on their edges; they are smoother than most of the other sorts: they do not appear till the middle or latter end of May, so the trees are seldom planted for ornament. 5. The minor, or upright elm, is found growing in hedge-rows in several parts of England. The branches of this sort have a smooth grayish bark, and grow erect. The leaves are narrow, and more pointed than those of the English elm, and are smoother; they are later in coming out in the spring than those, but continue longer in autumn; this has been by some called the *Irish elm*.

All the sorts of elm may be either propagated by layers or suckers taken from the roots of the old trees, the latter of which is generally practised by the nursery-gardeners: but as these are often cut up with indifferent roots, they often miscarry, and render the success doubtful; whereas those which are propagated by layers are in no hazard, and always make better roots and come on faster than the other, and do not send out suckers from their roots in such plenty, for which reason this method should be more universally practised.

ULSTER, the most northerly province of Ireland. In Latin it is called *Ulonia*, in Irish *Cui Guilly*; and gives the title of *earl* to the dukes of York of the royal family. It is bounded by the Atlantic Ocean on the west, St George's channel and the Irish Sea on the east, the Deucaledonian Ocean on the north, and on the south and south-west the provinces of Leinster and Connaught. Its greatest length is near 120 miles, its breadth about 100; and its circumference, including the windings and turnings, 460; containing 9 counties, 58 market-towns and boroughs, 1 archbishopric, 6 bishoprics, and 214 parishes. Ulster abounds in lakes and rivers, which supply it with variety of fine fish, especially salmon, besides what it has from the sea, with which a great part of it is bounded. The southern parts of it are rich, fertile, well cultivated, and inclosed; but the greater part of the northern is open and mountainous. The towns of this province are in general the neatest and best built of any in Ireland, as well as the farm-houses; which in most parts of the kingdom are constructed of no better materials than clay and straw. The inhabitants of Ulster are also more like the English in their manner and dialect, than those of the other three provinces: for as it includes within itself the whole, or by far the greater part of the linen manufactory, the best branch of trade in the kingdom, they have consequently the greatest intercourse with England. An Englishman in some parts of it, indeed, will imagine himself, from the similarity

of their language and manners, in his own country. This province had anciently petty kings of its own. It was first subjected to the English in the reign of Henry II. by John Courcy, the first who bore the title of *earl of Ulster*; but it afterwards threw off the yoke, and was never entirely reduced till the reign of James I. when great numbers of Scots by his encouragement went and settled in it. Of these, most of the present inhabitants are the descendants. This province was the first and principal scene of the bloody massacre in 1741. The counties contained in it are, Donnegal, Londonderry, Antrim, Tyrone, Fermanagh, Cavan, Monaghan, Armagh, and Down.

ULTERIOR, in geography, is applied to some part of a county or province, which, with regard to the rest of that country, is situated on the farther side of the river, mountain, or other boundary, which separates the two countries.

ULTRAMARINE, a beautiful blue colour used by the painters, prepared from the lapis lazuli by calcination.

ULTRAJECTUM. See *TRAJECTUM Rheni*.

ULTRAMONTANE, something beyond the mountains. The term is principally applied in relation to France and Italy, which are separated by the Alps.

ULVA, LAVER, or *Turkey Feather*; a genus of the order of algae, belonging to the cryptogamia class of plants. It consists merely of a foliaceous substance formed into long cylindrical tubes. There are 10 species; of which the most remarkable are, 1. The umbilicalis, navel leaver, in Scotland called *flake* or *flake*, is frequent on sea-rocks, and sometimes on low shores, growing single. It is a wide membranaceous leaf, of a dark, dull, purple colour, expanded flat; for the most part in a circular form, variously sinuated on the edges; often perforated on the surface, and generally fixed to the rocks by a central root. The substance of it is smooth and shining, and a little tough, but not difficult to be torn. The breadth is from three inches to a foot. It often varies into a riband-like form. The inhabitants of the Western isles gather it in the month of March; and after pounding and stewing it with a little water, eat it with pepper, vinegar, and butter. Others stew it with leeks or onions. In England it is generally pickled with salt, and preserved in jars; and when brought to table is stewed, and eaten with oil and lemon-juice.

ULUG BEIG, a Persian prince and learned astronomer, was descended from the famous Tamerlane, and reigned at Samarcand about 40 years; after which he was murdered by his own son, in 1449. His catalogue of the fixed stars, rectified for the year 1434, was published at Oxford by Mr Hyde, in 1665, with learned notes. Mr Hudson printed in his English Geography *Ulug Beig's* Tables of the longitude and latitude of places; and Mr Graves published, in Latin, his *Astronomical Epochas*, at London, in 1650.

ULYSSES, king of Ithaca, the son of Laertius, and father of Telemachus, and one of those heroes who contributed most to the taking of Troy. After the destruction of that city, he wandered for 10 years; and at last returned to Ithaca, where, with the assistance of Telemachus, he killed Antinous and other princes who intended to marry his wife Penelope and seize his dominions. He at length resigned the government of the

Uterior
||
Ulysses.

Umbella
||
Uction.

the kingdom to his son Telémachus; and was killed by Telégonus, his son by Circe, who did not know him. This hero is the subject of the *Odyssey*.

UMBELLA, an **UMBEL**, in botany; a species of receptacle: or rather a mode of flowering, in which a number of slender foot-stalks proceed from the same centre, and rise to an equal height, so as to form an even, and generally round surface at top. The term differs from *corymbus*, another mode of flowering, in that there is a common party the point, to wit, from which issue all the foot-stalks; and in that the foot-stalks are of an equal length, whereas in a *corymbus* the foot-stalks proceed from different points, and though they altogether form an even surface at top, as in the umbel, yet is each lower foot-stalk of greater length than that immediately above it.

UMBELLATÆ, the name of a class in Ray's and Tournefort's methods, consisting of plants whose flowers grow in umbels, with five petals that are often unequal, and two naked seeds that are joined at top and separated below.

The same plants constitute the 45th order of Linnaeus's Fragments of a Natural Method. See **BOTANY**, p. 1315.

UMBELLIFEROUS PLANTS, are such as have their tops branched and spread out like an umbrella.

UMBILICAL, among anatomists, something relating to the umbilicus or navel.

UMPIRE, a third person chosen to decide a controversy left to arbitration.

UNCIA, in general, a Latin term denoting the twelfth part of any thing; particularly the twelfth part of a pound, called in English an *ounce*; or the twelfth part of a foot, called an *inch*.

UNCTION, the act of anointing or rubbing with oil or other fatty matter.

UNCTION, in matters of religion, is used for the character conferred on sacred things, by anointing them with oil. Unctions were very frequent among the Hebrews. They anointed both their kings and high-priests at the ceremony of their inauguration. They also anointed the sacred vessels of the tabernacle and temple, to sanctify and consecrate them to the service of God. The unction of kings is supposed to be a ceremony introduced very late among the Christian princes. It is said, that none of the emperors were ever anointed before Justinian, or Justin. The emperors of Germany took the practice from those of the eastern empire: king Pepin of France was the first who received the unction. In the ancient Christian church, unction always accompanied the ceremonies of baptism and confirmation. Extreme unction, or the anointing persons in the article of death, was also practised by the ancient Christians, in compliance with the precept of St James, chap. v. 14 and 15 verses; and this extreme unction the Romish church has advanced to the dignity of a sacrament. It is administered to none but such as are afflicted with some mortal disease, or are in a decrepit age. It is refused to impenitent persons, as also to criminals. The parts to be anointed are the eyes, the ears, the nostrils, the mouth, the hands, the feet, and the reins. The laity are anointed in the palms of the hands, but priests on the back of it; because the palms of their hands have been already consecrated by ordination. The parts above-mentioned

are anointed in the form of a cross. The priest begins anointing the sick person's eyes, saying, "May God, by his holy anointing, pardon you the sins you have committed by the eyes." In like manner he proceeds to the other parts, varying the words according to the parts he anoints.

UNDECAGON, is a regular polygon, of 11 sides.

UNDECEM VIR, a magistrate among the ancient Athenians, who had ten other colleagues or associates joined with him in the same commission. The functions of the undecemviri at Athens were much the same as those of the *prevoits de marcheausse* in France. They took care of the apprehending of criminals; secured them in the hands of justice; and when they were condemned, took them again into custody, that the sentence might be executed on them. They were chosen by the tribes, each tribe naming its own; and as the number of the tribes after Cullithenes was but ten, which made ten members, a scribe or notary was added, which made the number eleven.

UNDERSTANDING, is defined by the Peripatetics, to be a faculty of the reasonable soul, conversant about intelligible things, considered as intelligible. They also make it twofold, *viz.* active and passive. Active understanding, they hold that faculty of the soul by which the species and images of intelligible things are framed, on occasion of the presence of phantasms or appearances thereof. For maintaining the intellect to be material, they hold it impossible it should be disposed to think by any disproportionate phantasms of mere body, and therefore that it is obliged to frame other proportionate species of itself, and hence its denomination *active*. Passive understanding, is that which, receiving the species framed by the active understanding, breaks forth into actual knowledge.

The moderns set aside the Peripatetic notion of an active understanding. The Cartesian define the understanding to be that faculty whereby the mind conversing with, and as it were intent on, itself, evidently knows what is true in any thing not exceeding its capacity. The Corpuscular Philosophers define the understanding to be a faculty expressive of things which strike on the external senses, either by their images or their effects, and so enter the mind. Their great doctrine is, *Nihil est in intellectu quod non prius fuerit in sensu*; and to this doctrine Mr Locke, and most of the latest English philosophers, subscribe.

Between the Cartesian and Corpuscularians there is this farther difference, that the latter make the judgment to belong to the understanding, but the former to the will. Hence, according to the most approved opinions of the Corpuscularians, the understanding has two offices, *viz.* perception and judgment; according to the Cartesian, it has only one, *viz.* perception. See **METAPHYSICS** and **LOGIC**.

UNDERWALD, a canton of Switzerland, and the sixth in rank. It is bounded on the north by the canton of Lucern and by the Lake of the Four Cantons, on the east by the high mountains which separate it from the canton of Bern, and on the west by the Canton of Bern. It is divided into two great valleys, which are separated by a chain of mountains covered with forests. The religion of this canton is the Roman Catholic.

UNDERWOOD, is coppice, or any wood that is not accounted timber.

UNDULATION, in physics, a kind of tremulous motion or vibration observable in a liquid whereby it alternately rises and falls like the waves of the sea.

UNGUENT, in medicine and surgery, a topical remedy or composition, chiefly used in the dressing of wounds or blisters.

UNICORN, an animal famous among the ancients, and thought to be the same with the rhinoceros. See **RHINOCEROS**.

UNICORN Fibb. See **MONODON**.

UNIFORM, denotes a thing to be similar, or consistent either with another thing, or with itself, in respect of figure, structure, proportion or the like; in which sense it stands opposed to difform.

UNIFORMITY, a similitude or resemblance between the parts of a whole.

UNIFORMITY and Variety. In things of nature's workmanship, whether we regard their internal or external structure, beauty and design are equally conspicuous. We shall begin with the outside of nature, as what first presents itself.

The figure of an organic body is generally regular. The trunk of a tree, its branches, and their ramifications, are nearly round, and form a series regularly decreasing from the trunk to the smallest fibre: uniformity is no where more remarkable than in the leaves, which, in the same species, have all the same colour, size, and shape; the seeds and fruits are all regular figures, approaching for the most part to the globular form. Hence a plant, especially of the larger kind, with its trunk, branches, foliage, and fruit, is a charming object.

In an animal, the trunk, which is much larger than the other parts, occupies a chief place. Its shape, like that of the stem of plants, is nearly round; a figure which of all is the most agreeable. Its two sides are precisely similar: several of the under parts go off in pairs; and the two individuals of each pair are accurately uniform. The single parts are placed in the middle; the limbs, bearing a certain proportion to the trunk, serve to support it, and to give it a proper elevation; upon one extremity are disposed the neck and head, in the direction of the trunk: the head being the chief part, possesses with great propriety the chief place. Hence the beauty of the whole figure is the result of many equal and proportional parts orderly disposed; and the smallest variation in number, equality, proportion, or order, never fails to produce a perception of deformity.

Nature in no particular seems more profuse of ornament, than in the beautiful colouring of her works. The flowers of plants, the furs of beasts, and the feathers of birds, vie with each other in the beauty of their colours, which in lustre as well as in harmony are beyond the power of imitation. Of all natural appearances, the colouring of the human face is the most exquisite; it is the strongest instance of the ineffable art of nature, in adapting and proportioning its colours to the magnitude, figure, and position of the parts. In a word, colour seems to live in nature only, and to languish under the finest touches of art.

When we examine the internal structure of a plant or animal, a wonderful subtlety of mechanism is dis-

played. Man, in his mechanical operations, is confined to the surface of bodies; but the operations of nature are exerted through the whole substance, so as to reach even the elementary parts. Thus the body of an animal and that of a plant are composed of certain great vessels; these of smaller; and these again of still smaller, without end, as far as we can discover. This power of diffusing mechanism through the most intimate parts is peculiar to nature; and distinguishes her operations most remarkably from every work of art. Such texture, continued from the grosser parts to the most minute, preserves all along the strictest regularity: the fibres of plants are a bundle of cylindric canals, lying in the same direction, and parallel or nearly parallel to each other: in some instances, a most accurate arrangement of parts is discovered, as in onions; formed of concentric coats, one within another to the very centre. An animal body is still more admirable in the disposition of its internal parts, and in their order and symmetry; there is not a bone, a muscle, a blood-vessel, a nerve, that hath not one corresponding to it on the opposite side; and the same order is carried through the most minute parts. The lungs are composed of two parts, which are disposed upon the sides of the thorax; and the kidneys, in a lower situation, have a position not less orderly. As to the parts that are single, the heart is advantageously situated near the middle: the liver, stomach, and spleen, are disposed in the upper region of the abdomen, about the same height; the bladder is placed in the middle of the body, as well as the intestinal canal, which fills the whole cavity with its convolutions.

The mechanical power of nature, not confined to small bodies, reacheth equally those of the greatest size; witness the bodies that compose the solar system, which, however large, are weighed, measured, and subjected to certain laws, with the utmost accuracy. Their places round the sun, with their distances, are determined by a precise rule, corresponding to their quantity of matter. The superior dignity of the central body, in respect of its bulk and lucid appearance, is suited to the place it occupies. The globular figure of these bodies, is not only in itself beautiful, but is above all others fitted for regular motion. Each planet revolves about its own axis in a given time; and each moves round the sun, in an orbit nearly circular, and in a time proportioned to its distance. Their velocities, directed by an established law, are perpetually changing by regular accelerations and retardations. In fine, the great variety of regular appearances, joined with the beauty of the system itself, cannot fail to produce the highest delight in every one who is sensible of design, power, or beauty.

Nature hath a wonderful power of connecting systems with each other, and of propagating that connection through all her works. Thus the constituent parts of a plant, the roots, the stem, the branches, the leaves, the fruit, are really different systems, united by a mutual dependence on each other: in an animal, the lymphatic and lacteal ducts, the blood-vessels and nerves, the muscles and glands, the bones and cartilages, the membranes and bowels, with the other organs, form distinct systems, which are united into one whole. There are at the same time other connections less intimate. Every plant is joined to the earth by its roots.

Uniformity roots; it requires rain and dews to furnish it with juices; and it requires heat to preserve these juices in fluidity and motion. Every animal by its gravity is connected with the earth; with the element in which it breathes; and with the sun, by deriving from it cherishing and enlivening heat. The earth furnisheth aliment to plants, these to animals, and these again to other animals, in a long train of dependence. That the earth is part of a greater system, comprehending many bodies mutually attracting each other, and gravitating all toward one common centre, is now thoroughly explored. Such a regular and uniform series of connections, propagated through so great a number of beings, and through such wide spaces, is wonderful; and our wonder must increase, when we observe these connections propagated from the minutest atoms to bodies of the most enormous size, and so widely diffused as that we can neither perceive their beginning nor their end. That these connections are not confined within our own planetary system, is certain; they are diffused over spaces still more remote, where new bodies and systems rise without end. All space is filled with the works of God, which are conducted by one plan, to answer unerringly one great end.

But the most wonderful connection of all, though not the most conspicuous, is that of our internal frame with the works of nature: man is obviously fitted for contemplating these works, because in this contemplation he has great delight. The works of nature are remarkable in their uniformity not less than in their variety; and the mind of man is fitted to receive pleasure equally from both. Uniformity and variety are interwoven in the works of nature with surprising art. Variety, however great, is never without some degree of uniformity; nor the greatest uniformity without some degree of variety. There is great variety in the same plant, by the different appearances of its stem, branches, leaves, blossoms, fruit, size, and colour; and yet when we trace that variety through different plants, especially of the same kind, there is discovered a surprising uniformity. Again, where nature seems to have intended the most exact uniformity, as among individuals of the same kind, there still appears a diversity, which serves readily to distinguish one individual from another. It is indeed admirable, that the human visage, in which uniformity is so prevalent, should yet be so marked, as to leave no room among millions for mistaking one person for another; these marks, though clearly perceived, are generally so delicate, that words cannot be found to describe them. A correspondence so perfect between the human mind and the works of nature is extremely remarkable. The opposition between variety and uniformity is so great, that one would not readily imagine they could both be relished by the same palate; at least not in the same object, nor at the same time: it is however true, that the pleasures they afford being happily adjusted to each other, and readily mixing in intimate union, are frequently produced by the same individual object. Nay, further, in the objects that touch us the most, uniformity and variety are constantly combined; witness natural objects, where this combination is always found in perfection. Hence it is, that natural objects readily form themselves into groups, and are agreeable in whatever manner combined: a wood with its trees, shrubs, and herbs, is agree-

able; the music of birds, the lowing of cattle, and the murmuring of a brook, are in conjunction delightful; though they strike the ear without modulation or harmony. In short, nothing can be more happily accommodated to the inward constitution of man, than that mixture of uniformity with variety which the eye discovers in natural objects; and accordingly the mind is never more highly gratified than in contemplating a natural landscape.

UNIFORMITY AND VARIETY, considered with relation to the fine arts.—In general, in every work of art, it must be agreeable to find that degree of variety which corresponds to the natural course of our perceptions; and that an excess in variety or in uniformity must be disagreeable, by varying that natural course. For that reason, works of art admit more or less variety according to the nature of the subject. In a picture of an interesting event, that strongly attaches the spectator to a single object, the mind relisheth not a multiplicity of figures nor of ornaments: a picture, again, representing a gay subject, admits great variety of figures and ornaments; because these are agreeable to the mind in a cheerful tone. The same observation is applicable to poetry and to music.

It must be at the same time remarked, that one can bear a greater variety of natural objects than of objects in a picture; and a greater variety in a picture, than in a description. A real object presented to view, makes an impression more readily than when represented in colours, and much more readily than when represented in words. Hence it is, that the profuse variety of objects in some natural landscapes neither breed confusion nor fatigue; and for the same reason, there is place for greater variety of ornament in a picture than in a poem. A picture however, like a building, ought to be so simple as to be comprehended in one view. Whether every one of Le Brun's pictures of Alexander's history will stand the test, is submitted to judges.

From these general observations we proceed to particulars. In works exposed continually to public view, variety ought to be studied. It is a rule, accordingly, in sculpture, to contrast the different limbs of a statue, in order to give it all the variety possible. Though the cone in a single view be more beautiful than the pyramid, yet a pyramidal steeple, because of its variety, is justly preferred. For the same reason, the oval is preferred before the circle; and painters, in copying buildings or any regular works, give an air of variety by representing the subject in an angular view; we are pleased with the variety, without losing sight of the regularity. In a landscape representing animals, those especially of the same kind, contrast ought to prevail: to draw one sleeping, another awake; one sitting, another in motion; one moving toward the spectator, another from him, is the life of such a performance.

In every sort of writing intended for amusement, variety is necessary in proportion to the length of the work. Want of variety is sensibly felt in Davila's history of the Civil Wars of France: the events are indeed important and various; but the reader languishes by a tiresome monotony of character, every person engaged being figured a consummate politician, governed by interest only. It is hard to say, whether Ovid disgusts more by too great variety, or too great uniformity.

mony. His stories are all of the same kind, concluding invariably with the transformation of one being into another; and so far he is tiresome by excess in uniformity. He is not less fatiguing by excess in variety, hurrying his reader incessantly from story to story. Aristotle is still more fatiguing than Ovid, by exceeding the just bounds of variety. Not satisfied, like Ovid, with a succession in his stories, he distracts the reader, by jumbling together a multitude of them without any connection. Nor is the Orlando Furioso less tiresome by its uniformity than the Metamorphoses, though in a different manner. After a story is brought to a crisis, the reader, intent on the catastrophe, is suddenly snatched away to a new story, which makes no impression so long as the mind is occupied with the former. This tantalizing method, from which the author never once swerves during the course of a long work, beside its uniformity, hath another bad effect; it prevents that sympathy which is raised by an interesting event when the reader meets with no interruption.

It may surprise some readers to find variety treated as only contributing to make a train of perceptions pleasant, when it is commonly held to be a necessary ingredient in beauty of whatever kind; according to the definition, "That beauty consists in uniformity amid variety." But this definition, however applicable to one or other species, is far from being just with respect to beauty in general. Variety contributes no share to the beauty of a moral action, nor of a mathematical theorem; and numberless are the beautiful objects of sight that have little or no variety in them: a globe, the most uniform of all figures, is of all the most beautiful; and a square, though more beautiful than a trapezium, hath less variety in its constituent parts. The foregoing definition, which at best is but obscurely expressed, is only applicable to a number of objects in a group or in succession; among which, indeed, a due mixture of uniformity and variety is always agreeable; provided the particular objects separately considered, be in any degree beautiful; for uniformity amid variety among ugly objects affords no pleasure. This circumstance is totally omitted in the definition; and indeed to have mentioned it, would at the very first glance have shown the definition to be imperfect: for to define beauty as arising from beautiful objects blended together in a due proportion of uniformity and variety, would be too gross to pass current; as nothing can be more gross, than to employ in a definition the very term that is to be explained.

UNION, a junction, coalition, or assemblage of two or more different things in one.

UNION, or *The Union*, by way of eminence, is more particularly used to express the act by which the two separate kingdoms of England and Scotland were incorporated into one, under the title of *The kingdom of Great Britain*. This union, in vain attempted by king James I. was at length effected in the year 1707, 6 Annæ; when twenty-five articles were agreed to by the parliament of both nations, the purport of the most considerable being as follow:

1. That on the first of May 1707, and for ever after, the kingdoms of England and Scotland shall be united into one kingdom, by the name of *Great Britain*.

2. The succession to the monarchy of Great Britain

shall be the same as was before settled with regard to that of England.

3. The united kingdom shall be represented by one parliament.

4. There shall be a communication of all rights and privileges between the subjects of both kingdoms, except where it is otherwise agreed.

9. When England raises 2,000,000*l.* by a land tax, Scotland shall raise 48,000*l.*

16, 17. The standards of the coin, of weights, and of measures, shall be reduced to those of England, throughout the united kingdoms.

18. The laws relating to trade, customs, and the excise, shall be the same in Scotland as in England. But all the other laws of Scotland shall remain in force; but alterable by the parliament of Great Britain. Yet with this caution, that laws relating to public policy are alterable at the discretion of the parliament; laws relating to private right are not to be altered but for the evident utility of the people of Scotland.

22. Sixteen peers are to be chosen to represent the peerage of Scotland in parliament, and 45 members to sit in the house of commons.

23. The 16 peers of Scotland shall have all privileges of parliament; and all peers of Scotland shall be peers of Great Britain, and rank next after those of the same degree at the time of the union, and shall have all privileges of peers, except sitting in the house of lords and voting on the trial of a peer.

These are the principal of the 25 articles of union, which are ratified and confirmed by statute 5 Ann. c. 8. in which statute there are also two acts of parliament recited; the one of Scotland, whereby the church of Scotland, and also the four universities of that kingdom, are established for ever, and all succeeding sovereigns are to take an oath inviolably to maintain the same; the other of England, 5 Annæ, c. 6. whereby the acts of uniformity of 13 Eliz. and 13 Car. II. (except as the same had been altered by parliament at that time) and all other acts then in force for the preservation of the church of England, are declared perpetual; and it is stipulated, that every subsequent king and queen shall take an oath inviolably to maintain the same within England, Ireland, Wales, and the town of Berwick upon Tweed. And it is enacted, that these two acts "shall for ever be observed as fundamental and essential conditions of the union."

Upon these articles and act of union, it is to be observed, 1. That the two kingdoms are now so inseparably united, that nothing can ever disunite them; except the mutual consent of both, or the successful resistance of either, upon apprehending an infringement of those points which, when they were separate and independent nations, it was mutually stipulated should be "fundamental and essential conditions of the union." 2. That whatever else may be deemed "fundamental and essential conditions," the preservation of the two churches, of England and Scotland, in the same state that they were in at the time of the union, and the maintenance of the acts of uniformity which establish the liturgy, are expressly declared so to be. 3. That therefore any alteration in the constitution of either of those churches, or in the liturgy of the church of England, (unless with the consent of the respective churches,

Union
of
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Provinces.

churches, collectively or representatively given) would be an infringement of these "fundamental and essential conditions," and greatly endanger the union.

4. That the municipal laws of Scotland are ordained to be still observed in that part of the island, unless altered by parliament; and as the parliament has not yet thought proper, except in a few instances, to alter them, they still (with regard to the particulars unaltered) continue in full force.

UNISON, in music. See INTERVAL.

UNIT, or UNITY, in arithmetic, the number one; or one single individual part of discrete quantity.

UNITED PROVINCES, or UNITED *Netherlands*, otherwise called the *Republic of Holland*, consist of the seven provinces of Holland, Zealand, Friesland, Groningen, Overijssel, Zulphe, and Utrecht. They are bounded on the west by the German Ocean; on the east by the circle of Westphalia; and on the south by Flanders, Brabant, and the duchy of Cleves. They compose the greatest part of the ancient Batavia, whose inhabitants were formerly so much renowned for their valour. Under the Romans, they were exempt from imposts and taxes, in consequence of bearing the honourable title of *allies of the Republic*. On the decline of the Roman empire they fell under the power of the Turks; but on the decline of the house of Charlemagne, the great lords and officers of the crown taking advantage of the weakness of the princes, rendered their governments hereditary in their families. The United Provinces, and indeed the whole of the Netherlands, now experienced frequent revolutions; being sometimes united into a monarchy, sometimes governed by independent petty sovereigns. The history of these times affords only an account of wars of the different provinces with each other, which at last terminated in nothing, and which for that reason we pass over in silence. The Netherlands came into the possession of the house of Austria by the marriage of Mary of Burgundy with the emperor Maximilian; but on that prince's resigning the Imperial crown, in hopes of being made a pope, the 17 provinces of the Netherlands devolved of right on Don John of Spain; but he, and his successor Philip le Beau, dying in a short time after, they, in 1505, fell under the dominion of Charles V. at that time a minor.

At this period the seven provinces, which now composed the Republic of Holland, enjoyed a kind of independence; but the policy and warlike disposition of Charles soon reduced them to obedience. When he resigned the sceptre to his son Philip, the Low Countries were in a most flourishing condition. In this small tract of country were reckoned no fewer than 350 large cities inclosed with walls, and 6300 considerable towns, all become rich by their application to the arts and to commerce. At the same time the love of liberty was very prevalent among the inhabitants, and they were jealous of every invasion of their rights and privileges. The arbitrary government of Philip was therefore very disagreeable to his subjects in the Low Countries, and the partiality shown on all occasions to the Spaniards soon lost their affections altogether.

The extreme superstition, however, and cruel bigotry, of Philip, proved the greatest source of discontent. The doctrines of the reformers had been preached and

received with avidity in the Low Countries. A cruel persecution of the reformed had been commenced by Charles V. inasmuch that he is said to have destroyed no fewer than 100,000 persons on account of religion. This cruelty had no effect except to increase the number of heretics; which being observed by Mary queen of Hungary, sister to the emperor, she invited him to the Low Countries, that he might personally behold the bad effects of his cruelty. On this the emperor granted a toleration, but Philip was altogether inflexible. In order to proceed more effectually against the reformed, a court of inquisition was instituted; and under pretence that the three bishoprics, which at that time comprehended the whole country, were too large, seventeen of these dignitaries were erected, three with the title of archbishops. To afford sufficient revenues for these, it became necessary to suppress several abbeyes, which of itself produced great discontent. But what gave the finishing stroke to the whole was Philip's announcing his intention of residing constantly in Spain; his appointing the dukes of Parma, his natural sister, to be regent of the Netherlands; and giving her for a counsellor cardinal Granvelle, a bloody persecutor of the reformed; at the same time that the provinces were oppressed by the violences of foreign troops, for the payment of whom they were also oppressed by taxes. Three councils were established at Brussels; one to preside over the laws and courts of justice; a second to direct every thing respecting peace or war; and the third to manage the revenues: but still the dukes of Parma was ordered to consult Granvelle in every matter, and make him at all times her chief confidant.

The dukes took upon her the government of the Universal Low Countries in the year 1560; and was no sooner arrived at Brussels, than complaints poured in from all quarters against the inquisition, cardinal Granvelle, and the new bishoprics. The dukes endeavoured to allay the ferment by fair words, but in vain. At the head of the malcontents were the prince of Orange, count Egmont, and count Horn, who strenuously insisted on calling an assembly of the States-general, and laying before them the grievances by which the country was oppressed. The event was, that, in 1564, the cardinal was obliged to resign his dignity; which yet did not produce any good effect, as he was succeeded by two of his creatures Barlaumont and Viglius, who trod exactly in his footsteps. They pushed on the inquisition to fresh executions; stigmatized the principal nobility as heretics; and on all occasions showed such violent and intolerable zeal for the Catholic religion, that one of Philip's ministers represented to him the danger there was of a total revolt of the provinces unless the rigours of persecution were somewhat relaxed. But Philip no sooner received this intelligence, than he replied, "that he had rather be without subjects, than be a king of heretics." Agreeable to this reply, all the obnoxious decrees were enforced with double rigour; upon which the state of affairs became so alarming, that it was thought necessary to send count Egmont into Spain, in order to have a personal interview with the king on the subject. Philip, accustomed to deceit, gave a smooth answer, abated the rigour of his decrees, and ordered the governor sometimes to consult with the prince of Orange.

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Provinces.

Court of
inquisition
established.

Duchess of
Parma appointed
governess.

Universal
discontent.

Extreme
bigotry of
Philip.

Thus

1
Batavians
in high
esteem
under
the Ro-
mans.

2
Fall under
the domi-
nion of
Spain.

3
flourishing
state of the
provinces
at that
time.

4
persecution
of the Re-
formed.

United
Provinces.

Thus tranquillity was for a time restored; but in the year 1566, it being discovered that a scheme for the total extirpation of the Protestants had been concerted by the queen-mother of France, her son Charles IX. and Isabella queen of Spain, in a conference at Bayonne, matters became worse than ever. That the information received concerning this detestable combination was true, very soon appeared from Philip's disclaiming all the favourable interpretations which had been put upon his answer to count Egmont, and from his ordering the inquisition to proceed with more fury than ever. The consequence of this was, a general association against this abominable tribunal, which was subscribed by all orders and degrees of men, Roman Catholics as well as Protestants. The confederates, headed by Henry de Brodenrode, a descendant of the ancient earls of Holland, waited on the dukes of Parma, in such a formidable body, that she was obliged to dismiss them with an absolute promise that their demands should be granted. These demands were, that the inquisition should be abolished, and the edicts against liberty of conscience recalled; and for this he immediately interposed all her interest with Philip. Sir William Temple alleges, that Philip, in consequence of the governante's remonstrances, granted all that was desired, but too late. All other historians, however, agree that he was inflexible, and that the dukes could procure no better conditions than that heretics should from that time forward be hanged instead of being burned. Even this appeared a concession unworthy of the king; the royal name was therefore forbid to be used.

Before the confederates proceeded to extremities, they sent deputies to Madrid; but, according to some authors, they were refused admittance into the king's presence. It appears, however, that they had found means of representing the true state of affairs to the king, and of informing him that the disturbances proceeded from the detestation in which the inquisition was every where held in the Low Countries. Their representations produced no other effect than an equivocal promise, which was evidently never intended to be kept.

The governante received orders to proceed against heretics with the utmost severity; upon which the people broke out into acts of open rebellion. In several towns of Flanders the churches were destroyed, images pulled down, and all those acts of violence committed which are the usual operations of a lawless mob. The principal inhabitants, however, still remained quiet, and even did all in their power to restrain the violence of the commonalty; so that, had Philip made any kind of reasonable concession, the public tranquillity might have been restored. Instead of this, however, a new oath of allegiance was administered by the governante, and all persons were obliged to swear that they would regard as traitors and enemies to their country all whom the king should think proper to proscriber. This extraordinary proceeding was followed by the most cruel persecution that can be imagined; at the same time that the duke of Alva was sent into the Netherlands with an army of 10,000 veteran troops, to put the last hand to the misery of the people, and fully to establish the despotism of the court. Counts Egmont and Horn took the abovementioned oath; but the prince of Orange could by no means be induced to it, and

therefore retired into Germany, along with counts Brodenrode and Hoogftrere. Their example was followed by great numbers of all ranks and conditions; and after the arrival of the army commanded by the duke of Alva, such multitudes continued to emigrate, that the dukes of Parma informed the king, that within a few days, 100,000 families had left his dominions; that in a short time the country must be depopulated, in which case there would be no occasion for a governante: she therefore begged leave to resign before she should have the mortification and disgrace of being left alone in the Netherlands.

Philip immediately complied with the request of the princeps, and the duke of Alva was appointed to succeed her in the government. It may easily be imagined that the miseries of the people would now become intolerable. The king was a proud and merciless tyrant, set at too great a distance from his subjects to be thoroughly sensible of their calamities, and totally destitute of compassion had he known them ever so well. The new governor was of the same disposition; and the army he commanded was fierce, rapacious, and cruel, desiring nothing more ardently than to enrich themselves at the expence of the inhabitants. The whole country was filled with blood and horror; counts Egmont and Horn were ignominiously executed, and the estate of the prince of Orange was confiscated. These last proceedings drove the people into despair, and they invited the prince to return, in order to take upon him the defence of the country from such insufferable tyranny and oppression.

All this time the prince of Orange, and his brother Lewis of Nassau, had been labouring to form alliances for the defence of the liberties of his country. He had represented matters in such a light to the emperor Maximilian, that his Imperial majesty sent an ambassador to Philip exhorting him to treat his subjects in the Netherlands with less rigour. This embassy was laughably received; Philip continued his persecutions, and the Prince of Orange his preparations for entering the Low Countries. His first efforts, however, were very unsuccessful. A detachment of Germans in the service of the prince attempted to penetrate into Brabant, and surprised Burmoed; but were defeated by a detachment from the duke of Alva's army. Another party, consisting chiefly of French, attempted to penetrate into Artois by the way of Picardy; but their officers were arrested by order of Charles IX. Lewis of Nassau, however, defeated a body of Spaniards, and killed 600 of them on the spot; but the vigilance of his enemies prevented him from drawing any advantage of consequence from his victory.

The duke of Alva was so much chagrined at the defeat sustained by his party, that he instantly assembled his troops from all quarters. His army then appeared too formidable to be opposed, and the prince of Nassau with count Hoogftrere retired towards the river Ens. But being hard pushed by the duke of Alva, and mutinies arising among their troops for want of pay, they were soon brought to an action, and totally defeated. The infantry were entirely cut in pieces; the cavalry were saved, but all the baggage and artillery were taken by the enemy. In the mean time the prince of Orange was hastening to the relief

United
Province.

13
Duchess
Parma re-
signs.

14
Is succe-
ed by the
duke of
Alva.

15
Prince of
Orange in-
vited by the
people to
return.

16
Hostilities
commence
to the dis-
advantage
of the
prince.

17
Prince of
Nassau and
count
Hoogftrere
defeated the
duke of
Alva.

9
A general
association
against the
inquisition.

10
The people
break out
into acts of
rebellion.

11
New oath
of allegi-
ance requi-
red.

12
Prince of
Orange re-
sires.

United
Provinces.
18
Prince of
Orange de-
fected, and
disbanded his
army.
19
Cruelty of
the duke of
Alva.

relief of his distressed allies with an army of 28,000 men; but having the misfortune of being also defeated, and count Hoogstrate killed in the action, his soldiers deserted in such crowds, that he was at last obliged to disband his army and return to Germany.

This disaster happened in the year 1569. The duke of Alva resolved to make the most of his time. He entered Brussels in triumph; and let loose his vengeance against all who had in the least assisted, or been supposed to assist, the prince of Orange. All the prisoners taken in the last campaign were put to death; and, not content with this barbarity, the cruel governor projected nothing less than the total extirpation of the reformed religion, by the destruction of every one who professed it; and of rendering himself despotic, by erecting citadels in all the considerable towns which were to be garrisoned by his soldiers. He began with Amsterdam, in which he laid the foundations of a strong citadel. The people complained of it as an infringement of their rights, but the duke was deaf to their complaints. At Antwerp he caused his statue to be erected; and here he was figured treading on the necks of two smaller statues, which represented the two estates of the Low Countries. This piece of insolent vanity exasperated the people to a great degree; and they were still farther provoked by a demand of the hundredth part of every man's estate to be paid immediately for the support of the army, besides the tenth of all the merchandize, and the twentieth of all immoveables, to be annually levied as a standing revenue. The provinces remonstrated, and refused to submit to such intolerable exactions: the governor was inflexible; and being incensed at their resistance, he sent the regiment of Lombardy to live at free quarters in the province of Utrecht.

21
Privateers
fitted out
to cruise on
the Spaniards.
22
Duke of
Alva at-
tempts in
vain to effu-
se his
new taxes
at Brussels.

In this situation of affairs, the prince of Orange was advised by admiral Coligni to fit out a squadron of privateers to cruise upon the Spaniards, intercept the supplies of money sent to the Netherlands, and thus raise a fund for the maintenance of an army. This measure was immediately executed, and numbers of the Spanish merchantmen were taken; but as no method was taken to save the profits, the designs of the prince of Orange were at first but little forwarded. The shoal of privateers went by the general name of *gueux*, or *sea-beggars*; and in a little time commenced pirates, to the no small detriment of their own country as well as the enemy.

23
Briel taken
by the Oran-
ge par-
ty.

All this time the prince of Orange was employed in laying plans for the deliverance of his distressed country; but, in 1501, the duke of Alva, growing impatient, ordered the edict concerning the new taxes to be published at Brussels. The city was instantly filled with confusion; the soldiers seized on the goods of the inhabitants by force; tradesmen shut up their shops; and the peasants refused to bring provisions to the market. The states offered to pay a subsidy of 2,000,000 of florins annually in lieu of the intended tax; but their offer was rejected. The drum beat to arms, and orders were issued to hang all who refused to comply. The soldiers were preparing to obey, when news arrived of the surrender of Briel in the island of Voorn, at the entrance of the Meuse, to the Gueux. Lumey, who commanded the Orange squadron, made a descent on the island from 40 ships,

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Provinces.

destroyed the churches, broke the images, and executed the priests, but offered no violence to the other inhabitants.

24
Duke of
Alva desists
from enforcing
his
taxes.

However unimportant the conquest of so inconsiderable a place might appear, it alarmed the duke of Alva, and produced the most extravagant rejoicings in Brussels. The duke regarding it as the harbinger of further opposition, dropped his taxes and executions for the present, and diligently applied himself to suppress the growing spirit of rebellion. He withdrew the garrison from Brussels, and detached it under the command of Maximilian Hermin Bossu, against the

25
A party of
his forces
defeated by
the Gueux.

Gueux. This officer, endeavouring to force Briel, was defeated by the Orange faction, and forced to retire with loss to the island of Beyerland. Trifling as this victory might seem, it served to animate the depressed spirits of the enemies to the government. The prince of Orange, sensible of the advantage of possessing this island, exhorted the nobility of his party to fortify

26
The Gueux
take Delfs-
haben.

and garrison it; his orders were obeyed, by which means he soon became master of Delfshaben, a town situated on the opposite banks of the Meuse. It appeared in Bossu's retreat, how unpopular the duke of Alva was in every part of the country. Dordrecht shut its gates against him. Rotterdam refused to admit his troops; but Bossu obtaining permission that they should pass through in separate small divisions, seized the gates, and began a general massacre of the inhabitants. Four hundred souls perished by the sword, the town was pillaged, the women were ravished, and every possible act of barbarity and inhumanity committed. Retribution was soon made by the enemy. Alva had detached Ossorio d'Angulo with a body of forces to secure Flushing, a considerable port in Zealand, and to erect a citadel. The inhabitants denied

27
Inhabitants
of Rotter-
dam malici-
ously trea-
soned with
the Spaniards.

Ossorio admittance, shut their gates, and seized Pacanco, a famous engineer, who had come to measure the ground where the citadel was to be erected. Apprehending that attempts would be made to force them to submission, they petitioned Lumey, admiral of the Gueux, for assistance; and he furnished them with 200 men, under the command of Captain Treslong.

On the arrival of this reinforcement, the Spanish engineer was hanged, and an unsuccessful attempt made to surprise Middleburg, the capital of the island of Walcheren. Not dispirited by this disappointment, the Zealanders assiduously prosecuted their cruizes upon the Spaniards, and obtained as much wealth as purchased a large store of arms and ammunition at Antwerp. Joined by great numbers of English and Scotch adventurers, they ventured to attack the duke of Medina Celi, sent with a strong squadron to succeed the duke of Alva in the government of the Netherlands. The duke was completely defeated, a great number of his ships were taken, and a booty amounting to near 1,000,000 livres was carried off by the Zealanders.

28
Duke de
Medina
Celi entirely
defeated by
the Zea-
landers at
sea.

The duke of Alva now ordered a squadron of ships to be equipped at Amsterdam to bridle the insolence of Lumey and the Zealanders, while he busied himself in raising an army to oppose the prince of Orange and Lewis de Nassau, who were making great preparations in Germany and France. To augment the army in the field, he had draughted most of the garrisons. By this means the prince's friends gained pos-

United
ProvincesUnited
Provinces30
Most of the
towns in
Holland de-
clared against
the Spani-
ards.32
Proceed-
ings of the
States gen-
eral in fa-
vour of the
prince of
Orange.33
His suc-
cesses.

cession of North Holland; and Lewis de Nassau was projecting a scheme to surprise Mons, with the inhabitants of which he held a secret correspondence. The design succeeded, which emboldened most of the cities and towns in Holland to declare against the government. The count de Bergues gained over several cities in Overysil, Guelderland, and Friseland. In a word, the revolt became so general, that the duke of Alva soon found he could not long resist the torrent. He now, when too late, published an edict to appease the people, setting forth, that he would consent to remit the most oppressive taxes, if the states could suggest any other means of raising the necessary supplies. He convoked the states-general to meet at the Hague, but his orders were now disregarded; and the states, in contempt of his authority, assembled at Dordrecht, inviting deputies from the prince of Orange, the nobility, and the towns that had declared against the governor. Here money was raised to enable the prince of Orange to begin his march. His forces amounted to 15,000 foot and 7000 horse. He had promised to advance three months pay; and was enabled to perform his engagements, by the liberality and public spirit of the states-general and the cities. Several regulations respecting the future support and government of the army were made on this occasion, and their proportions of the public expence assigned to the several provinces and cities. It was further resolved, that nothing of importance should be transacted without the privity and consent of the prince of Orange; and that the prince, on his part, should not negotiate a peace with the king or his lieutenants, contrary to the sentiments of the states. In a word, the prince showed the address with which he could manage and direct the people. Without the name of sovereign of the provinces under his government, he possessed the authority. He presided at all military operations by sea and land; made and disposed of offices at pleasure; assembled the states; and published all ordinances and regulations, relative to the present state of affairs, without controul. However, he conducted matters with the utmost delicacy, and used his power with great moderation, to avoid giving offence to the free spirit of the Hollanders. The Popish religion was banished the churches, and persons of that persuasion were, with great caution, admitted into public employments. Not only the king's revenue and church-tythes were appropriated to the public service, but the estates of those who remained firm in their loyalty. In short, the most vigorous measures were taken for resisting the tyranny of Spain; and those persons who had refused the tythes to the government, voluntarily subscribed their all to support a party formed in defence of liberty.

While the states-general were employed in ways and means to maintain an army, the prince of Orange advanced to Ruremonde, which he took by assault, on the refusal of the city to supply him with necessaries. From thence he marched to Brabant, and raised heavy contributions. He took Mechlin, Oudenarde, and Dendermonde; and could not restrain the excesses of the soldiers, who pillaged the churches, massacred the priests, and committed other barbarities. Next he approached to Mons, besieged by the duke of Alva, with design, if possible, to engage him to

give battle. The duke baffled all his endeavours to force him, and carried Mons by capitulation. The whole Spanish dominion, however, lately so insolent and exulting, was ready to expire in the Netherlands, had it not been revived by the massacre of the Protestants in Paris.

While the fate of Mons was depending, the states of Holland met at Haarlem, to deliberate on the defence of the province and the prosecution of the war. Amsterdam was in the enemy's hands, which greatly obstructed all their measures. It was therefore determined to besiege it; and the enterprise was committed to Lumey, chief of the Gueux. After putting the states to considerable expence, the project miscarried through Lumey's misconduct. Water was his element, but his vanity led him to display his abilities as a land-officer. He made regular approaches, and was foiled in every attempt.

The reduction of Mons, and the depression of spirits consequent on the massacre at Paris, obliged the prince of Orange to retire to Holland, and encouraged Alva to invest Dendermonde, Oudenarde, and Mechlin. The latter, being in no condition to resist, opened its gates; but the Spanish soldiers chose to scale the walls, to give an air of assault to the enterprise, and countenance to the horrid barbarities intended. Protestants and Catholics were massacred without distinction. The town was pillaged, and the booty estimated at 400,000 florins. All the other towns were evacuated by the garrisons, and loaded with heavy impositions by Alva. As to the prince, he had now removed the seat of war into the province of Holland. Only this province and Zealand remained firm to their engagements; the rest, overwhelmed with consternation, capitulated on the best terms they could procure from the government. However, the country being strong by its nature and situation among the waters, and more so by a fierce, rough, and sturdy people, proud of their ancient fame, and the most implacable enemies of Spanish tyranny, it was determined to make the most vigorous resistance. Frederic de Toledo was dispatched by Alva to begin the operations in Holland. He had already reduced Zutphen and Guelderland; and, flushed with success, appeared before Waerden, which he summoned to admit a garrison. The burghers replied, that they were intrusted by the king with the defence of the place, and could not receive a military force without violence to their privileges and engagements. They soon had reason to repent their firmness: the town was taken by surprise; and all the burghers, assembled in the great church to take the oaths of fidelity to the king, were wantonly butchered. Infants, old men, women, and the sick, were all put to the sword, without pity or remorse; and of all the barbarities hitherto committed, this was the most horrible. It was imagined that the terror inspired by such instances of severity, would reduce the people to obedience, and shake the obstinacy of the other towns. The contrary effects were produced; rage and despair took possession of every breast, and all determined to suffer the last extremities rather than submit to so cruel a tyranny.

Having finished this tragedy, Frederic went to Amsterdam, to deliberate with the officers of the army about the siege of Haarlem. Here it was determined, before

33
Is obliged
to retire.34
Success and
cruelty of
the duke of
Alva.

United
Provinces.

United
Provinces.

before they proceeded to extremities; that the city of Amsterdam should write to the magistrates, exhorting them, in the most pathetic terms, to submit, rather than incur the punishment inflicted on Waerden. The council of Haarlem met to take this letter into consideration. Some were for soliciting an immediate reinforcement from the prince of Orange; and others, who apprehended the prince was too weak to afford the necessary relief, were for making the best terms possible with the king. Those of the latter opinion were the magistrates. Accordingly, without consulting the burghers, deputies were dispatched to Frederic to stipulate conditions. In their absence, Ripperda, a gentleman of Friseland, strongly attached to the prince of Orange and the cause of liberty, assembled the chief burghers; and so animated them against the Spaniards, that they resolved to stand a siege, and suffer all the horrors of war, rather than submit. They sent to the prince of Orange to acquaint him with their determination, and to implore assistance. Four companies of Germans were detached to reinforce the garrison of Haarlem; and the deputies, on their return, were seized as traitors to their country, sent to the prince of Orange, and by his order beheaded. Frederic was preparing to compel the burghers to submission. On the 19th of December, he invested the town, after carrying Sparendam fort by assault, with great loss and slaughter of his soldiers. A variety of errors were committed in the attack, in the defence, and manner of succouring Haarlem. The assailants and defendants had equally shown themselves ignorant of the art of war, and implacable in their resentment. The prince of Orange used every expedient to relieve to town; but all his attempts were frustrated by untoward accidents, and the vigilance of the Spaniards. At last, quite spent with fatigue, despairing of relief, weakened by losses, and totally exhausted of provisions and ammunition, the burghers of Haarlem surrendered upon more favourable terms than they could well expect. A few only of the most obstinate were executed; the rest were pardoned on taking an oath of fidelity, and paying an acknowledgment of 15,000 florins.

35
Haarlem
besieged.

36
And taken.

37
Successes of
the Zea-
landers by
sea.

During the siege of Haarlem, the Zealanders were performing glorious achievements by sea, and gaining victories over the Spanish naval armaments. All the efforts of the governor of Antwerp could not prevent their carrying off a great number of ships out of the harbour. To revenge the insult, and relieve Middleburg and Rammekins blocked up by the Zealanders, he equipped a squadron, and gave battle to Wertz, the Zealand admiral, but was defeated. After repairing and augmenting his fleet, he again set sail with sixty large vessels, encountered a squadron of Zealanders much inferior in strength, and met with his former fortune. Most of his ships were sunk or taken; but he found means to push into Middleburg, with the broken remains of his squadron, to the great joy of the garrison, now reduced by the scarcity of provisions to the last extremity. D'Avila's disgrace did not end here; for, on his return to Antwerp, he was a third time attacked and defeated, with considerable loss, by Wertz, who thus repaired the disappointment of an unsuccessful attempt made on Tolon.

Soon after the reduction of Haarlem, Alva, per-

ceiving that his severity answered no other purpose than irritating the people more against the Spanish government, published a proclamation, couched in the most soothing terms: but the people were not disposed to confide in promises so often violated, nor to throw themselves on the clemency of a prince and governor, who had shown themselves inflexible, implacable, perfidious, and inhuman. They now expected the worst that could happen, and bid defiance to fortune. The Spaniards were preparing to invest Almar, and the Hollanders put every means in practice to resist them. Eight months pay was due to the garrison, who began to mutiny; but contributions were raised, which silenced their clamours. Frederic of Toledo, with 16,000 men, sat down before a town fortified by no regular works, and defended only by 300 burghers, and 800 soldiers, in extreme want of provisions, and without the prospect of relief. Sonoï, the governor, despairing of being able to sustain a siege, wrote to the prince of Orange, that a place destitute of troops, provisions, ammunition, money, and every necessary, ought to be evacuated, and the few soldiers in garrison, and the burghers, saved from falling into the hands of the enemy. But the prince of Orange so animated them by a letter, that, to a man, the townsfolk, governor, and soldiers, determined to sacrifice their lives, and spill the last drop of their blood in the breach. Perseverance had made the Zealanders masters of Rammekins, contrary to all hope and probability; the same virtue, the prince observed, might save Almar, a town of the utmost consequence to the cause of liberty. What particularly inspired the defendants with courage, was the prince's good fortune in surprising Gertrudenburg. Frederic pushed the siege with great vigour. He ordered the inhabitants of Haarlem to work in the trenches, and sustain the first fire of their friends and countrymen. On the 18th of September, a battery of 20 pieces of heavy cannon began to play; a breach was soon effected; the assault was given, and repulsed with vigour, though sustained by the bulk of the Spanish army. From a Spanish officer taken, the garrison were informed, that Alva had given orders to retire, in case he failed in the third assault; but if he succeeded, to put all to the sword. Their courage was whetted by this account, and preparations were cheerfully made for withstanding the utmost efforts. Frederic was foiled in every attempt; the assailants were driven from the breach with prodigious slaughter; the Spanish soldiers refused to mount the walls; in a word, the siege was raised, and the town relieved, to the exceeding joy of the prince of Orange, and great mortification of Alva.

This advantage was attended with another of less importance, but which equally served to inspire the Hollanders. The duke of Alva's grand fleet, equipped with great labour and expence, was defeated by the Zealanders. Though the action did not prove decisive, it greatly chagrined the duke, as Bossu, one of his best officers, was taken prisoner, and his fleet afterwards dreaded to look the enemy in the face. The year, and the government of Alva, concluded with a meeting of the states of those provinces subject to Spain. Here they deliberated on the means of continuing the war; read, and disregarded a remonstrance

38
The Spa-
niards re-
pulsed be-
fore Alc-
mar.

39
They are
defeated at
sea.

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sent by the prince of Orange, complaining of the violence of the duke, demanding the free exercise of their religion for his party, restitution of the rights and privileges of the provinces, and that the foreign troops should be withdrawn. On the 2d of December, the Duke of Alva quitted the Low Countries, with his son Frederic of Toledo; and Don Lewis de Requesnes, appointed to succeed him, began his government with pulling down the insulting statue of his predecessor, erected at Antwerp; a popular act, that would have produced happy consequences, had not the court of Spain been infatuated with notions of despotism and blind superstition.

Notwithstanding this success, the affairs of the States were yet in a most precarious situation; and their ability to support themselves appeared in the highest degree problematical. The new governor Requesnes had orders to push the war with vigour, and his antagonists prepared for the most obstinate resistance. The first advantages appeared on the side of the prince of Orange, by the surrender of Middleburg. But this was soon balanced by the defeat and death of prince Lewis of Nassau. The Spaniards, however, were prevented from pursuing the advantage they had gained, by a mutiny among their troops. This mutiny took place on a regular and well-concerted plan. The soldiers deposed all their officers, appointed new ones, and established a sort of community, vesting one of their number with the chief authority. The distresses of the Spaniards on account of this tumult were likewise augmented by a victory gained by the Zealanders at sea; when 40 of the Spanish ships were almost all taken or destroyed. Philip then perceiving that numberless difficulties would attend the reduction of the provinces by force, published an act of grace; but in such a limited manner, that it was unanimously rejected. Requesnes then determining to close the campaign with some remarkable exploit, laid siege to Leyden. The city was reduced to the utmost distress for want of provisions; the whole country was laid under water; and they could receive no relief except what was obtained by boats forcing themselves through the enemy to the city. In short, they were reduced to the brink of destruction, when a violent south-west wind drove the inundation against the works of the besiegers with such violence, that they were obliged to relinquish the enterprise for fear of being entirely swallowed up. In their retreat they were attacked by the garrison, and 500 of them destroyed. This disappointment for provoked the Spanish soldiery, that they deposed Valdes the commander whom they had chosen for themselves, and proclaimed their old one: a second mutiny ensued, and they marched in a tumultuous manner to Utrecht. Here, however, they met with a very unfavourable reception. Barlaumont the governor declared them rebels and traitors to their king; and gave free liberty to every one to massacre them wherever they could be found. The mutineers attempted to set fire to the gates; but being repulsed, and their leader slain, they capitulated, were received into favour, and sent into winter quarters.

The year 1575 commenced with some negotiations for peace; but these proving ineffectual, though the emperor interposed his mediation as far as possible, the war was renewed with redoubled fury. Fortune now

declared in favour of the Spaniards; and the States were reduced to such despair, that they began seriously to think of making an offer of the provinces to some Protestant power who might be able to defend them against the tyranny of the Spaniards. This offer was made to queen Elizabeth of England; but she declined it, for political reasons. A negotiation was even set on foot for this purpose with France, in favour of the duke of Anjou; but it ended in nothing besides the advantage of establishing a mart at Calais for the disposal of the prizes made by the Gueux. Philip, however, notwithstanding his power, had the utmost difficulty in supporting the expence of the war. He had already borrowed more than 40,000,000 crowns from the Spanish and Genoese merchants, and the interest still unpaid now amounted to as much as the capital. The war had besides cost a greater sum sent in specie from Spain and the Indies, which, with the immense losses occasioned by the stagnation of trade in the Netherlands, had quite exhausted the treasury. Large arrears were due to the troops; they were every day mutinying, and some broke out into actual rebellion. To remedy these evils, Requesnes demanded a supply of the provinces; and they answered him, by requiring restitution of their privileges, and dismissal of the Spanish troops. Flanders, in particular, paid the desired subsidy, by balancing it against half the damages the province sustained from the misconduct of the governors, and the wars wantonly and unnecessarily excited. While this affair was in agitation, Requesnes died of an ardent fever; and the council of state assumed the administration, and the prince of Orange took the opportunity of the confusion that ensued to lay the first foundation of the Pacification of Ghent, by which his affairs were considerably retrieved, and the greatest blow given to the court of Spain he had yet sustained. All now was anarchy in the Low Countries. The garrison of Zirczee mutinied for want of pay; and to appease them, the council of state sent 100,000 livres, which the Walloon regiments under Madragon seized upon, after expelling the Spanish soldiers, wounding and murdering their officers. This did not unite the Spanish mutineers among themselves: they turned out the few remaining officers, and made new appointments. Joining with the garrison of Lillo, they marched, to the number of 2000 men, towards the capital; committed horrible outrages; overwhelmed the inhabitants of Brussels with conflagration; and, upon the 26th of July, seized upon Alost, confined the principal burghers, and hanged up a king's officer. The most favourable conditions were offered by the council of state, in order to appease the tumult, and provisions were sent to the mutineers. This created suspicion in the inhabitants of Brussels, that the mutiny was excited by the connivance of the council, with a view of ruining the provinces, without incurring the resentment and odium consequent on any appearance of legal oppression. They arrested the council, declared the Spaniards rebels, and took measures in concert with the other cities and provinces for expelling foreigners out of the Netherlands. A confederacy to this purpose was formed between the provinces of Hainault, Artois, and Flanders, to which all the rest except Luxembourg acceded; and Don John of Austria, who had entered the Low Countries in quality of governor and successor to Requesnes, was obli-

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42
The States
offer the so-
vereignty
to queen
Elizabeth,
&c.

43
Philip dis-
tressed in
his finan-
ces.

44
Confusion
in the Spa-
nish affairs.

40
Duke of
Alva re-
signs.

41
Mutiny in
the Spanish
army.

United Provinces. obliged to live in obscurity in Luxemburg, until the storm should subside.

The prince of Orange was all this while profiting by these commotions. He had long laboured to have the States-General convoked; and he now saw them not only assembled, but preparing to make head against the Spaniards, by a strange vicissitude of fortune, arising from accidents which all his penetration and sagacity could not foresee. United in councils against the common enemy, every measure was taken for reducing the citadels of Ghent, Antwerp, and Maelricht, the chief places in the hands of the Spaniards, and what must principally contribute to their expulsion. Ghent citadel was taken on the 27th of November, by the assistance of a strong reinforcement of troops and artillery sent by the prince of Orange. At Antwerp the states of Brabant were less successful. The citadel was vigorously attacked; but the mutineers at Alost entering the citadel to assist their countrymen, a sally was made, the besiegers were driven from their trenches, great part of the town was consumed by fire, and the rest pillaged for three days with every kind of insolence and brutality, at a time when Antwerp was the most flourishing and populous city in the Netherlands, and indeed among the most wealthy in Europe. It is affirmed that the treasure carried off amounted to four millions, besides an infinity of rich merchandise. This terrible calamity united Papists and Protestants without distinction in a confederacy, and co-operated with the measures of the prince of Orange to form the Pacification of Ghent: which was a confederacy of all the provinces to expel foreign soldiers; to restore the ancient form of government; to refer matters of religion to the several states of the provinces; for ever to unite the other 15 provinces in the same common interest with Holland, Zealand, and the prince of Orange; to renew the commerce and amity between them; to assemble the states in the manner practised under the house of Burgundy and Charles V.; to suspend all the rigorous edicts of the duke of Alva on the subject of religion, until the States-General should take the matter into consideration; to release all the natives made prisoners, mutually, without ransom; and to restore all things upon the same footing as before the war, and the tyrannical government of the duke of Alva.

The States-General began with soliciting aid from the queen of England. Their ambassador had a gracious reception; and Elizabeth advanced them 20,000*l*. sterling, on condition that the French should not be invited into the Netherlands, that they would accept of reasonable terms of accommodation if offered, and that the loan should be repaid the ensuing year. Next a cessation of hostilities was agreed upon with Don John, upon his assurances that every reasonable request of the provinces should be granted. On the 27th of December, deputies were sent with proposals to Don John to disband the foreign troops; but he desired to know what security the states would give for their allegiance after the departure of the Spanish forces; and remonstrated against the unreasonableness of disarming the king, while his rebellious subjects were in arms, and ready to seize the first opportunity of deserting their obedience. He likewise demanded security with respect to religion; and insisted so warmly on this head, that it was obvious he had no inclination to part with

the Spanish army before the provinces of Zealand and Holland embraced the Catholic religion. After much altercation, necessary at length obliged Don John to grant all that was required, to confirm the Pacification of Ghent, and dismiss the Spanish army. He had the king's authority for his proceedings; the treaty was proclaimed at Brussels and Antwerp on the 17th of February; and Don John immediately acknowledged governor, and the king's lieutenant of the Netherlands.

It must be observed, however, that when this edict was signed, the provinces of Holland and Zealand, by the advice of the prince of Orange, made the following objections, viz. that the States-General had not established the right of assembling this sovereign tribunal in the persons originally invested with that power by the constitution; that in some particular instances they had suffered an infringement of their privileges; that the Spanish troops were allowed to carry off the immense wealth they had acquired in the Netherlands, and by the destruction of the city of Antwerp in particular; that no stipulation was made in favour of those dispossessed of their estates, &c. For these reasons the States and the prince refused to sign the edict, though they consented to all the articles that did not contradict those specified. This raised a contention, by which the public peace was soon broken. Don John was strenuous in recommending violent measures against the prince and his party. To this purpose he wrote a letter in cypher to the king; but this letter fell into the hands of Henry IV. of France, who transmitted it to the prince of Orange. Escovedo, secretary to Don John, was next sent into Spain with a message to the same purpose; but the governor becoming impatient for his return, left the country himself, under pretence of complimenting Margaret queen of Navarre on her journey to Spaw. In this expedition he seized on the citadel of Namur; but attempted to justify his conduct to the States, by representing, that he was under a necessity of retiring to a place of safety, while he saw the flames of war and rebellion ready to break out all around him; and concluded with desiring the States to disarm the burghers of Brussels, who were closely attached to the prince of Orange. This letter was answered by an invitation from the States to return; promising at the same time, that they would to the utmost of their power bring to punishment all those who should form any designs against him. This, however, was not only refused, but the whole tenor of his conduct afterwards shewed, that he was resolved to commence hostilities, and that he was encouraged to do so by Philip. The event Don John was, that Don John was deposed from his dignity, the archduke Matthias was appointed governor-general, and preparations were made for a new and vigorous war. The Spanish troops were ordered to assemble in Naples and Milan; levies were made in Burgundy and Luxemburg; and a resolution was taken of supporting Don John with the whole power of the Spanish monarchy. To oppose this formidable power, the States, in 1578, entered into a new treaty with the queen of England; by which that princess agreed to advance them 100,000*l*. Sterling, and to assist the provinces with 5000 foot and 1000 horse; on condition that the loan should be repaid with interest in

United Provinces.

48 Don John accedes to Pacification of Ghent.

49 Objections made to the Pacification by the provinces of Holland and Zealand.

50 Hostilities recommenced.

51 Don John deposed.

52 New treaty with queen Elizabeth.

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eight months; that certain towns should be ceded to her in security; and that the States should defray the expence of transporting their troops, and take them in to pay, while they acted in their service. Elizabeth, however, afterwards departed from these conditions, under pretence that the French would suspect her having some designs on the Netherlands, and would for that reason unite their forces with those of Spain against her. Instead of the English troops, she now proposed to send John Casimir, count Palatine, with 3000 foot and 3000 horse; refusing at the same time to pay the money stipulated, until the States had consented to this alteration.

Before this treaty was concluded, Don John was joined by an army of 16,000 foot and 2000 horse, all chosen veterans, commanded by Alexander Parnese, duke of Parma, the best officer in the Spanish service. Being thus superior to the prince of Orange, the Spaniards gained several advantages; which, how-

53
Amsterdam
concludes a
treaty with
the prince
of Orange.

ever, were more than balanced by the loss of the city of Amsterdam. This place had been closely blocked up for several months by sea and land, and at last concluded a treaty with the friends of the prince of Orange, by which it was stipulated, that the Protestants should hold their religious meetings without the walls, and have a burying place within; that the garrison should be disbanded, and 600 men, commanded by the burghers, levied for the defence of the city; that all persons banished on account of religion should be recalled; that Amsterdam should enjoy all its ancient privileges, and that all vacancies in public employments should be filled without distinction of party or connection. This capitulation, however, was soon after broken; the Catholic magistrates were driven out of the city, attended by the priests and Popish clergy of every denomination; the images were pulled down, and only the reformed clergy suffered to preach publicly. Some ineffectual negotiations next took place; after which the States, sensible that the misfortunes and losses in the winter arose from the irresolution of the provincial states, vested the archduke, the council of state, and the prince of Orange, with a power of levying what number of troops they should think necessary, and disposing of them as they thought proper, without referring to the states in every particular: they only recommended that they would proportion the expences to the revenue, which at that time amounted to 600,000 l. vres. About this time a revolution, greatly beneficial to the common cause, was effected in Guelderland; John of Nassau, brother to the prince of Orange, had been appointed governor of this province. Upon entering on the administration, he perceived that the whole conduct of affairs was in the hands of persons strongly affected to king Philip and the Catholic religion; most of the cities professed Popery; and the count, who had sworn to the pacification of Ghent, was restrained from attempting any change in religion. The face of affairs, however, took a sudden turn; John acquired great popularity, and soon discovered that foreigners were the leading persons. By his artifice and policy he stimulated the people against them; they were deprived of their seats in the provincial states, and turned out of their offices in the government of the cities. Thus Nassau obtained the chief direction, and was able to co-operate with the

54
Revolution
in Guelder-
land.

measures planned by his brother. Another revolution happened in Groningen, of which the sieur de Billy was governor. Billy was by birth a Portuguese, by religion a Catholic, and consequently a dependent on the court of Spain: he refused to accede to the union of the provinces, and the States-general found it necessary to send to him Francis Martin Stella, with proposals for signing the pacification of Ghent. Billy suspecting that the deputy's real design was to excite a revolt in the province, put him to the torture to extort confession; after having first wounded him with his own hand. The deputy bore the most excruciating tortures with firmness; and having a surgeon to dress his wound to enable him to undergo a second trial, he communicated something in the Greek language, which the surgeon soon made public: in consequence, the mob assembled, rescued Stella, declared for the pacification of Ghent, and obliged Billy to quit his government. The change of councils in these two provinces was of the utmost service to the confederacy; and would have enabled the province to have encountered the whole power of Spain, had not their affairs been distracted by dissensions among themselves.

At last the prince of Orange, perceiving that little confidence was to be placed in the unanimity of provinces rent by faction, different in religion, and divided by ambition, political maxims, and private interest, formed the scheme of more closely uniting the provinces of which he was governor, and cementing them with those more contiguous, in which the Protestant interest prevailed. Such an alliance was subject to fewer difficulties than attended the more general one of uniting all the provinces; it was in fact the only measure that could be proposed with safety, and it was prosecuted with that alacrity and address for which William was deservedly celebrated.

On the 23d of January 1579, deputies from the provinces of Holland, Zealand, Utrecht, Friesland, Groningen, Overijssel, and Guelderland, met at Utrecht, and signed the alliance ever since known by the name of the *Union of Utrecht*, the basis of that commonwealth so renowned by the appellation of the *United Provinces*. This treaty of alliance was founded upon the infraction of the pacification of Ghent solemnly acceded to by Philip, and the late invasion of certain towns in Guelderland. It was not hereby intended to divide the seven provinces from the other ten, or to renounce the pacification of Ghent; its object was to preserve the liberty stipulated in that pacification, by more vigorous operations, and united councils. The chief articles of this union are the following.

55
Union of
Utrecht.

The seven provinces shall unite themselves in interest as one province, never to be separated or divided by testament, donation, exchange, sale, or agreement; reserving to each particular province and city all its privileges, rights, customs, and statutes. In all disputes arising between either of the provinces, the rest shall interpose only as mediators. They shall assist each other with life and fortune against every foreign attempt upon any particular province, whether to establish sovereignty, the Catholic religion, arbitrary measures, or whatever else may appear inconsistent with the liberties of the provinces and the intention of the alliance. All frontier towns belonging to the United Provinces, shall, if old, be fortified at the expence of

the

United
Provinces.

the provinces; if new, at the joint expence of the union. The public imposts and duties shall be farmed for three months to the highest bidder, and employed with the king's taxes in the public service. No province, city, or member of the union, shall contract an alliance with any foreign prince or power, without the concurrence of all the other members. Foreign powers shall be admitted into the alliance, only by consent of all the contracting parties. As to religion, the provinces of Holland and Zealand shall act in that particular as they think advisable; the rest shall adhere to the purport of the edict published by the archduke Matthias, which prescribed that no man should be oppressed on the account of conscience. All the inhabitants, from the age of 18 to 60, shall be trained and disciplined to war. Peace and war shall be declared by the unanimous voice of all the provinces, other matters that concern the internal policy shall be regulated by a majority. The states shall be held in the usual constitutional manner, and coinage shall be deferred to future determination. Finally, the parties agree, that the interpretation of these articles shall remain in the States-general; but in case of their failing to decide, in the stadtholder.

This alliance was so universally approved, that in a short time the cities of Ghent, Nimeguen, Arnhem, Leeuwarden, Venlo, Ypres, Antwerp, Breda, Bruges, with several other towns, besides a great number of noblemen and persons of distinction, embraced and signed the union. Thus the foundation of a commonwealth was laid, but in a fluctuating and uncertain state of affairs, when men were actuated by different passions, views, and interests; intimidated by the great strength of the Spanish monarchy, and supported chiefly by a zealous adherence to liberty, and firm resolution to perish in defence of freedom. The first coin struck after this alliance is expressive of the situation of the infant republic. Here was represented a ship labouring amidst the waves, unassisted by sails or oars, with this motto, *Incertum quo fata ferant*.

It was expected, that the important object of this alliance would have attracted the attention of the Walloons, and indeed of all the Catholic inhabitants of the Netherlands: it in fact did so, but in a different manner from what was imagined. The Walloons not only refused to accede to the union, but they made the strongest remonstrances to the States general upon the danger, impropriety, and illegality of such a confederacy. It appears from Strada and Bentivoglio, that the duke of Parma was at the bottom of their intrigues. He stimulated and prompted their measures, inspiring them with a jealousy of the Protestant designs on the Catholic religion. In the end, he contracted an alliance with them; and thereby confirmed by his own example the legality and necessity of the union of Utrecht. Immediately they began levying an army; but still kept up appearances with the confederated provinces, though it was obvious that hostilities must soon commence. To prevent the effusion of blood, the emperor, as mediator, set on foot another negotiation; but Philip would allow no reasonable terms of accommodation, and give no security for liberty of religion. Instead of granting equitable conditions, he laboured to detach the prince of Orange from the union; made him extraordinary proposals; offered to restore him to

all his estates, indemnify his losses, raise him to the height of power, and give him the first place in his esteem and favour. But William was too wise to rely on the promises of a king, who had shown himself perfidious. He determined to share the fate of the United Provinces, to fulfil his engagements, and the hope conceived of his conduct.

In the mean time great disorders arose in Ghent. The inhabitants, finding that the Walloons refused all proposals of agreement, began afresh their violences against the Catholics. Their example was followed by Oudenarde and Dendermonde; and to such excess did they push their zeal, that the presence of the prince of Orange was necessary to restore the tranquillity of Ghent in particular. On the prince's arrival, he found every thing in confusion; the convents and churches pillaged by the soldiers, the houses and effects of the Catholic priests sold at public markets. But he soon put a stop to those arbitrary and iniquitous proceedings, and the Catholics were restored to the full possession of their estates: an instance of justice which, however, could not procure William the confidence of the Catholic faction; who esteemed the man, while they detested the heretic. An attempt was made by the Walloons to surprize the city; but it was frustrated by the prince's vigilance and prudence.

While the prince of Orange was busied in conciliating factions, forming alliances, and strengthening the union, the duke of Parma was taking measures to disconcert his projects, and reduce the provinces to the king's obedience. He dispatched Gonzaga and Mondragon with 8000 men to lay siege to Mursien. The town was taken by assault; the governor hanged; and 45 of the chief inhabitants were tortured to death, for having valiantly defended themselves, and faithfully discharged their duty. It is said the duke of Parma disavowed this bloody proceeding, so inconsistent with the character of a hero. After some farther considerable advantages obtained in the neighbourhood of Ruremonde, the king's army insulted Antwerp, where the archduke and the prince of Orange then resided. The states army was intrenched near Borgerhont, a post attacked without success by the duke of Parma, after a brisk skirmishing of two hours between the armies. La Nove, however, the general of the states army, not choosing to expose himself to continual alarms from the enemy's cavalry, retired under the cannon of Antwerp.

On La Nove's retreat, the duke of Parma invested Maelricht. The siege began on the 8th of March, and continued without remission to the 29th of June. This defence was deemed very extraordinary, as the fortifications were in bad order, the garrison slender, and the place but poorly provided with the necessaries of a siege. One Sebastian Tappin, an engineer by profession, a Protestant, and a brave and alert soldier, by his indefatigable vigilance raised continual obstructions to the duke's approaches. The garrison had sustained frequent assaults, and made divers bloody sallies, by which they were so much fatigued, that during a parley the town was surprized, and a great many soldiers were put to the sword; but Tappin was saved by favour of the duke of Parma, who gave strict orders that he should have quarter. For three days Maelricht was a scene of the utmost desolation and horror, the Span-

United
Provinces.59
His suc-
cesses.60
Maelricht
taken, and
the inhabi-
tants massa-
cred.57
First coin
struck by
the repub-
lic of Hol-
land.58
Intrigues of
the duke of
Parma.

United
Provinces.

61
Dilstrified
situation of
the repub-
lic.

nish soldiers committing every excess and enormity, in despite of all the endeavors of the general to restrain their licentiousness, and maintain discipline. With such diligence did the duke apply himself to this siege, that unable to support the fatigue, he was seized with a fever, which had near proved fatal. His situation inspired the enemy with fresh courage. They ventured to appear in the field; reduced Alolt, and some other places of little consequence; but could not prevent the loss of Menin taken by assault, though it was soon after retaken by the prince of Orange. In Brabant the states likewise obtained some advantages, though of too unimportant a nature to merit attention. The truth is, all the United Provinces were in a deplorable situation; and their trifling successes were owing entirely to accident, or the duke of Parma's illness. Several provinces contributed nothing to the common cause; others furnished but a small proportion of the taxes agreed upon at the union. The army had large arrears due, and lived at discretion; in a manner more oppressive to the people than taxes to the amount of their regular pay. The people clamoured against the states; they threw the blame on the officers for relaxing in the point of discipline; and the officers recriminated, alleging, that the fault was in the states, who failed in performing their engagements to the army. All was in confusion; but as no person would acknowledge his error, there appeared little hopes of amendment. In a word, nothing besides the same distress in the Spanish army could have prevented the duke of Parma from reducing the revolted provinces to accept any terms he should think fit to prescribe. He was equally in want of money; and his late treaty with the Walloons required that he should dismiss all his foreign troops in the space of six weeks after the publication of the treaty. His situation indeed was so deplorable, that he requested leave to resign his command, and retire with the foreign soldiers to Italy; but the court of Spain had too much confidence in his ability to entrust so important a charge to another. In this state of affairs the animosity of the parties remained, without the power of showing their repentment. The states were resolute, but unable to defend their liberties. Philip was determined, but too weak to be despotic; and both were obliged to content themselves with publishing bitter remonstrances against each other.

At last the prince of Orange renewed the treaty with the duke of Anjou. The queen of England was again offered the sovereignty, but she declined it for political reasons. The duke of Anjou was, however, opposed by a great number of the Reformed, on account of the share his mother had in the horrid massacre of the Protestants at Paris. All arguments to remove their prejudices were in vain. Anjou was a Roman Catholic, and that alone was sufficient to render him detestable. The prince of Orange urged the necessity of receiving the prince. Theologians and civilians allowed that it was lawful to have recourse in extremity to a Papist, but the people continued obstinate. This determined the prince of Orange to have recourse to the States-general, to whom he sent a long remonstrance, pointing out the causes why the confederacy did not produce the intended effect; and exhorting them to re-consider the affair respecting the duke of Anjou. In consequence, the States-general refer-

red the prince's remonstrances to the provincial states and cities; and after long deliberations, and warm debates, it was at length determined, in 1380, to call in the duke of Anjou, as the only resource in so great a calamity. Accordingly the year began with a solemn treaty, whereby the United Provinces renounced their allegiance to Philip, and acknowledged Francis Hercules de Valois, duke of Alençon and Anjou, for their sovereign. The treaty consisted of 27 articles, of which this we have mentioned was the chief. Deputies were sent to the duke of Anjou, to explain the articles, and congratulate him on his accession. As to the archduke Mathias, finding himself unsupported by the emperor, the empire, and the numerous fiends whom he expected would have joined him on his elevation, he expressed no repentment at the conduct of the provinces, which with great moderation he attributed to necessity. He only demanded to know their intention with respect to his own person; and the states made their apology, by representing the situation of their affairs, assuring him of their esteem, permitting him to reside in the Netherlands as long as he thought convenient, and highly applauding the prudence and equity of his conduct during his administration. As to the provinces of Holland and Zealand, they were left wholly in the hands of the prince of Orange, whose power as stadtholder was in no respect limited by the duke's sovereignty. After all, Grotius affirms, that the duke's authority was merely nominal, that the real power devolved on the prince of Orange, whose name, however, was used in all public acts only in a subaltern capacity. It was apparent indeed to the French, that William concealed ambitious views under the cloak of patriotism; but it was not convenient to discover their sentiments.

When the king of Spain was informed of this open defection of the Provinces, he attributed the whole to the prince of Orange, and proceeded directly to prescribe him; he confiscated his estate, upbraided him with ingratitude, and stained his character with ignominy. He even promised a reward of 25,000 crowns to whoever should bring him the prince of Orange dead or alive; the same to his heirs, in case the person perished in the enterprise; and he declared all those proscribed, their estates confiscated, their honours and dignities abolished, who adhered to William a month after the publication of this edict.

The prince of Orange did not silently pass over this proscription. He employed one Villiers, a Frenchman, to refute the edict: his answer was well received, and is recorded by historians as a proof of the spirit, the equity, the prudence, and the moderation of the prince. However, when it was proposed to the states for their opinion, with a request they would publish it in their own name, they declined it; assigning for a reason, that it contained some facts too little known to be credited, and perhaps too much acrimony and resentment against a prince whose power they still dreaded. With these recriminations ended the transactions of the year.

The following year the states, after long deliberations at the Hague, published an edict, excluding king Philip from any sovereignty, right, or authority over the Netherlands. This writing appeared on the 26th of July, 1581, under the title of *The Abdication of Philip king of Spain*. It was extremely well drawn up; it

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Provinces.

62
Duke of
Anjou ch-
sen fove-
reign.

63
Prince of
Orange pro-
scribed.

64
The States
publicly ex-
clude Phil-
ip from the
sovereignty.

Itated

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Provinces.

stated in the strongest manner the mutual privileges of the king and people; proved that the allegiance of the latter was voided by the breach of contract on the side of the former; enumerated the oppressive and tyrannical acts of his government; set aside his authority for the most cogent reasons; forbid money to be coined in his name; and took every other step towards independence. It was in vain for Philip to remonstrate: he knew the states were to be convinced only by the sword; to this therefore he appealed. The duke of Parma blocked up Cambray so closely, that the garrison was reduced to the extremity of living upon horses, dogs, and cats; though they still refused to capitulate, in hopes of being succoured. At length the duke of Anjou assembled a body of 10,000 foot and 4000 horse, and approached Cambray. The viscount de Turenne and count Voulondou, undertook to force themselves with a body of men into the town, but they were surrounded and taken prisoners by the Spaniards. This disappointment did not discourage the duke of Anjou: he still pressed forward with intention to attack the the Spanish lines; but the duke of Parma, not caring to hazard a battle, deserted his works, and retired to Bouchain. As soon as the duke of Anjou entered the city, he took an oath to govern it agreeable to its ancient laws, and to preserve the citizens in the full possession of all its liberties. He was now pressed by the states and the prince of Orange to march directly into Flanders: he endeavoured to comply; but his army, composed chiefly of volunteers, was so weakened by desertion, that the design was laid aside.

It was about this time that the duke of Anjou resumed the notion of addressing Elizabeth queen of England. Not deterred by the ill success of his former negotiation, he determined upon a voyage to England; an excursion which proved equally unsuccessful to himself and unfortunate to the United Provinces, as during his absence the duke of Parma made himself master of Tournay, which concluded the transactions of this campaign. He was magnificently entertained, led into a persuasion that all would succeed according to his wish, and at length tired out with tedious expectation. In his absence, St Guilan was reduced by the prince of Espinoi. This general directed his march towards Dunkirk, with intention to join the French forces. The duke of Parma, who had notice of his motion, repaired to seize the opportunity of investing Tournay. He began his approaches, and was vigorously received by that garrison, inspired by the courage of the princess Maria d'Espinoi, niece of the count Horn so cruelly beheaded by the duke d'Alva. The town was stormed in breach by the duke of Parma, who supported the assailants in person, received a wound, and had the mortification to see his Spaniards thrown headlong from the walls. The duke of Anjou repeatedly promised succours; but either forgot, or could not perform his engagements: the latter indeed is the most probable; as he was certainly a dupe to the superior policy of Elizabeth, who had not yet declared openly in favour of the states. In the end, despairing of relief, harassed with perpetual watching, and weakened by losses, the garrison capitulated on the 29th of November. The conditions were honourable; and the princess d'Espinoi was treated with particular marks of distinction by the duke of Parma, who

highly esteemed the heroic qualities of this amazon. This advantage was succeeded by another, obtained by the Spanish general Verdugo, over the confederate army in Friesland, commanded by general Norris and William Lewis of Nassau, a young prince of great expectation. It appears from the Spanish account, that Norris was attacked in a defile, where he could not draw out his troops in battalia; and that he was put in confusion, and defeated with great loss. On the other hand, the Dutch writers allege, that he attacked the enemy; but being inferior to them in cavalry, retreated in good order, with scarce any loss.

The year 1582 began with a spectacle very unusual in the Netherlands, the public entry of a sovereign elected by the people. The duke of Anjou setting sail from England on the 8th day of February, arrived on the 10th at Flushing, where he was received by the princes of Orange and d'Espinoi. Next day they set out for Antwerp with a magnificent retinue, and went up the Scheldt attended by 50 barges. His reception at Antwerp was splendid beyond any thing ever seen in the provinces; they even exceeded the preparations made for Philip himself on his being appointed to the government in the Netherlands by Charles V. his father. A theatre was erected before the walls of the citadel, in which was placed a chair of state, covered with cloth of gold. There the duke was seated, and the conditions were read to him, upon which he was received as duke of Brabant. When he had sworn to observe the articles, he was clothed with the ducal robe, and his head adorned with the ducal coronet by the prince of Orange; who said, "I will pin it in such a manner that it will not be easily shaken;" an expression which at that time was taken for a happy omen, though it soon proved fallacious.

While the states of Brabant were employed in festivity and mirth, a Biscayan merchant, named *Gasper Anasra*, had contrived a project to redeem his shattered fortune by the death of the prince of Orange. He corrupted one of his domestics, by the promise of half the reward, to strike the blow. The assassin entered the citadel; and as the prince was passing after dinner into another room, discharged a pistol, and dangerously wounded him behind the ear. The prince was stunned with the force of the ball, and before he recovered the assassin was killed by his attendants; which prevented for a time the absolute discovery of the plot, though it afterwards appeared from circumstances. It was traced that he had confessed the secret to a Dominican named *Antonio Tunnmermon*, receiving from the wicked priest absolution, and a promise of eternal reward. Tunnmermon was hanged, drawn, and quartered, his limbs being fixed upon the walls of Antwerp. But though for this time the prince escaped the danger, he was in 1584 assassinated at Delft, by one Bal-
thazar Gerrard or Guion, a person who had before served his highness with fidelity and zeal. He was at that very time employed by the prince to carry letters into France, and had received money to bear his expenses, with which he purchased pistols to murder his benefactor. At the criminal's examination, it appeared that he had long meditated this bloody action, and was confirmed in his resolution by the Jesuits and Catholic priests; he even affirmed on the rack, that the duke of Parma was privy to the design, who promised

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Provinces.

67
Duke of
Anjou
makes his
public en-
try.

68
Prince of
Orange
assassinated.

65
Cambray
relieved by
the duke of
Anjou.

66
Successes of
the Span-
iards.

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Provinces.

he should have the reward : upon the whole, Gerrard seems to have been an enthusiast, and his crime the result rather of insanity, than of any concerted scheme, or malicious intention. His punishment, however, regarded only the action : it was cruel beyond measure, shocking to humanity, and a striking instance of the vehement party-spirit of the times; not of the justice of the judges, or the attachment of the people to the prince of Orange.

The United Provinces were now in a most deplorable situation. The duke of Anjou had been totally unable to resist the duke of Parma, in consequence of which many towns had been taken; and in other respects the states had sustained immense losses. The duke of Anjou, chagrined and disappointed, had retired to France, where he died. But above all, the loss of the prince of Orange seemed to give the finishing stroke to the affairs of the states; and confusion and anarchy now reigned in their councils. The provinces of Zealand and Holland alone endeavoured to repair the loss, and show their gratitude to William by electing his son Maurice their stadtholder and captain-general by sea and land. Maurice was at that time only 18 years of age; but appeared in every respect worthy of the high dignity which had been conferred upon him. The first step taken by the confederates was a solemn renewal of the treaty of Utrecht; after which the most vigorous preparations were made for the defence of the country. But before any thing of consequence could be done, the duke of Parma had reduced Lilloenhouk, Dendermonde, Vilvorde, Ghent, and Antwerp; which struck the states with such terror, that they again offered the sovereignty to queen Elizabeth. This was once more refused; though that princess engaged, by a new treaty, to assist the States both with men and money. An army was accordingly sent into the Netherlands under the command of the earl of Leicester; but it does not appear that this was of any essential service to the cause; for the conduct of that general was so exceedingly improper, that he was not only baffled in every military enterprise, but drew upon himself a general odium. It is very probable indeed that the States could not long have supported themselves in such circumstances, had not Philip rashly engaged in a war with England, with whose naval power he could scarce be enabled to cope by any superiority in numbers whatever. The defeat of the Spanish armada in 1588, gave such a blow to the power of that nation, as totally disabled them from carrying on the war in the Netherlands. Instead of sending the proper assistance to the duke of Parma, that general received orders to hasten to the aid of the duke of Mayence, who had been defeated by Henry IV. The duke was obliged to comply with this order, though he was sensible the loss of the United Provinces must be the consequence. Prince Maurice now carried every thing before him; and by the end of the year 1591, the Dutch saw their frontiers extended, the whole country secured by rivers and covered by fortified towns, with the greatest probability of driving the Spaniards out of Friesland in another campaign.

The remainder of the history of this war is only a detail of the Spanish losses and misfortunes, which now ensued. Their affairs were at last totally ruined by a

decisive victory gained by prince Maurice, in the year 1600, over the archduke Albert, who had been appointed the Spanish governor of the Netherlands. King Philip II. died in 1598, leaving the affairs of his kingdom in the most distressed situation; notwithstanding which, his successor Philip III. was too haughty to consent to peace, or allow that the States were free, though he was plainly unable to keep them in subjection. At last, in 1606, the courts of Madrid and Brussels began to think of peace in good earnest. In 1607 a suspension of hostilities took place, and in 1609 a treaty was concluded. In the first article of the treaty, the archduke, in his own and the king of Spain's name, acknowledged the United Provinces, and renounced all claim to sovereignty over them, but in such general terms as would admit of altercation. In the second, a truce for 12 years, by sea and land, through all the dominions of both parties, was concluded. By the third article, the parties were to remain in possession of what they now held, without cession or exchange. In the fourth, a general amnesty was stipulated, and full freedom of trade by sea and land to each others dominions granted. This necessarily implied a cessation of hostilities in the Indies; however, great debates afterwards arose upon this account. Spain observing the rapid progress of the Hollanders in the India trade, apprehended they would soon become too powerful in that quarter; and the Dutch were willing to maintain the advantage of their superiority. Both, for this reason, disputed the article; yet it could not be set aside without destroying the whole treaty, and the fruits of all their laboured conferences. The fifth article regulated the imports, and the duties to be paid by the subjects of the archduke and the States, trading to each others dominions, which were to be on the same footing with those of other nations. The archduke used his utmost endeavours to have the duties at Lillo, on the Scheld, abolished, and the commerce of Antwerp restored to its former grandeur; but this was so diametrically opposite to the interest of the Hollanders, that it was impossible it should ever take place. The sixth and seventh articles likewise regarded commercial affairs. But it would be unnecessary to dwell on particulars. Sufficient is it, that the truce was mutually beneficial, Spain being no longer in condition to support the war, and the Hollanders having obtained the end of all their desperate resistance and invincible perseverance in the cause of liberty. Philip of Nassau, by the truce, entered into possession of all his paternal estates in the Spanish Netherlands and Burgundy; while the States rewarded the faithful services of Maurice with a pension of 25,000 florins, to be paid annually out of the public treasury, besides an appointment of 60,000 francs as governor-general. Pensions were likewise settled on the other princes of the house of Nassau: all were gratified in a manner that demonstrated the high sense the republic had of their merit, though they might possibly be disappointed in their great design of raising prince Maurice to the sovereign authority.

No sooner were the Dutch freed from this extreme danger, and felt the blessings of liberty, than dissensions among themselves took place. The disputes betwixt the Arminians and Calvinists produced violent disturbances, which frequently ended in the persecution of the former. In 1621 war was renewed with

Spain;

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Provinces.

72
A truce of
twelve years
concluded
with Spain

60
Prince
Maurice
chosen
stadtholder.

70
Success of
the Spaniards.

† See
England,
110 243.

71
Duke of
Parma
obliged to
leave the
United
Provinces.

73
War re-
newed.

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Provinces.

Spain; and it may be remarked, that during the whole course of it, the subjects of the republic traded to the Spanish ports, as if there had been an entire friendship subsisting between the two nations. It was no uncommon practice with them to supply towns with provision that were besieged by their own armies; and to furnish the enemy with ammunition and other necessities, without which they could not carry on the war. Their motive and apology for this conduct was, that thus they kept in their own hands the profits by which other nations would be enriched. By steadily pursuing this line of conduct, making as many prizes as they could by force, and at the same time making as much profit of their enemies as could be obtained by a lucrative trade, it is no wonder that the republic should flourish, and rival in wealth the greatest nations of Europe. In 1628 the Spaniards met with a dreadful blow by the capture of their flota from Mexico. This was the greatest prize the Hollanders had ever met with; being valued at no less than 15,000,000 livres. From this time the Spaniards were every where defeated and baffled in almost every enterprise they undertook; nevertheless, they carried on the war, with an obstinacy hardly to be matched, for 20 years longer. At last, in 1648, a treaty was concluded, by which his Catholic Majesty renounced all right and sovereignty over the Lords the States-general of the United Provinces, who were henceforth declared a free and independent republic, and that both sides should remain in the unmolested possession of what they held severally at the signing of the treaty.

From this time to the year 1670 we meet with nothing very remarkable in the history of the United Provinces. By invariably pursuing the maxims of prudence, industry, and frugality, the republic had attained the highest pitch of grandeur. Amsterdam was become the emporium of Europe, and the richest city in the universe. Holland alone contained 3,000,000 of souls, and all the other provinces were proportionably populous. The States dispatched ministers and consuls to China, Siam, and Bengal, to the Great Mogul, the king of Persia, the khan of Tartary, the grand Signior, the czar of Muscovy, and the princes of Africa. They were considered as an important weight in the scale of Europe, and no treaty was concluded without their ambassadors. The triple alliance with England and Sweden, into which they had entered, gave Lewis suspicion that they proposed to set bounds to his ambition, and clip those bold pinions which had so swiftly conveyed his conquests over the Low Countries. Van Beuningen's insolence, in comparing himself to Joshua stopping the course of the sun, which was the French king's device, highly disgusted his Majesty; who was shocked at the presumption and pride of a republic just started out of obscurity, and gained, in the space of a century, from the ocean. But what was still more alarming to Lewis, was the probability that the Dutch would ruin the manufactures of France, and his new established commerce of the Indies. His jealousy discovered itself in divers instances; and the pensioner De Witt, who at that time had the leading of affairs, his brother, and his party, did all in their power to remove these prejudices; but the unhappy differences which then prevailed in the United Provinces frustrated all their endeavours.

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Provinces.

Lewis now fought every opportunity of breaking with the Dutch; less perhaps from any dread of their power, or ability to injure him, than with a view to enlarge his dominions by the entire conquest of the Low Countries. He knew that the whole strength of the republic consisted in her marine; that her frontier was weak, her provinces divided, and the chief power in the hands of men inveterately set against the family of Orange, the ancient captains of the republic. His first attempt was to dissolve the triple alliance, and disengage from it Charles II. king of England. In this business the duchess of Orleans was employed: he went to England under pretence of visiting the king her brother; and her negotiation was successful. In the mean time Lewis possessed himself of Lorraine, under pretence that duke Charles was forming alliances in the empire against France.

Treaty between the kings of France and England.

The following year was spent in negotiations with the emperor, Spain, and Sweden, with the electors of Cologne and Brandenburg, with the bishop of Munster, and other spiritual and German princes. The design of Lewis was to prevent their acceding to the triple alliance; from which he had already weaned one power, the most considerable of the whole. The bishop of Munster beheld with uneasiness the growing power of the United Provinces: he pretended that they had made several attempts upon the counties of Stirum, Culemburg, Bentheim, and East Friesland; that they had seized on Ravenstein on the Meuse, and several other places belonging to his bishopric. In his own defence he concluded a treaty with France, and prevailed on the elector of Cologne to follow his example. By signing a treaty with these two princes, the king opened a way to Holland by the Meuse and the Rhine; he established by this means places of arms and magazines in a country distant from his own dominions, and secured a retreat in case his enterprize proved abortive. With respect to the emperor, every artifice was used to keep him neutral; and indeed his own inclinations co-operated but little in favour of the Dutch, whom he regarded as subjects revolted from the princes of his family, and in possession of several places belonging to the empire. In Sweden, Lewis's negotiations were equally successful; for here he prevailed so far with Charles XI. as to obtain a stipulation, that if the emperor, or any of the princes of the empire, joined their forces to the Dutch, a Swedish army should march into the very heart of Germany and join the French, in order to force those princes to observe the treaty of Westphalia.

Of all the Germanic body, the elector of Brandenburg alone interested himself for the safety of the States-general. The peace of Westphalia had prevented this enterprising prince from extending his dominions in Germany, and retaking Pomerania from the Swedes. He had long aspired at the stadtholdership of Holland; and though that office had been for six years suppressed, yet he flattered himself, that in case of a war he might obtain it, perpetuate it in his family, and in time reduce Holland by dint of force, intrigue, and stratagem. With this view, he rejected the proposals of several princes of the empire, and even those of France, endeavouring by every possible method to insinuate himself into the friendship and confidence of the States. In the end he concluded a treaty

Brandenburg assists the republic

74
Spanish flota taken.

75
Peace concluded.

76
Flourishing state of the republic.

77
Cause of the war with France

with them, whereby it was stipulated that he should assist the republic with 25,000 men. Beverning, the Dutch ambassador at Madrid, disconcerted all the schemes of France at that court, and engaged the queen of Spain to furnish money and troops for the defence of the United Provinces. Thus was the face of Europe wholly changed. France and England, who had contributed largely to the raising and aggrandizing the republic, were now incited to destroy her; while Spain, which for an age had been endeavouring to suppress her, was arming for her support. Pierre de Groot, the Dutch minister at the Hague, was employed to penetrate into Lewis's designs; he gave his constituents notice that he foresaw a terrible storm ready to fall upon them, which they might nevertheless break by seasonable submissions and proper acknowledgments. Upon this the States wrote to the king, endeavouring to appease his wrath; but finding him inexorable, they prepared for receiving him, and provided for the security of their provinces. But the long peace the republic had enjoyed destroyed her standing forces, and little confidence could be reposed in her new levied soldiers.

80
Hostilities
commenced

As soon as matters were ripe for execution, Lewis ordered an army of 100,000 men to file off towards the Rhine. Before the opening of the campaign, and previous to his declaration of war, he divided his army into four columns; commanding one in person, with the marshal Turenne under him. Another was led by the prince of Condé, assisted by the marshals Humieres and Bellefonds; the third was headed by Crecqui; and the fourth marched to Westphalia under the conduct of the duke of Luxemburgh, to join the bishop of Munster. As the marshals Crecqui, Bellefonds, and Humieres, refused to receive orders from Turenne, they were banished; but after six months exile, were recalled, at the instance of the whole body of marshals in France, upon their making proper submissions.

Such an army drawing towards their frontiers could not but terrify the Dutch, now torn with civil factions. The partisans of the Orange family were for abolishing the perpetual edict, and raising William III. to the dignity enjoyed by his predecessors; but the De Witt faction opposed him violently, though they could not prevent the young prince from being chosen captain-general and high admiral. Many persons hoped that William's new dignity would incline his uncle Char. II. to return to the triple alliance; but that hope was frustrated by the conduct of his Majesty; who, in conjunction with the most Christian king, declared war against the States-general on the 7th day of April. A month after, the elector of Cologne and bishop of Munster followed the example of the two kings. The Dutch put themselves in the best posture of defence that circumstances would admit. Maastricht was strongly garrisoned; the prince of Orange had assembled an army of 25,000 men, with which he advanced to the banks of the Issel, and the Dutch fleet cruised off the mouth of the Thames to prevent the junction of the naval forces of England and France, which amounted to 150 ships. All Europe watched the first motions of the two powerful kings, seconded by the best generals of the age.

His most Christian Majesty joined his army at Charleroy. It was composed of 23 companies of *gens d'*

arms, life-guards, musqueteers, and light-horse, two regiments of the French and Swiss guards, 14 regiments of foreign infantry, and 60 regiments of light horse or dragoons, comprising in all an army of 110,000 fighting men, under the command of marshal Turenne as captain-general. Holland could only be attacked by the Rhine or the Meuse; and the generals and ministers differed by which of these inlets they were to make the first impressions. At last, after several deliberations, it was determined to make both attacks at the same time, in order the more to disconcert their councils. It is probable that Turenne always opposed the siege of Maastricht; for we find him immediately after the surrender of Maseick strongly dissuading the king from that enterprise, in opposition to the sentiments of the prince of Condé. At last he prevailed; and it was resolved in council to advance towards the Rhine, and besiege at the same time the towns of Rhinberg, Vessel, Orsoi, and Burick. These places were all well fortified, and deemed the keys of Holland; however, the Dutch did not appear disturbed at their being invested, as they were only under the protection, and did not immediately belong to, the United Provinces. They were besides in hopes, that any attempts upon the territory of Cleves would hasten the preparations of the elector of Brandenburg, and even rouse the emperor unto a sense of the danger he was in from the vast designs of Lewis. Nothing could oppose armies so well appointed, led by generals so skilful and so experienced. The four towns surrendered within a few days of each other; and Rhinberg, that held out longest, opened its gates on the 7th of June. A few days after, the town and fort of Rhees, and the town of Emerick, surrendered; upon which the king resolved to pass the Rhine by a ford, over which the cavalry were to swim. This bold enterprise was projected and conducted by Condé; who, in the face of two regiments of foot, and several squadrons of horse, under general Wartz, intrenched on the opposite side, effected the passage, in the same order, and with as much regularity, as if he had marched his troops on dry land. The enemy made a stout resistance; but were driven from their post, after having killed the duke de Longueville on the spot, and wounded the prince of Condé, which disabled him for some time from attending the service, and obliged him to resign the command of his army to Turenne.

It is almost incredible with what rapidity towns and fortresses yielded to the fortune of his Majesty's arms. The reduction of Betau, the most fruitful country of the United Provinces, and the surrender of Tolhus fort, obliged the prince of Orange to abandon the Issel, lest he should be attacked in the rear, and to retire to the very heart of the country, as far as Rhemen, in the province of Utrecht. By this means the town of Arnheim, the forts of Knofsembourgh, Voorn, St André, and Shenck, this last the strongest in the Netherlands, (having cost the great Henry Frederic prince of Orange, a few months siege), with a variety of other forts and towns, surrendered as soon as summoned; and at last Nimeguen, a town strong from the nature of the works and fortifications, and garrisoned by 8000 fighting men, including the inhabitants, was invested. After the citizens had for eight days exhibited signal proofs of cou-

rage

87
Successes of
the French

United
Provinces.

rage in defence of their liberties, they were forced to yield to the superior skill of Turenne.

In the mean time the bishop of Munster and elector of Cologne, having joined that body of troops under the command of the duke of Luxembourg, the united army entered the province of Overysel, and by dint of cruelty, and terror which the duke spread, reduced the towns as soon as he appeared before them. Animated by that implacable rage that constantly attends religious wars, the two prelates obliged the duke to exert a severity, by no means suited to his nature, against heretics and the rebellious subjects of the house of Austria. Next the king's forces penetrated into the province of Utrecht, where their conquests went on with the same rapidity, and put the capital of the province in the utmost danger. To retard its fate, the Dutch could imagine no other expedient than opening their sluices, and overflowing the country. The other towns followed the example of Utrecht; and Holland, Brabant, and Dutch Flanders, was one vast lake, the towns rising like islands in the midst of the waters. Farther to stem the torrent of Lewis's conquests, the people were persuaded the only barrier was to lodge the supreme power in the hands of the prince of Orange. They accordingly obliged the states of Holland and West-Friesland to unite the dignity of stadtholder to those of captain-general and high admiral, with which the prince was already invested. They likewise sent remonstrances so pathetic to the king of England, that Charles, moved with the situation of the republic, and jealous of the designs of Lewis, dispatched the duke of Buckingham and earl of Arlington into Holland, to quiet the fears of the Dutch, and insist upon the king's penetrating no farther into Holland. In case of Lewis's refusal, Charles declared he would break the alliance; as he perceived, that, instead of securing Zealand to the English, agreeable to the treaty, the designs of France were to unite the whole republic to their own monarchy. His most Christian majesty had in fact no great regard to the menaces of his ally: but as persisting obstinately to advance into a country which the inundation rendered impassable, might terminate in the ruin of all his schemes, he seemed, out of compliment to the king of England, to listen to terms of accommodation; which, after all his victories, could not fail of proving advantageous. In the space of three months he had conquered the provinces of Guelderland, Overysel, and Utrecht, taken about 50 towns and forts, and made 24,000 prisoners. Condé and Turenne advised his Majesty to send the prisoners to work upon the canal of Languedoc, and to leave all the places that were not essential to the preservation of his conquests; the minister Louvois was of a different opinion, and his sentiments determined the king. The prisoners were released for a trifling ransom, and the king's army totally reduced and exhausted by the continual drains made to garrison the conquered places.

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Unsuccessful
negotiation

A negotiation was set on foot at Bostel, near Boisle due, whither the king, attended by the English ambassadors and the Dutch deputies, repaired: but the terms required of the republic were so hard, that they were rejected with disdain by the Dutch; who, animated by their stadtholder, resolved to wait a change of fortune in the midst of the waters. They used every expedient to rouse the princes of Germany in

their defence; and so successfully, that the elector of Brandenburg, the nearest and most interested prince, prepared to take the field. The undaunted courage, the vigilance, and public spirit of the prince of Orange, gained him the intire confidence and affection of the republic; and excited their resentment against the two brothers De Witts, his implacable enemies, whom they accused of receiving pensions from Lewis. The suggestion was false; but possibly their love of liberty, and jealousy of the house of Orange, had carried those two great politicians too far in their pacific measures and complaisance to the power of the French monarch. The pensionary was attacked in the street by the populace; but by his personal bravery broke through the crowd, and saved his life, though covered with wounds. Soon after the sedition broke out afresh, and the partisans of the house of Orange again stirred up the animosity of the republic against the De Witts. Several crimes were laid to the pensioner's charge, but he cleared himself. Suborned witnesses accused his brother of an attempt to poison the prince of Orange. Cornelius was imprisoned, and treated with great barbarity. While he was under the torture, he sung that ode of Horace, *Justum et tenacem propositi virum*. His brother took him out of prison after sentence of banishment was pronounced; the tumult rose high, and both the De Witts were cruelly torn in pieces in the streets. William of Orange seemed touched at this terrible sacrifice; he made the pensionary's eulogium, and ordered the murderers to be prosecuted; however, the clemency he showed them, the advantages he obtained by the massacre, and the animosity he bore the De Witts, convinced all men that he countenanced the murder.

William of Orange in the mean time daily ingratiated himself more. He gave up his whole fortune for the safety of the state; and exerted himself with such prudence and ability, that all Europe began to unite against the two kings by the month of July. Every prince in Germany was in motion to succour the Dutch. The emperor, the king of Denmark, the elector of Brandenburg, the duke of Brunsvick Lunenburg, the landgrave of Hesse, immediately ordered their troops to join; several of the other princes were preparing to take the field. All were jealous, England began to waver, and there was not a power in Europe upon whom Lewis XIV. could heartily rely. The army of Brandenburg commanded by the elector in person, and the forces of the empire under the famous Montecuculi, joined near Heidelberg, and composed a body of 40,000 men. Turenne, now appointed generalissimo of the king's army on his Majesty's return to Paris, marched to oppose the enemy's passing the Rhine. For three whole months were the elector and Montecuculi employed in abortive attempts to effect a passage at Mentz, Coblintz, Strasburgh, and other places. This answered the purpose of making a powerful diversion in favour of the Dutch, though they could not accomplish their design of joining the prince of Orange. After repeated disappointments, the imperial army directed its march to Westphalia; and Turenne followed, in order to keep the bishop of Munster steady to his engagements. For half the campaign, he, with a body of 16,000 men, baffled every stratagem of the elector and Montecuculi, the latter the most renowned

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The De
Witts
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murdered.85
Exploits of
Turenne.

general.

general of the empire, at the head of an army near triple his strength. He obliged them to go into winter-quarters, in a country harassed and exhausted; and confirmed the bishop of Munster in the alliance of France, at the very time he was on terms with the emperor. He obliged the elector of Brandenburg, who took the chief command during Montecuculi's illness, to abandon the siege of Werle; took Unna, Kamen, Altena, Berkembaum, and several other towns and fortresses. By continuing his operations, he forced the elector out of his winter-quarters again into the field, chased him from post to post, until he obliged him to quit Westphalia, repass the Weser, and retire with precipitation into the bishopric of Hildesheim. After taking possession of all the elector's towns in Westphalia, he pursued him into the bishopric of Hildesheim; and at length, by mere dint of superior genius, forced him to seek shelter in his hereditary dominions. All this was effected after Louvois had appointed the marshal's army quarters in Alsace and Lorraine, amidst the rigours of a severe winter, opposed by a superior enemy, by the artifices of Louvois, and seconded only by his own prudence, and the affections of his troops, which he maintained in defiance of all the difficulties, hardships, and dangers, they encountered. It was indeed supposed, that Montecuculi was prevented from giving Turenne battle by the remonstrances of prince Lobkowitz, the emperor's ambassador, influenced by the gold of Lewis. Certain indeed it is, that Montecuculi's illness arose from his chagrin at seeing all his projects frustrated by the unsteady dilatory conduct of the court of Vienna. Lewis's negotiations disturbed Europe no less than his arms. His tools and creatures swarmed in every court. Leopold could not be prevented from declaring in favour of Holland; but his ministers were bought off from seconding the emperor's intentions. The whole English nation exclaimed against the alliance of their king with France; but Charles stood in need of French gold to supply his extravagance and profligacy. The elector of Bavaria had indeed been compelled by Lewis to retire to his capital; but it was by dint of intrigue that he was forced from his alliance with Holland, and constrained to sign a peace with France.

While Turenne was thus employed on the Rhine, Condé having recovered of his wounds, returned to the command of the army in Holland. He besieged and took Maastricht in 13 days. Having repaired the fortifications, he proposed making himself master of several other towns; but the inundations every-where stopped his course. All his attempts to draw off the waters were in vain; and he was forced to content himself with preserving, without pretending to extend, the king's conquests.

Whatever glory the king might have acquired by land, certain it is that the conduct of his admirals deserved equal praise with that of his generals. In little more than 12 months the French were taught the art of naval war. Before, they fought ship to ship; but understood nothing of those evolutions by which whole fleets imitate the movements of armies. The duke of York, afterwards James II. invented the method of giving all orders at sea by means of signals: this and every other part of the art the French borrowed from the English; and became so apt scholars, that they

ventured to give battle to the Hollanders, the great rivals of the English on that element. Their fleet, amounting to 40 sail, besides fire-ships, joined to the English, gave battle three different times to the Dutch. De Ruyter gained additional glory in these engagements; and D'Edrees, the French admiral, gained the eîtem of De Ruyter.

In the mean time Spain declares in favour of the Dutch; and prevails upon the emperor to act more heartily in the cause of Holland, and defence of the liberties of Europe. The prince of Orange was reinforced by 10,000 Spaniards, sent to him by the governor of the Low Countries. Philip had concluded a treaty with the States at the Hague, whereby he declared war against France, engaged the emperor to make a powerful diversion on the Rhine, stipulated not to accept of peace before the Dutch had retrieved all their losses, and obtained from them a promise to listen to no terms of accommodation before his Catholic majesty was reinstated in all his possessions in the Low Countries, previous to the peace of the Pyrenees. Montecuculi was ordered to advance with 30,000 men to Franconia; and Turenne, joining the troops of Cologne and Munster, passed the Main, and took post in the electorate of Mentz. The prince of Orange receiving no impediment from Condé, who was forced on account of the inundations to repass the Meuse, thought this a proper time for action, as the enemy had no considerable forces in the heart of the United Provinces. He ordered some troops to file off secretly to Amsterdam and Muiden; lined with infantry the intrenchments which secured the passage to Holland; and to deceive the duke of Luxemburg, who commanded in Utrecht, sent some forces by sea to attack Bowmel. The duke, not penetrating the prince's design, came to succour the place; and William finding his stratagem succeed, marched to Naerden, and with 25,000 men invested and took the place before the duke could provide for its security. Upon this success, the Dutch took courage, fortune inclined in their favour, and in a short time all the horrors of war were removed from the interior parts of the United Provinces to the Spanish Netherlands. Neither the experience nor consummate address of Turenne, the genius of Vauban, or the indefatigable vigilance of Louvois, could repair the error committed in ruining the army to garrison the conquered towns. Even Condé's fire seemed extinguished in the waters with which the Dutch had drowned their country. Instead of penetrating farther, he was obliged to retreat. Turenne could not prevent the junction of Montecuculi and the prince of Orange, nor the loss of Bonne. This junction, and the declaration of Spain, obliged the armies of France to abandon the three provinces with still more rapidity than they had conquered them. The triumphal arch at St Denis was hardly erected as a monument of Lewis's victories, before the fruits of those victories were relinquished. In a word, the parliament of England would no longer suffer Charles to be the mercenary tool of France; the late ill success cooled the elector of Cologne and bishop of Munster in their friendship; and Lewis, forsaken by all his allies, found himself under the necessity of maintaining singly a war against the empire, Spain, and the United Provinces.

From that time the United Provinces have been
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State of the
republic to
the present
time.* See
Britain,
no 339, 340

distinguished among the European nations as a very considerable maritime and commercial power. Their connection with Britain by the revolution in 1688, when William III. stadtholder of Holland became king of this island, brought on a much closer connection between the two nations than had ever taken place before. By means of this connection William formed a plan of humbling his great adversary Lewis XIV. who had for lately brought his country to the verge of ruin. For this purpose he renewed the war in 1689, and commanded the army in person. However, he was overmatched by the abilities of Luxembourg the French general; who opposed him, and obliged him to conclude a peace in 1697. His enmity to the French king, however, was not yet extinguished. The remaining part of his life he employed in forming a most powerful confederacy against that monarch; and so much was he wrapped up in this project, that even in his dying moments it seemed to prevail over every other consideration *. His measures, however, were adopted by his successor Queen Anne; and the French monarch had nearly sunk under the united efforts of the forces of Britain, Holland, and Germany, headed by the experienced generals Marlborough and Eugene. But at last the whole plan was disconcerted by a revolution in the British ministry; the Dutch were disappointed in the moment of their expectations, and obliged to consent to the peace of Utrecht, which left them exposed to the attempts of France as much as ever. A barrier composed of a great number of fortified towns was indeed granted them; but barriers of this kind are a slender defence against the modern improvements in war. In the war of 1739, these towns were taken one after another by Marshal Saxe, who thus revenged the exploits of the duke of Marlborough; while the Dutch and British army commanded by the late duke of Cumberland, were driven from place to place, without being able to make one successful effort from the beginning of the war to the end of it. See BRITAIN, no 342—423.

It is probable that the bad success of this war cooled the affections of the Dutch towards Britain so much, that ever since they have acted rather as concealed enemies than friends. In the war of 1755, their attachment to France was evident; and in the last, it proceeded to such an height, as to oblige the British ministry to declare war against them. The issue of this war is still fresh in our memories. A single naval engagement was the only event of consequence that took place, and showed that both were formidable antagonists to each other. The republic still possesses dominions of great consequence in the East Indies, with some portion of South America, and by constant application to commerce may perhaps be reckoned the richest nation in Europe.

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Climate,
&c of the
United
Provinces.

The seven United Provinces being in great part surrounded by the sea, lying low, and abounding in marshes, have a damp and unwholesome air. Rains and fogs are frequent; and the gout, scurvy, rheumatism, and agues, very common, and difficult of cure. The effects of human industry here are wonderful in the dykes and dams erected for defending the country against the inundations of the sea, and in ditches, canals, mills, and sluices, for draining the marshes. The quantity of grain produced is not sufficient for

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home consumption; but the pastures in the marshes are so rich, that they can spare a great deal of butter and cheese for exportation. They have also a good breed of sheep, whose wool is highly valued. There is turf, madder, tobacco, some fruit, and iron; but all the pit-coal and timber used in this country, and indeed most of the necessaries of life, are imported. All the provinces either lie upon, or communicate with, the North-sea, by means of that called the *Zuyder*, or *Sourh-sea*; which was formed partly by the Rhine's right branch, then increased by the Vecht, which has now another outlet, overflowing the low swampy grounds through which it passed; and partly by the sea's breaking in, in the 13th century, and overflowing a large tract of ground contiguous to that before laid under water by the Rhine. The principal rivers are the Rhine, the Meuse, the Scheld, and the Vecht. The first is divided into several branches, one of which joins the Old IJssel, and after that falls into the *Zuyder-sea*; another named the *Leek*, at the village of Krimpen, mingles with the Meuse; a third, called the *Crooked Rhine*, is branched out at Leyden into canals, of which one runs into the lake of Haarlem, and another loses itself in the sand hills between Catwyk on the Rhine, and Catwyk on the sea; and a fourth, called the *Waal*, falls into the Meuse over against Workum. The Meuse, after dividing itself into two branches, and again uniting these, falls into the North-sea, below Rotterdam. The Scheld below Antwerp divides itself into two branches, called the *Western* and *Eastern Scheld*; the first separating Flanders from Zealand; and the other, running north by Bergen-op-Zoom, and afterwards east, between the islands of Beveland and Schowen, falls into the sea a little below. The Vecht runs from east to west through the province of Overijssel, and falls into the *Zuyder-sea*. There are many smaller rivers that join these, and a vast number of canals; yet there are few good harbours in the provinces. The best are those of Rotterdam, Helvoetsluis, and Flushing. As to the harbour of Amsterdam, it is indeed one of the largest and safest in Europe; but there is a bar at the entrance of it, over which large vessels cannot pass without being lightened or unloaded. There are no mountains in these provinces; and the only lake, properly so called, is that of Haarlem. The provinces are extremely well cultivated, and very populous; especially that of Holland, which, in this respect, perhaps has not its equal in the universe. The towns are very agreeable, being kept clean, and having canals in the middle of the streets, planted with trees. The number of inhabitants is computed at about 200,000. The animals here are much the same as in England; but their horses and horned cattle are of a larger size. Storks build and hatch on their chimnies; but, being birds of passage, they leave the country about the middle of August, with their young, and return the February following. It is said there are some wild boars and wolves here; and that neither oysters nor herrings are to be found upon the coast: but of other fish, they have the several sorts, both in their seas and rivers, that we have in Britain.

The established religion here is the Presbyterian, or Calvinism; none but Presbyterians are admitted into any office or post in the government, excepting the army;

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Religion.

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army; yet all religions and sects are tolerated, and have their respective meetings or assemblies for public worship, among which the Papists and Jews are very numerous. There are five universities in the provinces, viz. those of Utrecht, Leyden, Franeker, Groningen, and Harderwic; but the three last are inconsiderable. The dissenters in England often send their children to these universities for education. Before the Reformation there was an archbishop at Utrecht, who had for his suffragans the bishop of Deventer, Groningen, Middleburg, Haarlem, and Lewarden. The language here is a dialect of the German, but French is much spoken by the better sort.

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Commerce,
&c.

With regard to the commerce of this country, their East-India company have had the monopoly of the fine spices for more than 100 years, and is the most opulent and powerful of any in the world. Though the country itself produces very few things, yet almost all the products and commodities of the globe may be found here, nearly as cheap as in the countries where they are made or produced. A vast variety of manufactures are carried on in the provinces, and with extraordinary skill and diligence; and a great number of hands are employed, and much wealth acquired, by the herring, cod, and whale fisheries. No nation has hitherto equalled them in the curing of herrings; those cured at Glasgow, in Scotland, are thought to come nearest to them. About 150 sail are annually employed in the whale fishery, and about 200 in the herring. The profits of the latter, in a good year, after all deductions, are thought to amount to 200,000 Holland guilders. The principal manufactures here are those of linen, paper, and earthen-ware of all sorts. Ship-building also employs vast numbers of hands. The trade of this country, however, upon the whole, is said to be upon the decline; owing partly to a decline of their ancient parsimony and industry; but chiefly to the improvement of manufactures, trade, and navigation, in other countries.

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Constitu-
tion.

Most of the towns in the several provinces are little republics, whose deputies, with the nobility, compose the states thereof; and the deputies of the provinces, in like manner, compose the states-general. Every town or province may send as many deputies as they please to the assemblies of the provincial states, or states-general; but those of each town or province have but one voice, and preside by turns. No resolution taken by the states-general is of any force, till it is confirmed by the several provinces. The legislative power in the towns is vested in the senates; and the executive in the burgomasters, syndics, &c. The states of the provinces are styled, Noble and Mighty Lords; but those of Holland, Noble and Most Mighty Lords; and the states-general, High and Mighty Lords, or the Lords the States-general of the United Netherlands, or their High Mightinesses. Besides the states-general, there is also a council of state, consisting of deputies from the several provinces, making twelve in all; of which Holland sends three; Gelderland, Zealand, and Utrecht, two a-piece; and Friesland, Groningen, and Overysel, one. In this council every deputy presides a week by turns, and the stadtholder has a decisive voice when the votes happen to be equal. The principal affairs that come under their delibera-

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tion, are those relating to the army and finances. The stadtholder is also president of the states in every province, but has no seat in the states-general. One dissenting voice in the provincial states prevents their coming to any resolution. From the death of William III. prince of Orange and king of England, there had been no stadtholder, at least for the provinces of Holland, Zealand, and West-Friesland; but these also, in 1747, upon the French breaking into Dutch Flanders, made choice of William-Charles-Henry-Frifo, prince of Orange. The stadtholdership was at the same time made hereditary to his heirs male and female, provided the latter did not marry the son of a king, or a Papist. The stadtholder's powers and prerogatives are very considerable: in particular, he seems directly, or by his influence, to have the nomination of the magistrates, deputies, and most of the officers civil and military. In short, though he has not the title, he has more real power and authority than many kings; for besides the influence and revenue he derives from the stadtholdership, he has several principalities and large estates of his own.

With respect to the administration of justice in this country, every province has its tribunal, to which, except in criminal cases, appeals lie from the petty and country courts; and it is said, that justice is nowhere distributed with more impartiality.

The taxes in these provinces are so many, and so heavy, especially in Holland, that it is not without reason asserted, that the only thing that has escaped taxation there is the air they breathe. The ordinary revenues of the republic are computed at between two and three millions sterling annually. Out of 100 guilders, the province of Holland contributes 58; and consequently above one half of the whole public expences. For the encouragement of trade, the duties on goods and merchandise are said to be exceeding low.

With respect to their land-forces in time of peace, they seldom exceed 40,000, and very often fall short of that number. They employ a great many foreigners in their service; and in time of war, hire whole regiments of Germans. The chief command of the army is vested in the stadtholder, under whom is the field-marshal general. In 1756 the expences of the army amounted only to 9,765,004 guilders. No nation in the world can so quickly fit out a formidable fleet than the Dutch; having always vast quantities of timber prepared for building of ships, and such numbers of ship-carpenters and mariners; however, in times of peace, they usually have no more than 30 in commission, for the protection of their trade in the Mediterranean, and to convey the homeward-bound Indians, &c. Their navy is under the direction of the five admiralty colleges, who, to defray the charges thereof, levy the duties on exports and imports.

As to the character of the Dutch, the boors or husbandmen are industrious enough, but heavy, and slow of understanding. The seamen are a plain, blunt, but rough, surly, and ill-mannered sort of people. Their tradesmen are something sharper, and make use of all their skill to take advantage of those they deal with. Every class of men are extremely frugal. All appetites and passions run lower and cooler here than in other countries, avarice excepted. Quarrels are very rare;

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Character.

rare; revenge is seldom heard of; and jealousy scarcely ever known. It is very uncommon for any of them to be really in love, or even to pretend to it; nor do the women seem to care whether they are or not. People converse pretty much upon a level here; nor is it easy to distinguish the man from the matter, or the maid from the mistress, such liberties do they allow their servants, or rather are obliged to allow them; for they may not be struck or corrected by them, but the dispute must be left to the magistrate. The Dutch are tall and strong-built; but both men and women have the grossest shapes that are to be met with any where. Their garb, except among the officers of the army and some few others, is exceeding plain, and the fashions change as seldom as in Spain. The men are addicted to drinking; which some think necessary in this foggy air, both for their health and the improvement of their understandings. Among their diversions, that of skating in winter is one of the chief. It is amazing to see the crowds in a hard frost upon the ice, and their great dexterity in skating; both men and women darting along with inconceivable velocity. The Dutch are remarkable for their cleanliness: nothing can exceed the neatness of their houses, towns, and villages. Many of them have distinguished themselves by their learning, and some even by their wit and ingenuity; witness Erasmus, Grocius, &c. The Dutch excel also in painting and engraving; and some of them have been no contemptible statuary.

UNITY, in poetry. There are three unities to be observed, *viz.* the unity of action, that of time, and that of place. In the epic poem, the great, and almost the only, unity, is that of the action. Some regard indeed ought to be had to that of time; for that of place there is no room. The unity of character is not reckoned among the unities. See POETRY, chap. ii. 24, &c.

UNIVERSAL, something that is common to many things; or it is one thing belonging to many or all things.

UNIVERSE, a collective name, signifying the whole world; or the assemblage of heaven and earth, with all things therein. See ASTRONOMY and GEOGRAPHY.

UNIVERSITY, a collective term applied to an assemblage of several colleges established in a city, wherein are professors in the several sciences, appointed to teach them to students, and where degrees or certificates of study in the divers faculties are taken up.

In each university four faculties are usually taught, theology, medicine, law, and the arts and sciences.

They are called *universities*, or *universal schools*, by reason the four faculties are supposed to take in the whole compass of study.

Universities had their first rise in the XIIth and XIIIth centuries. Those of Paris and Bologna pretend to be the first that were set on foot; but they were on a different footing from the universities among us.

The universities of Oxford and Cambridge seem entitled to the greatest antiquity of any in the world; and Balliol and Merton colleges in Oxford, and St Peter's in Cambridge, all made colleges in the XIIIth century, may be said to be the first regular endowments of this kind in Europe.

The universities of Scotland are four, *viz.* those of VOL. X.

St Andrews, Aberdeen, Edinburgh, and Glasgow. University. See EDINBURGH, &c.

UNIVERSITY-COURTS, in England. The two universities enjoy the sole jurisdiction, in exclusion of the king's courts, over all civil actions and suits whatsoever; where a scholar or privileged person is one of the parties; excepting in such cases where the right of freehold is concerned. And then by the university charter they are at liberty to try and determine, either according to the common law of the land, or according to their own local customs, at their discretion; which has generally led them to carry on their process in a course much conformed to the civil law.

This privilege, so far as it relates to civil causes, is exercised at Oxford in the chancellor's court; the judge of which is the vice-chancellor, his deputy, or assessor. From his sentence an appeal lies to delegates appointed by the congregation; from thence to other delegates of the house of convocation; and if they all three concur in the same sentence, it is final, at least by the statutes of the university, according to the rule of the civil law. But if there be any discordance or variation in any of the three sentences, an appeal lies in the last resort to judges delegates appointed by the crown under the great seal in chancery.

As to the jurisdiction of the university-courts in criminal matters, the chancellor's court at Oxford, and probably also that of Cambridge, hath authority to try all offences or misdemeanors under the degree of treason, felony, or mayhem; and the trial of treason, felony, and mayhem, by a particular charter, is committed to the university jurisdiction in another court, namely, the court of the lord high steward of the university.

The process of the trial is this. The high steward issues one precept to the sheriff of the county, who thereupon returns a panel of 18 freeholders; and another precept to the bedells of the university, who thereupon return a panel of 18 matriculated laymen, *laicos privilegio universitatis gaudentes*: and by a jury formed *de medietate*, half of freeholders and half matriculated persons, is the indictment to be tried; and that in the guildhall of the city of Oxford. And if execution be necessary to be awarded in consequence of finding the party guilty, the sheriff of the county must execute the university process; to which he is annually bound by an oath.

VOCABULARY, in grammar, denotes the collection of the words of a language, with their significations, otherwise called a *dictionary*, *lexicon*, or *nomenclature*. See DICTIONARY.

A vocabulary is properly a lesser kind of dictionary, which does not enter so minutely into the origin and different acceptations of words.

VOCAL, something that relates to the voice or speech: thus vocal music is that set to words, especially verses, and to be performed by the voice; in contradistinction to instrumental music, composed only for instruments, without singing.

VOCATIVE, in grammar, the fifth state or case of nouns. See GRAMMAR.

VOETIUS (Glabri), an eminent divine of the 16th century, was professor of divinity and the Oriental tongues at Utrecht, where he was also minister. He assisted at the synod of Dort; and died in 1676, aged 87. He wrote a great number of works; and was the

declared enemy of Des Cartes and his philosophy. His followers are called *Voetians*.

Voetius had two sons, *Daniel* and *Paul*, who also wrote several works. *John Voetius*, the son of Paul, was doctor and professor of law at Herborn: he wrote a commentary on the *Pandects*, which is esteemed, and other works on law.

VOICE, a sound produced in the throat and mouth of an animal, by an apparatus of instruments for that purpose.

Voices are either articulate or inarticulate. Articulate voices are those whereof several conspire together to form some assemblage or little system of sounds: such are the voices expressing the letters of an alphabet, numbers of which joined together form words. Inarticulate voices are such as are not organized, or assembled into words; such is the barking of dogs, the braying of asses, the hissing of serpents, the singing of birds, &c.

The formation of the human voice, with all the varieties thereof observed in speech, music, &c. makes a very curious article of inquiry; and the apparatus and organism of the parts administering thereto, is something exceedingly surprising. Those parts are the trachea or wind-pipe, through which the air passes and repasses into the lungs; the larynx, which is a short cylindric canal at the head of the trachea; and the glottis, which is a little oval cleft or chink left between two semicircular membranes stretched horizontally within the larynx; which membranes, though capable of joining close together, do generally leave an interval, either greater or less, between them, called the *glottis*. A particular description of each part may be seen in *ANATOMY*, Part IV.

VOICE, in grammar, a circumstance in verbs, whereby they come to be considered as either active or passive; *i. e.* either expressing an action impressed on another subject, as, *I beat*; or receiving it from another, as, *I am beaten*. See *GRAMMAR*.

VOICE, in matters of election, denotes a vote or suffrage.

VOICE, in oratory. See *DECLARATION*; *READING*, n° xii.; and *ORATORY*, n° 129, 131.

VOLANT, in heraldry, is when a bird, in a coat of arms, is drawn flying, or having its wings spread out.

VOLATILE, in physics, is commonly used to denote a mixed body, whose integral parts are easily dissipated by fire or heat; but is more properly used for bodies whose elements or first component parts are easily separated from each other, and dispersed in air.

VOLATILE *Alkali*, a name given to one of the primary or elementary salts, the basis of all those which go by the name of *ammoniacs*. It is produced chiefly from animal-substances, especially urine, either by distillation with a strong heat, or by putrefaction. In its pure state it is a transparent elastic fluid like common air, but lighter in a considerable proportion; and in this state Dr Prießley has given it the appellation of *alkaline air*. It unites very readily with fixed air, and with all kinds of acids, forming with them various neutral salts according to their different natures. It unites also with water, which will imbibe one third of its weight of alkaline air. The mixture then is a caustic volatile spirit, the strongest that can be made, which unites with acids without any effervescence. If

fixed air is added, the spirit then contains volatile salt, and is said to be mild; though in fact it is now partly changed into a neutral saline mixture along with a quantity of caustic spirit. If a true caustic spirit is exposed to the air, part of the alkali will fly off; but part is also neutralized by the fixed air which it attracts from the atmosphere. The salt formed by an union of fixed air with volatile alkali is the most volatile of all the ammoniacal salts, and may be made perfectly neutral, though it is easily super-saturated with alkaline air, and is then extremely pungent. In this state it is called *volatile salt*, and is used in smelling-bottles; but the superfluous quantity of alkaline air soon flies off, and the salt remains neutral as before. Alkaline air in large quantities is fatal to animals, though in a small proportion it is a medicine of great efficacy in cases of fainting. It is very caustic; dissolves oils, and renders them soluble in water; prevents putrefaction; and is inflammable, but burns without any explosion. For the chemical properties of the volatile alkali, see *CHEMISTRY*, n° 319, & seq.

VOLATILISATION, the art of rendering fixed bodies volatile, or of resolving them by fire into a fine subtle vapour or spirit which easily dissipates and flies away. All bodies, even the most fixed, as gold, may be volatilized, either of themselves, or with the admixture of some volatile substance or spirit, by distillation or sublimation.

VOLCANO, or VULCAN, a name given to several parts of the earth whence flames, smoke, stones, cinders, &c. are sometimes thrown out with astonishing violence and in prodigious quantity. The name is borrowed from VULCAN the Heathen god of fire, who was fabled by the poets to have his work-shop under Mount *Ætna*, where he, with the assistance of the Cyclops his servants, forged thunderbolts for Jupiter.

The greater part of the known volcanoes are situated under high mountains, which they perforate by means of their internal heat, and throw out such immense quantities of melted and burning hot matter, from the bowels of the mountain, that it is wonderful how it continues to support itself, and is not at once precipitated into the huge caverns which must be occasioned by the disgorging such immense quantities of matter. The very summit of volcanoes indeed does from time to time fall into the abyss below; but this is soon repaired again by the quantity of stones, cinders, and ashes, thrown out of the volcano, which form a conical mount, hollow like a funnel in the inside, and having an hole in the middle which leads directly down to the abyss whence the fire proceeds. This conical mount is supported all the way down by the stones and other matter heaped up on each side of the spiracle or chimney through which the fire of the volcano passes. But in process of time the vehemence of the heat, or its long continued action, wears away those supports, and the top again falls in, and soon after is renewed as before. But though the summit of volcanoes thus very often falls in, we seldom or never hear of a burning mountain falling down from the foundation. On the contrary, *Ætna*, though it has continued to burn from time immemorial, is still a very high mountain. *Vesuvius* also continues much of the same height as ever, though its summit, and even great part of the mountain itself, has been known to fall

Derivation
of the
name.

General
account
of the
situation
and
form of
volcanoes

Volcano. fall in. However, it must be remarked, that though volcanoes are generally seated under high mountains, this is not always the case. In the Mediterranean, a burning island arose in the beginning of the present century, upon which there was no eminence of any considerable height. In the island of Tanna, in the South Sea, also, Mr Forster mentions a volcano whose height was much less than that of many hills in the neighbourhood.

3
Plumes of
their eruption
uncertain.
Though volcanoes generally emit a hot sulphureous and suffocating steam, yet they by no means cast forth flames at all times with violence. This happens only at uncertain intervals of sometimes more than a century together. Nay, sometimes even the emission of the above-mentioned kind of steam ceases, the crater or chimney of the volcano is covered over with earth and vegetables, and it is forgot that ever any eruption took place. This appears to have been the case with Vesuvius before the time of Pliny; for at that time nobody seems to have apprehended the least danger; though it is now pretty certainly determined that many eruptions had happened before this time. The signs of an approaching eruption are enumerated under the article *Ætna* so fully, that little remains to be added here. It would seem however, from the accounts of Sir William Hamilton and Mr Brydone, that neither the volcanoes of *Ætna*, Vesuvius, nor Stromboli, are ever in a state of perfect quietness. Smoke continually issues from them, and explosions and other noises are heard within them. Mr Brydone particularly mentions a small mountain on the side of *Ætna*, which disturbed him in the night-time with frequent explosions like the noise of heavy cannon fired at a distance, though the mountain was then as quiet as it is almost ever known. Mr Hamilton mentions it as a common remark at Naples, that Vesuvius *grumbles in bad weather*; which he explains by supposing that the sea forces itself into some of the caverns under the mountain, and which are at all times of a glowing heat, whence arise those explosions and strange kinds of sounds above-mentioned: but we can scarce suppose this to be peculiar to Vesuvius; nor is there any certainty of a communication between that mountain and the sea. Mr Raspe indeed supposes the sea-water to be necessary for the accension of volcanoes; but of this he brings no proof. It is certain indeed that many of them are below the bottom of the sea; but it seems most probable that the water has not access, or but in small quantity, to the place whence the fire originates. Mr Forster, from more certain observation, concludes, that volcanoes are exasperated by the falling of rain. This he took particular notice of in the volcano in the island of Tanna, and suspects that rain excites the explosions by increasing the fermentation of the mineral substances within the mountain.

4
Vesuvius
most noisy
in bad weather.
The force with which a volcano explodes seems to be the greatest hitherto known in nature. So great indeed is this force, that we must of necessity suppose the resistance of the air to be exceedingly lessened before the projected materials. Under the article *GUNNERY*, it is shown how great this resistance is, and what an effect it has upon globes of solid iron. Upon irregular masses of rock, then, and much more upon streams of liquid lava, the resistance must be such as to stop their motion almost as soon as it began.

5
Conjectures
concerning
the accension
of volcanoes.
6
Prodigious
force of volcanoes.
Nevertheless, in the great eruption of Vesuvius in 1779, Sir William Hamilton informs us, that a stream of lava of an immense magnitude was projected to the height of at least 10,000 feet above the top of the mountain; and if to this we add the depth of the source whence this lava was derived, the force by which it was impelled must exceed our imagination. Indeed, let us suppose the cause to be what we will, had the air exerted its resisting power upon this lava as it does on a cannon-ball, the force necessary to have carried it to that amazing height must have dashed the stream in pieces at its first emission from the mouth of the volcano. Either the extreme heat of the lava, therefore, or some other cause must contribute to keep off this resistance, without which we cannot suppose that it could have reached to such an height, much less could the lighter materials, ashes, cinders, &c. have arisen to an height sufficient to carry them to the distance of 100 miles from the mountain, which we are assured was the case at that time.

7
There are no phenomena in nature whose cause seems more difficult to be explained than volcanoes. The fermentation of pyrites, and sulphur and iron, the explosion of nitre, of aqueous steam violently heated, or of air pent up and greatly rarefied, have all been of volcanic thought of to explain them, but with very little success. Dr Woodward and others have recourse to a central fire which they suppose to exist in the bowels of the earth, and suppose that volcanoes are so many spiracles or chimneys to prevent it from destroying the whole world.

8
It must, however, be very evident, that the immense force which we observe in volcanoes cannot by any means be accounted for from any such principles. It is impossible that beds of pyrites can be so totally inexhaustible as to remain for thousands of years under, or nearly under, the same part of the surface of the earth. And as to nitre, it is never found in a fossil state, nor indeed can we conceive that such quantities of nitre can exist under any one part of the surface as would be sufficient for a single explosion: besides, nitre does not explode instantaneously, unless it is thoroughly mixed with sulphur and charcoal in order to convert it into gun-powder; an operation which cannot take place in the bowels of the earth. As little can we suppose those eruptions owing to the expansion of aqueous steam; for though this will in some cases explode with great violence, yet in others it seems to be in a manner totally deprived of that power. With melted lead, copper, or salts, it explodes with the utmost fury, even when water in a very small quantity is thrown upon the surface of such substances; yet on the surface of melted glass, which is much hotter than any of them, water will not explode, but evaporates quietly, seemingly kept at some distance from the surface of the glass by the violent emission of steam from its under part. Nay, with this violent heat, it does not even appear to boil; but gradually lessens in its dimensions, until at last it quite disappears. Indeed, if we suppose water intimately mixed and dispersed in small quantities through the substance of melted glass or any similar substance, no doubt a very violent explosion will take place; but in this case the matter, instead of being thrown up in a full stream, would be scattered all around in an im-

Volcano.

menſe number of ſmall drops. Indeed we cannot conceive how any ſuch intimate mixture could take place; for if we ſuppoſe any large collections of water to exit under ground at the ſame time that a lava is by ſome unknown means melted in ſuch a manner as to come in contact with it, either the water muſt fall upon the lava, or the lava into the water. If the water falls upon the lava, no exploſion will take place, as has been already ſhown; and if the lava falls into the water, the liquid muſt no doubt be heated boiling hot, and the ſteam diſſipated with thoſe noify exploſions mentioned under the article *ΑΡΤΗ*, when a lava of that mountain ran into the ſea. On this ſuppoſition, however, the lava could never be projected above the mountain; much leſs can we ſuppoſe that ſolid rocks ſhould be moved from their places, and thrown to great diſtances, as experience ſhows them to be. In the eruption of Veſuvius in 1779, Sir William Hamilton meaſured one which was 108 feet in circumference and 17 feet high, and which was thrown to the diſtance of more than 1300 feet from the crater of the volcano. If we ſuppoſe this ſtone to have been only twice as heavy as water, it muſt have weighed conſiderably more than 700 tons; and the projectile power employed to throw this to ſuch a diſtance muſt have exceeded any thing we can conceive, almoſt, of the force of gun-powder itſelf.

Difficulties
in aſcertain-
ing the true
cauſe.

Indeed, when we conſider the immenſe power exerted by volcanoes, we can ſcarce find any thing in nature to which it can be aſcribed. What only ſeems to reſemble it is the exploſions of inflammable air in mines, and of which an account is given under the article *DAMPS*. But as it is impoſſible to account for the continual generation of this air, which we know muſt be deſtroyed by every exploſion, we cannot have recourſe to this agent; nor, though electricity ſeems to be very much concerned in volcanoes, are we acquainted with any laws according to which that fluid acts, by which a ſucceſſion of violent exploſions could be occaſioned. The primary conſideration, however, in attempting to account for the phenomena of volcanoes, is the means by which the fire is originally kindled, becauſe upon this, ſome-how or other, all the reſt of the phenomena depend. This, from what has been already obſerved, cannot be occaſioned by fermentations of metalline, mineral, or ſaline ſubſtances, which in time would wear out; but muſt depend on ſome inexhauſtible cauſe.

Fire of vol-
canoes origi-
nally kind-
led by the
electric
fluid,

The only inexhauſtible ſource of fire which we are acquainted with is the electric fluid, by means of which every degree of heat, even to that which vitrifies gold and platina, may be excited. From the many articles in this work, where the nature of the electric fluid has been conſidered, it muſt appear very probable that it is no other than the light of the ſun himſelf abſorbed by the earth, pervading every part of it, receiving new motions, and becoming ſubject to new laws, in conſequence of this abſorption, as if it were different fluid. As the ſun perpetually ſends down an immenſe quantity, great part of which is ſtill abſorbed, it is impoſſible that ſuch an abſorption can take place without an emiſſion of an equal quantity ſomewhere or other. The outlets to this fluid are innumerable; but by various cauſes many of theſe may occaſionally be ſtopped. In this caſe it is plain, that the fluid muſt move with greater velocity through thoſe which remain

open. But it has been ſhown, under the article *ELECTRICITY*, n° 79. and *HEAT*, n° 9. that the violent motion of the electric fluid through any ſubſtance is heat; that when this fluid converges to a centre, or diverges from one, heat always takes place in the central point, and that more or leſs violent according to the quantity of fluid which thus converges or diverges. If then, from any cauſe, the electric matter diffuſed through a very large portion of the earth ſhould converge towards one particular ſpot on the ſurface, then that ſpot would undoubtedly be heated, or perhaps ſet on fire; and if a ſufficient quantity of electric matter ſhould conſtantly be directed in this manner, we muſt eaſily ſee that the heat would be continual. Hence may be underſtood the origin of *ſol-fataras*, or ſpots of earth which have a continual heat in them, and of hot ſprings. But if this violent flux of electric matter ſhould by any means be interrupted and renewed at uncertain intervals, we ſee, in that caſe, the heat muſt occaſionally increaſe and decreaſe, without any cauſe viſible to thoſe who dwell near the ſpots above-mentioned. In volcanoes, however, it is probable that the flux of electric matter always continues to a very conſiderable degree, but occaſionally is increaſed in ſuch a manner as to melt down the earth, ſtones, and mineral ſubſtances through which it paſſes into the ſemivitrified compound called *lava*.

We cannot indeed, as yet particularly know the cauſes by which this electrical flux is at all times occaſioned. In general, we are certain, that whatever has a tendency to ſolicit the matter to the ſurface, will increaſe the violence of an eruption; and whatever can increaſe it after it has begun, will alſo contribute to bring it on originally. This will happen when the preſſure of the atmosphere directly over the mountain is leſſened; when a cloud paſſes over it whoſe electricity is oppoſite to that of the mountain itſelf, or which, by acting as a conductor, may facilitate the eſcape of the confined electric matter; or it will readily happen if by any means the ſurface of the mountain and of the earth round it is rendered a better conductor than uſual. But above all, the ſtate of electricity in the neighbouring earth and air muſt contribute towards the bringing on an eruption, or increaſing one which is already begun. Under the article *EARTHQUAKE*, n° 29. it has been ſhown, that when there is a perfect equality between the electricity of the earth and of the atmosphere, there is then great danger of a conſuſion, becauſe the electric matter can neither get into the atmosphere from the earth, or into the earth from the atmosphere. It muſt therefore ſtagnate altogether, and be ready to burſt out on all ſides, when the preſſure upon it becomes ſufficiently ſtrong. In ſuch circumſtances, if there happens to be a volcano in the neighbourhood, it is probable that it will be ſet on fire, or perhaps a new volcano may be produced on this occaſion.

Theſe cauſes ſeem to be ſufficient for the production of volcanoes, and ſetting them on fire from time to time, as uſually happens with them; though no doubt there may be others much more unknown to us which take place in the bowels of the earth itſelf; but theſe are entirely concealed from us, we can only gueſs at their exiſtence. But that all the above-mentioned cauſes do contribute towards the eruption of burning mountains experience evinces. Sir William Hamilton

Volcano.

Origin of
ſol-fataras
and hot
ſprings.

It is of the
lava
of vol-
canoes.

How a flux
of electric
matter may
be determi-
ned to one
particular
ſpot.

Why vol-
canoes are
produced, or
ſet on fire,
by earth-
quakes.

Facts in
confirmation
of vol-
canoes be-
ing ſet on
fire by elec-
tricity.

men.

Volcano.

mentions it as a common observation, that the inward explosions of Vesuvius increase during bad weather, when we know that the pressure of the atmosphere is lessened, and the defending vapours serve as conductors to the electric fluid. The same gentleman informs us, that, on the 7th of August 1779, as he was observing Vesuvius, a collection of thunder-clouds passed directly over its summit, and mingled with the sulphureous and mineral clouds of smoke, cinders, and ashes, which were then piled up to an amazing height over its top. "At this moment (says he) a fountain of fire was shot up to an incredible height, casting so bright a light, that the smallest objects could be clearly distinguished at any place within six miles or more of Vesuvius." Thus we see that these clouds acting either by their conducting power as aqueous vapours, or by an electricity opposite to that of the volcano, solicited a vast discharge of the fire as soon as they came directly over it. Mr Forster's observation, that the volcano in the island of Tanna took fire after rain, has been already mentioned; and the cause will now be apparent, namely, that by this means the surface of the ground all round was rendered a much better conductor than before, and perhaps supplied with a greater quantity of electricity, the passage of which to the volcano was now free, in consequence of which it took fire and burnt violently till this supply was again exhausted. Lastly, it is well known that some countries which were formerly very subject to earthquakes, have been freed from these destructive phenomena by the breaking out of a volcano. In the time of earthquakes also, temporary volcanoes are often formed, and the neighbouring ones throw out vast quantities of fire. This was particularly observed in the great earthquake of 1692, when Catania was destroyed, at which fatal moment a vast flame was seen to issue from mount *Ætna*. But whether any such appearance was observed during the earthquakes of the present year (1783), which seem not to have been less violent than that of 1692, has not yet been authenticated.

We shall only add one remark more in confirmation of the hypothesis that volcanoes are set on fire by electricity, namely, that in a volcanic eruption the quantity of this fluid emitted from the mountain is quite incredible. For a long time together, the smoke is sometimes so much electrified as to attract the ashes which are thrown out along with it almost into a solid column. The stones thrown out, according to Sir William Hamilton, are sometimes transparent, which we can only attribute to an immoderate electricity. Nay, the same author informs us, that the vast stream of lava which issued in 1779 to the height of almost two miles, was transparent also. Add to this, that the volcanic smoke proves very dreadful by reason of the thunder-forms which issue from it. In the great explosion of 1779, which, however, lasted only twenty-five minutes, a cloud of electrified smoke was produced which threatened the destruction of Naples at six miles distance from the mountain; and though it was happily driven from thence by the wind, the air continued so much electrified, that a Leyden vial armed with a pointed wire soon became considerably charged by being only held out at a window. At Ottaviano, which was involved in this cloud, incessant flashes of lightning added greatly to the horror of the

scene, as well as to the danger of the inhabitants. By another day's eruption the air was filled with meteors resembling falling stars, which give us a yet higher idea of the quantity of electric matter emitted, as these indicate a greater degree of electricity than even the most violent forked lightning. See LIGHTNING, n° 7.

Thus we have attempted to explain the original cause of volcanoes, the formation of lava, and the reason why the volcanic eruptions are not constant, but only take place at uncertain intervals. It now remains only to assign a reason why volcanoes do not burn quietly as any common fire, but, even during the time of an eruption, by fits and intervals. The explosions indeed are in a manner continued; but, Sir William Hamilton observes, that the burning mountains are subject to what he calls a *crisis at noon and midnight*. The exacerbations also are very remarkable, so that our author distinguishes them by the name of *fever-fits*. All these phenomena, however, may be solved by an attentive consideration of the principles above laid down. The lava is formed by a great quantity of electric matter violently forcing itself through a small spot of earth, in consequence of which that spot is melted, and thus becomes a better conductor of electricity than before, whence the force of the electric blast towards that place is still augmented. Now, as the earth is composed of what we call simply *mould*, together with stones, and minerals of various kinds, moistened with a certain quantity of water, it is not possible that a mass of this kind can be melted without the production of an incredible quantity of steam of various kinds. It is not only the aqueous vapour that is here concerned, but almost all the different kinds we can imagine. No doubt the steam of water alone shows, in certain circumstances, an incredible degree of strength; but of all vapours hitherto known, the aerial ones are the most powerful in their effects as well as the quickest in their operation. Mr Robins, in his Treatise on Gunnery, relates some experiments, from which he concluded, that air, heated to an intense white heat, was expanded into more than four times its usual bulk, and consequently, in such circumstances, has more than four times its usual elasticity. From another experiment he showed, that inflamed gun-powder produces a quantity of permanently elastic steam equivalent to 244 times the bulk of the gun-powder itself. Hence he concludes, that the force of inflamed gun-powder is nearly equal to 1000 times the pressure of the common atmosphere. Now, though the air produced by the inflammation of gun-powder is of a different kind from that which we may suppose to be produced by the melting of a lava, and in much greater quantity in proportion to the bulk of most of the materials, yet it does not appear that the elasticity of the volcanic steam is at all inferior, as far as it goes. From Dr Priestley's experiments it appears, that the expansion of the different kinds of air by heat are in the following proportions:

Common air	-	-	-	132
Inflammable	-	-	-	205
Nitrous	-	-	-	202
Fixed	-	-	-	220
Marine acid	-	-	-	133
Dephlogificated	-	-	-	221
Phlogificated	-	-	-	165
				Vitriolic

17
Explosions
and exacer-
bations of
volcanoes
accounted
for.

16
Incredible
quantities
of electric
matter e-
mitted by
volcanoes.

Vitriolic acid	- - -	237
Fluor acid	- - -	283
Alkaline	- - -	475

In order to form some estimate of the force of volcanic steam, however, it is necessary not only that we should know the different elasticity of the airs which may be supposed to be extricated, but the proportions which are yielded by different substances. But here our data are very slender. Dr Priestley, to whom we must in a manner wholly have recourse, has not made experiments on those substances which we can most reasonably suppose to exist in the bowels of the earth. From some, however, air was discharged in the following proportions, with a heat indeterminate indeed, but certainly not greater than that of a volcano.

Wood-ashes	-	160 times their own quantity
Pitcoal ditto	-	110
Lapis calaminaris	-	306
Manganese	-	40
Chalk	-	1

All these substances we may with good reason suppose to exist in a volcano, or at least substances equally ready to discharge air. Nay, Dr Priestley himself supposes as much dephlogisticated air to be discharged from the melted materials of a lava as is sufficient to continue the burning. But however much he may be in the right with regard to the quantity of dephlogisticated air produced in this manner, he must certainly be mistaken as to the use of it. It is certain that the burning must have commenced before any air could be emitted from the materials, and the cause which produced must also be sufficient to continue it; not to mention that lava could not be kept melted, nor stones red-hot, by blowing air in any quantity upon their surfaces.

With regard to the effects of this steam, we must easily see, that where the quantity of materials is very large, it must be extremely formidable. From the calculations of Dr Priestley above-mentioned, it appears, that fixed air let loose and heated is more powerful than atmospheric air, and consequently more so than even the air emitted by gun-powder, which Mr Robins observes to have much the same elasticity with common air. It is true, that nitre yields pure dephlogisticated air, which is somewhat more elastic than fixed air: but it is instantly phlogisticated by the other ingredients; and Dr Priestley found what remains after the accension of gun-powder to be more phlogisticated than common air, and consequently to have very little more elasticity, as Mr Robins observed. Now, the steam of a volcano must undoubtedly be composed of fixed air, vitriolic acid, some marine acid, dephlogisticated and inflammable air, all blended together at once by the melting of the lava, not to mention a prodigious quantity of aqueous steam rarefied and heated to an extreme degree. As all these are more powerful than an equal quantity of the vapour of inflamed gun-powder, no wonder that such terrible effects ensue from it. From Dr Priestley's calculation, it appears that two ounces of wood-ashes, if a strong white heat could be suddenly applied to them in such a manner as to make them give out all their air at once, would be much more powerful than one ounce of gun-powder; three ounces of pit-coal ashes would be more powerful than an ounce and an half of gun-powder; six ounces of manganic

would be more than an equivalent to one ounce, and 15 pounds of chalk would be the same; though this last we may be assured would in such circumstances yield more than 50 times the quantity of air that Dr Priestley could obtain from it. Lapis calaminaris would be terrible beyond all measure; one ounce of it being nearly equivalent to two of gun-powder. What must be the consequence, then, if thousands of tons of materials equally prolific in such kinds of air are melted at once?

When all this is attentively considered, we will be so far from being surpris'd at the immense power of volcanoes, that it will rather be matter of surpris'e that more mischief is not done by them than what actually happens. This however is prevented by the force being constantly directed upwards, and not horizontally along the surface of the earth. The first consequence of the production of a lava must be a violent tendency of it to expand. The reason of this is obvious, viz. because the steam is dispersed through every part of it, and therefore swells and heaves it up, as we see is the case with any glutinous fluid when set over the fire to boil. As this expansion is very violently resisted by the obstacles below ground, the overcoming of these, which in fact is no less than removing and breaking to pieces rocks and huge masses of earth, must be attended with the most tremendous explosions; and hence we may account for the noises below ground before an eruption of a volcano takes place. As the lava is excessively tenacious, it will continue to swell, and keep the steam within itself for a long time, though violent blasts of smoke and elastic steam will now and then get out, as we see that puffs of smoke will get out from any thick matter boiling over a fire. As these blasts of volcanic steam must also be composed partly of the smoke of burnt earth, and partly of elastic air, they are consequently of a black colour; and hence the sign of an approaching eruption is a quantity of black smoke now and then shooting up to an immense height in the air. Along with this black smoke, however, a white one will be emitted without intermission. This white smoke is composed of aqueous vapour, and what comes from the outside of the lava when thoroughly melted, which is always observed to emit a white steam. As the lava advances, a prodigious quantity of earth, stones, &c. are collected on its upper part, so that the blasts of steam cannot get out without breaking through this covering. The earth in the mean time is calcined to ashes, and the stones are made red-hot by the vehement heat of the lava underneath, and by the violent current of electric matter converging towards that point. The volcano therefore begins to throw up red-hot stones, cinders, ashes, and scorize of the lava itself. These falling down into the crater, continually fill it up; and thus confining the steam, give constant occasion for fresh explosions, and the mountain continues to rage with more or less violence, according to the quantity of steam yielded by the lava, and the degree of resistance it meets with. At last, when the lava has reached the summit, or meets with a weak place in the mountain, as the same tendency to expand still continues, it runs over the top, or bursts out thro' the side. Then all the violent explosions and fury of the volcano cease, because the steam gets continual vent by forcing more of the lava out through the opening. But if by any accident the running

Volcano. The eruption of the lava happens to be stopped, or the vent happens to be too narrow, all the former phenomena return, sometimes with double violence.

Thus we may in a pretty plausible manner account for the general phenomena of volcanoes; and if extraordinary phenomena sometimes occur, we may reasonably suppose them to be owing to some accidental circumstance. Thus the vast height to which the lava of Vesuvius ascended in 1779, must certainly have been occasioned by some extraordinary pressure, such as indeed we may well be surpris'd how the sides of the mountain could bear. There are three circumstances which may reasonably be supposed to cause the lava spring up to a considerable height. 1. Its being very suddenly formed; for thus all the elastic steam will be discharged in a manner at once, and the tendency to expand will be inconceivably great. 2. The degree of resistance. And, 3. The capability of the materials to produce elastic steam. All these seem to have concurred to produce the great explosion on the 8th of August 1779. The immense quantity of electric fluid which at this time issued from the mountain, indicated that the lava had been suddenly formed. Immediately before its emission, such a report was heard as shook the houses at Portici, broke the windows, and cracked several walls; and the fitness of the materials at that time in the mountain for producing elastic steam, appeared from the vast quantities of smoke which issued along with the lava.

With regard to the uses of volcanoes, we may observe, that however terrible their eruptions may be, they answer very important purposes in nature, by giving vent to such quantities of electric matter as might otherwise render the earth totally uninhabitable, if not endanger its frame altogether. Sulphur, sal ammoniac, and various other salts, are produced by them; their ashes fertilize the neighbouring country; and the lavas, tufa, basaltas, &c. afford materials for building. By their means also many islands have been thrown up from the bottom of the sea, and afford new habitations for man.

VOLERY, a great bird-cage, so large that the birds have room to fly up and down in it.

VOLITION, the act of willing. See **METAPHYSICS**.

VOLLEY, a military salute, made by discharging a great number of fire arms at the same time.

VOLONES, in Roman antiquity, slaves who in the Ponic war voluntarily offered their service to the state; which is the reason of the appellation; upon which they were admitted to citizenship, as none but freemen could be soldiers.

VOLT, in the manage, a round or circular tread; and hence, by the phrase *to make volts*, is understood a gate of two treads, made by a horse going sidewise round a centre, in such a manner that these two treads make parallel tracts; one larger, made by the fore feet, and another smaller made by the hind-feet; the croup approaching towards the centre, and the shoulders bearing out.

VOLTAIRE (Francis de), one of the most celebrated French authors and wits, was born in the year 1694. At twelve years of age, having written some verses that appeared to be superior to what could have been expected at that early period, he was introduced to

the celebrated Ninon d'Enclos by the Abbe Chateaufneuf, her intimate friend; and that extraordinary woman bequeathed to him the sum of 2000 livres to buy books; which legacy was punctually paid.

Notwithstanding his extreme youth, he was admitted to an intimacy with the Abbe Chaulien, the Marquis de la Fare, the duke of Sully, and the Abbe Courtin; and he has often told us that his father believed him entirely ruined, because he kept company with people of fashion and made verses.

At the age of 18, he began the tragedy of Oedipus, in which he proposed to introduce choruses after the manner of the ancients. The players were very unwilling to appear in a tragedy, the subject of which had been already treated by Corneille, whose performance was what is commonly called a *stock play*. It was not acted till 1718, and even then not without an order from the court. The young man, who was excessively dissipated, and immersed in all the pleasures common at his time of life, was not sensible of the risk he ran, nor did he give himself any trouble whether his pieces succeeded or not. He indulged himself in a thousand sallies on the stage; and at last wantonly laid hold of the train of the chief priest, in a scene where that pontiff was producing a very tragical effect. Marechal Villars's lady, who was in the first box, inquired who the young man was that had played that trick, as it seemed to be done with a view to ruin the piece; and being told that he was the author, she sent for him into the box, and the attachment he formed from that time to the marechal and his lady continued during their lives.

After having finished his Oedipus, but before it had been performed, he began the Henriade; when, with Monsieur de Caumartin, intendant of the finances at St Ange, having one day read several cantos of his poem when on a visit to his intimate friend the young president de Maisons, he was so teized with objections, that he lost patience, and threw his manuscript into the fire. The president Henaut with difficulty rescued it. "Remember (said M. Henaut to him, in one of his letters), it was I that saved the Henriade, and that it cost me a handsome pair of ruffles." Some years after, several copies of this poem were handed about while it was only a sketch; and an edition of it with many changes was published under the title of *The League*. All the poets in Paris, and even many of the learned, fell foul of him. The Henriade was played at the fair; and it was insinuated to the old bishop of Frejus, preceptor to the king, that it was indecent, and even criminal, to write in praise of admiral Coligny and queen Elizabeth. The cabal had interest enough to engage cardinal de Bissy, then president of the assembly of the clergy, to pass a judicial censure upon the work; but this strange design proved abortive. The young author was filled with equal surprise and resentment at these intrigues. His dissipation prevented him from making friends among the literati; and he had not the art of combating his enemies with their own weapons, which is said to be absolutely necessary in Paris, if a man wishes to succeed in any kind of pursuit.

In 1722, he gave the tragedy of Mariamne. That princess was poisoned by Herod. When she drank the cup, the faction cried out, "The queen drinks;" and the piece was damned. These continual mortifications deter-

Voltaire. determined him to print the *Henriade* in England, as he could neither obtain privilege nor patronage for it in France.

Here king Geo. I. and more particularly the prince of Wales, afterwards queen of England, raised an immense subscription for him. Their liberality laid the foundation of his fortune: for on his return to France in 1728, he put his money into a lottery established by Mr Desforts, comptroller general of the finances. The adventurers received a rent-charge on the *Hôtel-de-Ville* for their tickets; and the prizes were paid in ready money: so that if a society had taken all the tickets, it would have gained 1,000,000 of livres. He joined with a numerous company of adventurers, and was fortunate.

We are afterwards informed of the bad success of his *Brutus* and *Zara*; and of the refusal of the academicians to admit him into their society. About this time he became intimately acquainted with the illustrious marchioness of Chateliet, with whom he studied the principles of Newton, and the systems of Leibnitz. They retired to Cirey, in Champagne, for several years; two of which Mr Kœnig, an eminent mathematician, passed with them. Mr Voltaire caused a gallery to be erected, where they performed all the experiments on light and electricity. When he attempted to publish his *Elements of the Newtonian Philosophy*, a philosophy then scarce known in France, he could not obtain a privilege from the chancellor Aguessau, who was a man of universal learning, but being bred a Cartesian, discouraged the new discoveries as much as he could. Our author's attachment to the principles of Newton and Locke, drew upon him a new crowd of enemies. He wrote to Mr Falkner, to whom he dedicated his *Zara*. "It is believed that the French love novelty, but it must be in cookery and fashions, for as to new truths they are always proscribed among us; it is only when they grow old that they are well received."

By way of relaxation from his studies in natural philosophy, he amused himself in writing his *Maid of Orleans*. Although this poem was only comic, yet there is much more fancy in it than in the *Henriade*; but it was vilely disgraced by some shameless scoundrels, who printed it with horrid lewdnesses. The only good editions are those of Geneva. Not long afterwards, he became acquainted with the celebrated Rousseau at Brussels; and they soon conceived a strong aversion for each other. Rousseau having shown his antagonist a lyric epistle addressed to posterity, met with this reply: "My friend, this letter will never be delivered according to its direction." Rousseau never forgave this piece of rillery.

In the year 1738, he commenced a correspondence with the king, then hereditary prince-royal, of Prussia; and in the year 1740 he went to pay his court at Berlin before the king was prepared for invading Silesia. Soon after his return from Berlin, he wrote the tragedies of *Mahomet* and *Merope*. The tragedy of *Merope* is the first piece, not upon a sacred subject, that succeeded without the aid of an amorous passion, and which procured our author more honour than he hoped from it. It was played on the 26th of February 1743.

Soon after, we see him again taking a journey to the king of Prussia, who was always inviting him to Berlin, but could never prevail on him to quit his old

friends for any considerable time. In his journey he performed a singular service to the king his master; as we see by the letters which passed between him and Mr Amelot the minister of state.

In the year 1749, after the death of the illustrious marchioness of Chateliet, whom Mr Voltaire had attended to the court of Stanislaus, the king of Prussia gave him an invitation to come and live with him. It was not till towards the end of the month of August 1750, after having for six months combated the opinions of all his friends, who strongly dissuaded him from going, that we find him resolved to quit France, and attach himself to his Prussian majesty for the rest of his life. He could not withhold the letter which the king of Prussia wrote to him on the 23d of August from the apartments destined for his future guest in the palace of Berlin: a letter which has been often printed, and is universally known.

After this letter, the king of Prussia asked the consent of the king of France, by his minister at that court, which was readily granted. Our author was presented at Berlin with the order of Merit, the key of chamberlain, and a pension of 20,000 livres. However, he did not give up his house at Paris; and by the account of Mr Delaieu the notary, we find that Mr Voltaire was at the expense of 30,000 livres a-year there. He was attached to the king of Prussia by the most respectful regard, as well as by their conformity of taste. He has a hundred times said, that monarch was as agreeable in company as he was formidable at the head of an army; and that he had never more pleasing evening parties at Paris, than those to which that prince would have constantly admitted him. His regard for the king of Prussia rose to a degree of enthusiasm. His apartments were under the king's, and he never quitted them but to go to supper. The king composed works in philosophy, history, and poetry, in the upper apartments, while his favourite cultivated the same arts and the same talents in the lower. They communicated their works to one another. The Prussian monarch wrote his *Memoirs of the House of Brandenburg* at Potsdam; and the French author having carried his materials with him, wrote his *Age of Lewis XIV.* at the same place. Thus did his days glide along in tranquillity, enlivened by such agreeable employments.

This happiness would have been more lasting, if it had not been for a dispute on a subject in mixed mathematics which arose between Maupertuis, who likewise lived at that time with the king of Prussia, and Kœnig librarian to the prince of Orange at the Hague. This dispute was a continuation of that which for a long time had divided the mathematicians about the living and dead forces. The tempers of the disputants were soured; and Maupertuis, who ruled the academy at Berlin, procured a condemnation of Kœnig's opinion in the year 1752, on the authority of a letter of the late Leibnitz, without being able to produce the original of that letter, which however had been seen by Mr Wolf. He went still farther.—He wrote to the prince of Orange, to beg her to dismiss Kœnig from his employment of librarian; and represented him to the king of Prussia as a man who had been wanting in the respect due to his Majesty. Voltaire, who had passed two whole years at Cirey with Kœnig,

Voltaire
||
Volute.

Kœnig, during which he had contracted an intimacy, thought it was his duty openly to espouse the cause of his friend. The quarrel became violent; and Maupertuis having reported that Voltaire had spoken disrespectfully of the king's literary abilities, the latter returned the key of chamberlain, &c. which, however, the king sent him back.

Soon after his departure from Berlin, he purchased the seignory of Ferney in the *pays de Gex*, about a league from Geneva. It was here that he undertook the defence of the celebrated family of Calas; and it was not long before he had a second opportunity of vindicating the innocence of another condemned family of the name of *Sirven*. It is somewhat remarkable, that in the year 1774, he had the third time a singular opportunity of employing that same zeal which he had the good fortune to display in the fatal catastrophe of the families of Calas and Sirven.

In this retreat M. Voltaire continued long to enjoy the pleasures of a rural life, accompanied with the admiration of a vast number of wits and philosophers throughout all Europe. Worn out at length, however, with his situation, or yielding to the importunities of friends, he came to Paris about the beginning of the year 1778, where he wrote a new tragedy called *Irene*. By this time his understanding seems to have been impaired, either through the infirmities of age, or continued intoxication by the flattery of others; and he ridiculously suffered himself to be crowned in public with laurel, in testimony of his great poetical merit. He did not long survive this farce: for having over-heated himself with receiving visits, and exhausted his spirits by supplying a perpetual fund of conversation, he was first seized with a spitting of blood; and at last becoming restless in the night-time, he was obliged to use a soporific medicine. Of this he unluckily one night took too large a dose, that he slept 36 hours, and expired a very short time after awaking from it.

VOLUME, in matters of literature, a book or writing of a just bulk to be bound by itself. The name is derived from the Latin *volvere*, "to roll up;" the ancient manner of making up books being in rolls of bark or parchment. See **BOOK**.

VOLUNTARY, in music, a piece played by a musician extempore, according to his fancy. This is often used before he begins to set himself to play any particular composition, to try the instrument, and to lead him into the key of the piece he intends to perform.

VOLUNTEERS, persons who, of their own accord, either for the service of their prince, or out of the esteem they have for their general, serve in the army without being enlisted, to gain honour and preferment, by exposing themselves in the service.

VOLVOX, in natural history, a genus of insects belonging to the order of vermes zoophyta. The body is round, gelatinous and destitute of limbs. For an account of the beroc, a species of this genus, see the article **ANIMALCULA**, n° 46.

VOLUTA, in natural history, a genus of insects belonging to the order of vermes. The animal is of the snail kind, with an unilobular spiral shell, of which there are 46 species, distinguished by peculiarities in their shells.

VOLUTE, in architecture, a kind of spiral scroll
Vol. X.

Vomica
||
Vossius.

used in the Ionic and Composite capitals, wherewith it makes the principal characteristic and ornament.

VOMICA, is commonly taken for a suppurated imposthume, or an abscess with a suppuration. See **MEDICINE**, n° 535.

NUX VOMICA, in pharmacy, a flat compressed round fruit, of the breadth of a shilling, or somewhat more, and of about the thickness of a crown piece.

It is the nucleus of a fruit of an East-Indian tree, the wood of which is the *lignum colubrinum* of the shops.

Some have prescribed small doses of the *nux vomica* as a specific against a gonorrhœa, and others against quartan agues. But we have so many good and safe medicines for all these purposes, that there seems no occasion for our having recourse to such as these, which show so many signs of mischief.

VOMIT. See **EMETIC**.

VOMITING, a retrograde spasmodic motion of the muscular fibres of the œsophagus, stomach, and intestines, attended with strong convulsions of the muscles of the abdomen and diaphragm, which, when gentle, create a nausea; when violent, a vomiting.

VOORN, one of the islands of Holland, bounded by the river Maas, which divides it from the continent and the island of IJsemond, on the north; by the sea called the *Biesbosch*, on the east; by another branch of the Maas, which divides it from the islands of Goeree and Overflackee, on the south; and by the German sea on the west; being about 24 miles long, and 5 broad.

VORTEX, in meteorology, a whirlwind, or sudden, rapid, and violent motion of the air in gyres, or circles.

Vortex is also used for an eddy or whirlpool; or a body of water, in certain seas or rivers, which run rapidly around, forming a sort of cavity in the middle.

VORTEX, in the Cartesian philosophy, is a system or collection of particles of matter moving the same way, and round the same axis.

Such vortices are the grand machines whereby those philosophers solve most of the motions and other phenomena of the heavenly bodies. Accordingly, the doctrine of these vortices make a great part of the Cartesian philosophy.

VOSSIUS (John Gerard), one of the most learned and laborious writers of the 17th century, was of a considerable family in the Netherlands; and was born in 1577, in the Palatinate, near Heidelberg, at a place where his father, John Vossius, was minister. He became well skilled in polite literature, history, and sacred and profane antiquities, and was made director of the college of Dort. He was at length made professor of eloquence and chronology at Leyden, from whence he was called in 1633 to Amsterdam, to fill the chair of a professor of history. He died in 1649. He wrote many learned works, of which a complete edition has been printed at Amsterdam, in 9 vols folio.

Vossius (Isaac), a man of great parts and learning, the son of John Gerard Vossius, was born at Leyden in 1618. He had no other tutor but his father, and employed his whole life in studying: his merit recommended him to a correspondence with queen Christina of Sweden; he made several journeys into Swe-

Vote
Upfal.

den by her order, and had the honour to teach her the Greek language. In 1670 he came over to England, where king Charles made him canon of Windsor; tho' he knew his character well enough to say, That there was nothing that Vossius refused to believe, excepting the Bible. He appears indeed by his publications, which are neither so useful nor so numerous as his father's, to have been a most credulous man, while he afforded many circumstances to bring his religious faith in question. He died at Windsor castle in 1688.

VOIE, the suffrage or resolve of each of the members of an assembly, where any affair is to be carried by a majority; but more particularly used for the resolves of the members of either house of parliament.

VOTIVE MEDALS, those on which are expressed the vows of the people for the emperors or empresses. See MEDAL.

VOW, a solemn and religious promise, or oath. See OATH.

The use of vows is found in most religions. They make up a considerable part of the Pagan worship, being made either in consequence of some deliverance, under some pressing necessity, or for the success of some enterprise. Among the Jews, all vows were to be voluntary, and made by persons wholly in their own power; and if such person made a vow in any thing lawful and possible, he was obliged to fulfil it. If he appointed no particular time for accomplishing his vow, he was bound to do it instantly, lest by delay he should prove less able, or be unwilling, to execute his promise. Among the Romanists, a person is constituted a religious by taking three vows; that of poverty, chastity, and obedience.

Vows, among the Romans, signified sacrifices, offerings, presents, and prayers made for the Cæsars and emperors, particularly for their prosperity and the continuance of their empire. These were at first made every 5 years, then every 15, and afterwards every 20, and were called *quinquennialia*, *decennialia*, and *vincennialia*.

VOWEL, in grammar, a letter which affords a complete sound of itself, or a letter so simple as only to need a bare opening of the mouth to make it heard, and to form a distinct voice.

The vowels are six in number, *viz.* A, E, I, O, U, Y, and are called *vowels*, in contradistinction to certain other letters, which, depending on a particular application of some part of the mouth, as the teeth, lips, or palate, can make no perfect sound without an opening of the mouth, that is, without the addition of a vowel, and are therefore called *consonants*.

VOWEL (John). See HOOKER.

UPHOLSTER, UPHOLSTERER, or Upholder, a tradesman that makes beds, and all sorts of furniture therunto belonging, &c.

UPLAND, denotes high ground, or, as some call it, *terra firma*, by which it stands opposed to such as is moorish, marshy, or low.

UPLAND, a province of Sweden, bounded on the north-east by the Baltic Sea, on the south by the sea of Sudermania, and on the west by Westmania and Gestricia, from which it is separated by the river Dela. It is about 70 miles in length and 45 in breadth, and contains mines of iron and lead. Stockholm is the capital.

UPSAL, a rich and considerable city of Sweden, in

Upland, with a famous university, and an archbishop's see. The town is pretty large, and as straight as a line; but most of the houses are of wood, covered with birch-bark, with turf on the top. On an eminence, to the south of the town, is a ruined castle. Those that view the town from hence would take it to be a garden, whose streets represent the alleys; and the houses, which are covered with turf, the grass-plats. It was formerly the residence of the kings, and is now the usual place where they are crowned. It is seated on the river Sala, over which there are two bridges. It is 27 miles north-west of Stockholm. E. Lon. 17. 56. N. Lat. 60. 10.

UPUPA, in ornithology, a genus belonging to the order of picæ. The beak is arcuated, convex, and something blunt; the tongue is obtuse, triangular, entire, and very short; and the feet are fitted for walking. There are two species; both natives of India. The epops, hoopoe, or dung-bird, is frequently seen in Britain. It may be readily distinguished from all others that visit these islands by its beautiful crest, which it can erect or depress at pleasure. It is in length 12 inches; in breadth, 19; the bill is black, two inches and a half long, slender, and incurved; the irides are hazel; the crest consists of a double row of feathers; the highest about two inches long; the tips are black; their lower part of a pale orange colour; the neck is of a pale reddish brown; the breast and belly white; the lesser coverts of the wings are of a light brown; the back, scapulars, and wings, crossed with broad bars of white and black; the rump is white; the tail consists of only 10 feathers, white marked with black, in form of a crescent, the horns pointing towards the end of the feathers. The legs are short and black; the exterior toe is closely united at the bottom to the middle toe.

According to Linnæus, it takes its name from its note, which has a sound similar to the word; or it may be derived from the French *huppe*, or "crested;" it breeds in hollow trees, and lays two ash-coured eggs; it feeds on insects, which it picks out of ordure of all kinds: the ancients believed that it made its nest of human excrement; so far is certain, that its hole is excessively fetid from the tainted food it brings to its young. The country people in Sweden look on the appearance of this bird as a presage of war;

Fucies armata videtur.

And formerly the vulgar in our own country esteemed it a forerunner of some calamity. It visits these islands frequently; but not at stated seasons, neither does it breed with us. It is found in many parts of Europe, in Egypt, and even as remote as Ceylon. The Turks call it *tir chaos*, or the "messenger-bird," from the resemblance its crest has to the plumes worn by the chaos or Turkish couriers.

Ovid says that Tereus was changed into this bird:

*Veritur in volucem, cui stant in vertice crisse,
Prominet immodicum pro longa cuspide rostrum
Nomen epops volucris.* Metam. lib. vi. l. 671.

Tereus, through grief and haste to be reveng'd,
Shares the like fate, and to a bird is chang'd.
Fix'd on his head the crested plumes appear.
Long is his beak, and sharpen'd as a spear.

Croall.

UR (anc. geog.), a citadel of Mesopotamia, situate between the Tigris and Nisibis; taken by some for Ur of

Upupa,
Ur.

Uranburg
Urim.

of the Chaldees, the residence of Abraham. What seems to confirm this is, that from Ur to Haran, the other residence of the patriarch, the road lies directly for Palestine. And it is no objection that Ur is said to be in Mesopotamia; because the parts next the Tigris were occupied by the Chaldeans, as seems to be confirmed from A&S vii. 2, 4. It is called *Orche*, in Strabo; *Orchoe*, in Ptolemy.

URANBURG, or URANIBURG, a castle of Denmark, situated on the little island of Huen, in the Sound, 16 miles north-east of Copenhagen. Here was the celebrated observatory built by that noble Dane Tycho Brahe, and furnished with instruments for observing the course and motions of the heavenly bodies.

URANIA, in fabulous history, one of the nine Muses, was supposed to preside over astronomy. She is commonly represented in an azure robe, crowned with stars, and supporting a large globe with both hands.

URANOSCOPUS, in ichthyology, a genus belonging to the order of jugulares. The head is large, rough, and depressed, the upper jaw being shorter than the under one; there are five dentated rays in the membrane of the gills; and the anus is in the middle of the body. There is but one species, found in the Mediterranean sea.

URBINO, a province of Italy, in the pope's territory, bounded by Romania and the gulph of Venice on the north and east, by the marquisate of Ancona on the south, and by Tuscany on the west, being 70 miles long, and from 20 to 50 broad.

Urbino is also the capital of this province.

URCHIN, in zoology. See ECHINUS.

URETERS, in anatomy. See ANATOMY, n° 363.

URETHRA, in anatomy. See ANATOMY, n° 371, f.

URIM and THUMMIM, among the ancient Hebrews, a certain oracular manner of consulting God, which was done by the high-priest dressed in his robes, and having on his pectoral or breast-plate.

Various have been the sentiments of commentators concerning the urim and thummim. Josephus, and several others, maintain, that it meant the precious stones set in the high-priest's breast-plate, which by extraordinary lustre made known the will of God to those who consulted him. Spencer believes that the urim and thummim were two little golden figures shut up in the pectoral as in a purse, which gave responses with an articulate voice. In short, there are as many opinions concerning the urim and thummim as there are particular authors that wrote about them. The safest opinion, according to Broughton, seems to be, that the words *urim* and *thummim* signify some divine virtue and power annexed to the breast-plate of the high-priest, by which an oracular answer was obtained from God when he was consulted by the high-priest; and that this was called *urim* and *thummim*, to express the clearness and perfection which these oracular answers always carried with them; for *urim* signifies "light," and *thummim* "perfection;" these answers not being imperfect and ambiguous, like the heathen oracles, but clear and evident. The use made of the urim and thummim was to consult God in difficult cases relating to the whole state of Israel; and sometimes in cases relating to the king, the sanhe-

drim, the general of the army, or some other great personage.

URINAL, in medicine, a vessel fit to receive and hold urine, and used accordingly for the convenience of sick persons. It is usually of glass, and crooked; and sometimes it is filled with milk, to assuage the pain of the gravel.

URINAL, in chemistry, is an oblong glass vessel, closed for making solutions, and so called from its resemblance to the glasses in which urine is set to settle for the inspection of the physician.

URINE, a serous and saline fluid, of a citron colour, separated from the blood, and carried by the emulgent arteries to the kidneys, from whence it descends to the bladder by the ureters, and is from time to time emitted thence by the canal of the urethra. See ANATOMY, n° 365. For the analysis of urine, see CHEMISTRY, n° 308.

URN, a kind of vase, of a roundish form, but biggest in the middle, like the common pitchers, now seldom used but in the way of ornament over chimney-pieces, in buffets, &c. The great use of urns among the ancients, was to preserve the ashes of the dead after they were burnt; for which reason they were called *cineraria*, and *urna cineraria*, and were placed sometimes under the tomb-stone whereon the epitaph was cut; and sometimes in vaults in their own houses. Urns were also used at their sacrifices to put liquid things in.

UROGALLUS, in ornithology. See TETRAO.

URSA, in astronomy. See ASTRONOMY, n° 206.

URSULINES, in church-history, an order of nuns, founded originally by St Angela of Brescia, in the year 1537; and so called from St Ursula, to whom they were dedicated. They observe the rules of St Augustine, and are chiefly noted for taking on them the education and instruction of young maids: their monasteries are a kind of schools where young ladies of the best families receive their education.

URSUS, the BEAR; a genus of quadrupeds belonging to the order of feræ. There are six fore-teeth in the upper jaw, alternately hollow in the inside, and six in the under jaw, the two lateral ones being labiated. The dog-teeth are solitary and conical; the eyes are furnished with a nictitating membrane; the nose is prominent; and there is a crooked bone in the penis. There are five species, viz.

1. The *ursus cauda abrupta*, has strong, thick, and clumsy limbs; very short tail; large feet; body covered with very long and shaggy hair, various in its colour: It inhabits the north parts of Europe and Asia; the Alps of Switzerland, and Dauphine; Japan and Ceylon; North America and Peru. The brown bears are sometimes carnivorous, and will destroy cattle, and eat carrion; but their general food is roots, fruits, and vegetables: they will rob the fields of pease; and when they are ripe, pluck great quantities up, beat the pease out of the husks on some hard place, eat them, and carry off the straw: they will also, during winter, break into the farmer's yard, and make great havoc among his stock of oats; they are also particularly fond of honey. The bears of America are small and black, and confine themselves entirely to vegetables: they are remarkably greedy of maize and potatoes; and will even reject animal-food, though pressed by hunger: neither of these varieties

Ursinal
Urisus.

will attack mankind, unless wounded, or when they have their young: they strike with their fore-feet like a cat; seldom or never use their mouths in fighting, but seizing the assailant with their paws, and pressing him against their breast, almost instantly squeeze him to death. The females after conception retire into the most secret places; left, when they bring forth, the males should devour the young: it is affirmed, that out of the several hundred bears that are killed in America, during winter, (which is their breeding season), scarce a female is found among them; so impenetrable is their retreat during their pregnancy: they bring two, rarely three, young at a time: the cubs are deformed, but not a shapeless mass to be licked into shape, as the ancients pretended. The flesh of a bear in autumn, when they are excessively fat, by feeding on acorns, and other mast, is delicate food; and that of the cubs still finer; but the paws of the old bears are reckoned the most exquisite morsel; the fat white, and very sweet; the oil excellent for strains and old pains. The latter end of autumn, after they have fattened themselves to the greatest degree, the bears withdraw to their dens, where they continue for a great number of days in total inactivity, and abstinence from food, having no other nourishment than what they get by sucking their feet, where the fat lodges in great abundance; their retreats are either in cliffs of rocks, in the deepest recesses of the thickest woods, or in the hollows of ancient trees, which they ascend and descend with surprising agility: as they lay in no winter-provisions, they are in a certain space of time forced from their retreats by hunger, and come out extremely lean: multitudes are killed annually in America, for the sake of their flesh or skins; which last makes a considerable article of commerce.

2. The polar, or white bear, has a long head and neck; short round ears; great teeth; the hair long, soft, and white, tinged in some parts with yellow: growing to a vast size; the skins of some being 13 feet long.

This animal is confined to the coldest part of the globe; it has been found as far as navigators have penetrated northwards, above lat. 80. The frigid climes only seem adapted to its nature; for we do not learn from any authority that it is met with farther south than Newfoundland. Its bounds in respect to longitude are also very limited; being an animal unknown except on the shores of Hudson's Bay, Greenland, and Spitzbergen, on one side, and those of Nova Zembla on the other; for such as have appeared in other parts have been brought there involuntarily on floating islands of ice; so that the intermediate countries of Norway and Iceland are acquainted with them but by accident. We cannot trace them farther east than Nova Zembla; though the frozen sea, that is continued from thence as far as the land of Tschuktschi, that lies above Kamtschatka, is equally suited to their nature. The late histories of those countries are silent in respect to them.

During summer, the white bears are either resident on islands of ice, or passing from one to another: they swim admirably, and can continue that exercise six or seven leagues, and dive with great agility. They bring two young at a time: the affection between the parents and them is so strong, that they would die rather than desert one another. Their winter retreats are under the

snow, in which they form deep dens, supported by pillars of the same. They feed on fish, seals, and the carcases of whales, and on human bodies, which they will greedily tear up: they seem very fond of human blood; and are so fearless as to attack companies of armed men, and even to board small vessels. When on land, they live on birds and their eggs; and allured by the scent of seals fish, often break into and plunder the houses of the Greenlanders: their greatest enemy in the brute creation is the morse, with whom they have terrible conflicts, but are generally worsted, the vast teeth of the former giving it a superiority. The flesh is white, and said to taste like mutton: the fat is melted for train-oil, and that of the feet used in medicine: but the liver is very unwholesome, as three of Barentz's sailors experienced, who fell dangerously ill on eating some of it boiled. One of this species was brought over to England a few years ago; it was very furious, almost always in motion, roared loud, and seemed very uneasy, except when cooled by having pailfuls of water poured on it.

3. The luscus, or wolverene, has a black sharp pointed visage; short rounded ears, almost hid in the hairs; the sides of a yellowish brown, which passes in form of a band quite over the hind-part of the back, above the tail; the legs are very strong, thick and short, of a deep black: the whole body is covered with very long and thick hair, which varies in colour according to the season. It inhabits Hudson's Bay and Canada, as far as the straits of Michilimackinac; is found under the name of the *glutton* in the north parts of Europe and Asia, being a native of the most rigorous climates.

It is a most voracious animal, and slow of foot; so is obliged to take its prey by surprise. In America it is called the *beaver-eater*, watching those animals as they come out of their houses, and sometimes breaks into their habitations, and devours them. It often lurks on trees, and falls on the quadrupeds that pass under; will fasten on the horse, elk, or stag, and continue eating a hole into its body, till the animal falls down with the pain; or else will tear out its eyes: no force can disengage it; yet sometimes the deer in their agony have been known to destroy it, by running their head violently against a tree. It devours the otter, or white fox; searches for the traps laid for the fables and other animals; and is often beforehand with the huntsmen, who sustain great losses by the glutton: authors have pretended that it feeds so voraciously, that at length it is in danger of bursting; and that it is obliged to ease itself of its load, by squeezing it out between two trees.

In a wild state, it is vastly fierce; a terror to both wolf and bear, which will not prey on it when they find it dead, perhaps on account of its being so very fetid, smelling like a pole-cat: it makes a strong resistance when attacked; will tear the flock from the gun, and pull the traps it is caught in to pieces. Notwithstanding this, it is capable of being tamed, and of learning several tricks; burrows, and has its den under ground. The skin is sold in Siberia for 4s. or 6s.; at Jakutsk for 12s.; and still dearer at Kamtschatka, where the women dress their hair with its white paws, which they esteem a great ornament. The fur is greatly esteemed in Europe: that of the north of Europe and Asia, whose skins are sometimes to be seen in the furriers shops, is much finer, blacker, and more glossy

than that of the wolverene, or American kind. The glutton has by some authors been confounded with the hyæna.

4. The lotor, or raccoon, has the upper part of the body covered with hair, ash-coloured at the root, whitish in the middle, and tipped with black; tail very bushy, annulated with black; toes black, and quite divided.—It inhabits the warm and temperate parts of America; is found also in the mountains of Jamaica, and in the isles of Maria, between the fourth point of California and Cape Corientes, in the South Sea: is easily made tame, very good-natured and sportive; bus as unlucky as a monkey. It is almost always in motion; and very inquisitive, examining every thing with its paws. It makes use of them as hands; sits up to eat; is extremely fond of sweet things, and strong liquors, and will get excessively drunk. It has all the cunning of a fox; and is very destructive to poultry; but will eat all sorts of fruits, green corn, &c. At low water it feeds much on oysters, and will watch their opening, and with its paw snatch out the fish; it sometimes is caught in the shell, and kept there till drowned by the coming in of the tide: it is also fond of crabs. It climbs very nimbly up trees. It is hunted for its skin; the fur next to that of the beaver for making hats.

5. The meles, or common badger, is an animal of a very clumsy make, with short thick legs, long claws on the fore-feet, and a fetid white matter exuding from the orifice below the tail. It inhabits moist parts of Europe, as far north as Norway and Russia, and the step or desert beyond Orenburgh, in the Russian Asiatic dominions, north of the Caspian Sea: inhabits also China, and is often found in the butchers shops in Peking, the Chinese being fond of them; but a scarce animal in moist countries. It seldom appears in the day; confines itself much to its hole: is indolent and sleepy; generally very fat: feeds by night; eats roots, fruits, grubs, insects, and frogs; but is not carnivorous: it runs slowly; when overtaken, it comes to bay, and defends itself vigorously; its bite is dangerous. It burrows under ground; makes several apartments, but forms only one entrance from the surface. It is hunted during night for the skin, which serves for pistol-furniture; the hairs for making brushes to soften the shades in painting. Its flesh makes good bacon.

URTICA, the NETTLE; a genus of the tetrandria order, belonging to the monocœia class of plants.

1. The uren, or lesser stinging nettle, grows in waste places, on dunghills, &c. The stings or prickles of this are very numerous and inflammatory; the leaves of a roundish oval figure, and light green colour: the male and female flowers grow in different parts of the same plant, in crowded oblong green clusters, erect, nearly sessile in the axils of the leaves. The stings are very curious microscopic objects: they consist of an exceedingly fine pointed tapering hollow substance, with a perforation at the point, and a bag at the base. When the spring is pressed upon, it readily perforates the skin, and at the same time forces up some of the acrimonious liquor contained in the bag into the wound.

2. The dioica, or common stinging nettle, grows plentifully in waste places, and under hedges. The male and female flowers grow on distinct plants; the clusters branched, and generally in pairs. The aculei,

or stings of the nettle, have a small bladder at their base, full of a burning corrosive liquor: when touched, they excite a blister, attended with a violent itching pain, though the sting does not appear to be tubular, or perforated at the top, nor any visible liquor to be infused into the puncture made by it in the flesh. It seems certain, however, that some of this liquor is insinuated into the wound, though invisibly, since the stings of the dried plant excite no pain. The chives afford a very pleasing appearance: they are rolled inwards under the segments of the cups, which fold over them till they are ripe, when the segments gradually expanding, the chives released from their confinement, roll back with an elastic force, and discharge the contents of their transparent tips which float in the air like a cloud of dust, that it may arise to the summits of the fertile flowers.

Nettle-tops in the spring are often boiled and eaten by the common people instead of cabbage-greens.

In Arran, and other islands, a rennet is made of a strong decoction of nettles: a quart of salt is put to three pints of the decoction, and bottled up for use. A common spoonful of this liquor will coagulate a large bowl of milk very readily and agreeably. The stalks of nettles are so like in quality to hemp, that in some parts of Europe and Siberia they have been manufactured into cloth, and paper has been made of them. The whole plant, particularly the root, is esteemed to be diuretic, and has been recommended in the jaundice and nephritic complaints. It is also reckoned astringent; and of service in all kinds of hæmorrhagies, but is at present but little in practice. The roots boiled will dye yarn of a yellow colour. The larvæ, or caterpillars of many species of butterflies, feed on the green plant; and sheep and oxen will readily eat the dried.

URTICA Marina. See ANIMAL-Flower.

USANCE, in commerce, is a determinate time fixed for the payment of bills of exchange, reckoned either from the day of the bills being accepted, or from the day of their date; and thus called because regulated by the usage and custom of the places whereon they are drawn.

USE, in law, the profit or benefit of lands and tenements; or a trust and confidence reposed in a person for the holding of lands, &c. that he to whose use the trust is made shall receive the profits.

USHANT, an island of France, 15 miles west of the coast of Britany, at the entrance of the British channel.

USHER (James), archbishop of Armagh, one of the most illustrious prelates in the 17th century, as well with respect to his piety and other virtues, as his uncommon erudition, was born in Dublin in 1580, and it is said that two of his aunts taught him to read, though they were both born blind. Dublin college being finished in 1593, he was one of the three first students admitted into it. He made so swift a progress in his studies, that at eighteen years of age he was able to dispute with Henry Fitz-Simon, a famous Jesuit, who challenged all the Protestant clergy; and defended his cause so well in the castle of Dublin, that he made him repent his challenge. He was ordained priest in 1601, and soon after was appointed to preach constantly before the court at Christ church in Dublin,

on Sundays in the afternoon. In 1603, he was sent over to England with Dr Luke Challoner, in order to purchase books for the library of Dublin. In 1607, he took the degree of bachelor of divinity; soon after, he was made chancellor of St Patrick's cathedral, and the same year was chosen professor of divinity, when he made choice of Bellarmine's controversies for the subject of his lectures. Some years after, he made it a constant custom to come over to England once in three years, spending one month of the summer at Oxford, another at Cambridge, and the rest of the time at London. In 1612, he took the degree of doctor of divinity; at the latter end of the year 1620, he was promoted to the bishopric of Meath, and in 1625 was made archbishop of Armagh. In the administration of his archbishopric he acted in a very exemplary manner, and endeavoured to reform the clergy and officers in the ecclesiastical courts. In 1640, he came over to England with his family, with an intention soon to return to Ireland; but was prevented by the rebellion which broke out there in 1641; and in that rebellion he was plundered of every thing, except his library, which was in England, and some furniture in his house at Drogheda. His majesty, therefore, conferred on him the bishopric of Carlisle, to be held in *commendam*: the revenues of which were greatly lessened by the Scots and Irish armies quartering upon it; but when all the lands belonging to the bishoprics in England were seized by the parliament, they voted him a pension of 400 l. *per annum*, though he never received it above once or twice. He afterwards removed to Oxford; and, in 1643, was nominated one of the assembly of divines at Westminster, but refused to sit amongst them: which, together with some of his sermons at Oxford, giving offence to the parliament, they ordered his study of books, of considerable value, to be seized; but by the care of Dr Featly, one of the assembly, they were secured for the primate's use. The king's affairs declined; and Oxford being threatened with a siege, he left that city and retired to Cardiff in Wales, to the house of Sir Timothy Tyrrel, who had married his only daughter, and was then governor and general of the ordnance. He was afterwards invited to London by the countess of Peterborough. In 1647, he was chosen preacher in Lincoln's Inn; and during the treaty in the Isle of Wight, he was sent for by the king, who consulted him about the government of the church. The death of his majesty struck him with great horror. The countess of Peterborough's house, where the primate then lived, being just over-against Charing-Cross, several of her gentlemen and servants went up to the leads of the house, whence they could plainly see what was acting before Whitehall. As soon as his majesty came upon the scaffold, some of the household told the primate of it; and asked him, whether he would see the king once more, before he was put to death. He was at first unwilling, but at last went up: where, as the ceremonial advanced, the primate grew more and more affected; and, when the executioners in vizards began to put up the king's hair, he swooned away; and being carried to his bed, is said to have prophesied what happened in England ever since. He died of a pleurisy, in 1655; and was solemnly buried at Westminster, in St Erasmus's chapel. He

published, 1. *Britannicarum Ecclesiarum Antiquitates*. 2. *Polycarpi et Ignatii Epistolæ, Græce Latine, &c.* 3. *Annals of the Old and New Testament, in Latin.* 4. *De Græce Septuaginta interpretum Versione Syntagma*; and many other books which are esteemed. A considerable number of his works still remain in manuscript.

USHER, an officer or servant who has the care and direction of the door of a court, hall, chamber, or the like.

USHER of the Black Rod, the eldest of the gentlemen ushers, daily waiters at court, whose duty is to bear the rod before the king at the feast of St George and other solemnities.

USK, a river of Wales, which rises on the west of Brecknockshire, and runs south-east through that county and Monmouthshire, falling into the mouth of the Severn.

USQUEBAUGH, a strong compound liquor, chiefly taken by way of dram.

There are several different methods of making this liquor; but the following is esteemed one of the best: To two gallons of brandy, or other spirits, put a pound of Spanish liquorice, half a pound of raisins of the sun, four ounces of currants, and three of sliced dates; the tops of baum, mint, savory, thyme, and tops of the flowers of rosemary, of each two ounces; cinnamon and mace, well bruised, nutmegs, aniseeds, and coriander-seeds, bruised likewise, of each four ounces; of citron or lemon, and orange-peel, scraped, of each an ounce: let all these infuse 48 hours in a warm place, often shaking them together: then let them stand in a cool place for a week: after which the clear liquor is to be decanted off, and to it is to be put an equal quantity of neat white port, and a gallon of canary; after which it is to be sweetened with a sufficient quantity of double-refined sugar.

USTION, in pharmacy, the preparing of certain substances by burning them.

USUFRUIT, in the civil law, the use of enjoyment of any lands or tenements; or the right of receiving the fruits and profits of an inheritance, or other thing, without a power of alienating or changing the property thereof.

USURER, a person charged with a habit or act of usury. See USURY.

USURIOUS CONTRACT, is any bargain or contract whereby a man is obliged to pay more interest for money than the statute allows.

USURPATION, in law, is an injurious using or enjoyment of a thing for continuance of time, that belongs of right to another.

USURY, an unlawful contract upon the loan of money, to receive the same again with exorbitant increase. Under the article INTEREST, it was observed, that by statute 37 Hen. VIII. c. 9. the rate of interest was fixed at 10 l. *per cent. per annum*: which the statute 13 Eliz. c. 8. confirms, and ordains, that all brokers shall be guilty of a *præmunire* that transact any contracts for more, and the securities themselves shall be void. The statute 21 Jac. I. c. 17. reduced interest to 8 l. *per cent.*; and it having been lowered in 1650, during the usurpation, to 6 *per cent.* the same reduction was re-enacted after the restoration by statute 12 Car. II. c. 13. and, lastly, the stat. 12 Ann.

ft. 2. c. 16. has reduced it to 5 per cent. Wherefore not only all contracts for taking more are in themselves totally void, but also the lender shall forfeit treble the money borrowed. Also if any scrivener or broker takes more than 5 s. per cent. procuration-money, or more than 12 d. for making a bond, he shall forfeit 20 l. with costs, and shall suffer imprisonment for half a year.

UTERUS, in anatomy. See there, n° 372, g.

UTICA (anc. geog.), a town of Africa Propria, on the Mediterranean: a Tyrian colony, and older than Carthage, (Sil. Italicus); its name, according to Bochart, denoting *old*: reckoned second to it; but after the destruction of Carthage, became the capital and centre of all the Roman transactions in Africa, according to Strabo; who adds, that it stood on the same bay with Carthage, at one of the promontories called *Apollonium*, bounding the bay on the west side, the other to the east called *Hermelia*, being at Carthage. It became famous by the death of Cato, who thence was called *Uticensis*. Now called *Bijerta*, or a town near the spot on which Utica stood, in the kingdom of Tunis. E. Long. 9° Lat. 37°.

UTRECHT, one of the seven United Provinces, or States of Holland, wholly surrounded by Holland and Guelderland, excepting a small part of it that borders on the Zuyder-Zee. Its greatest length is about 32 miles, and breadth about 22. It enjoys a good air; and in most places the soil is fruitful, but in some sandy, or what is called *turf-ground*, and in others over-run with wood. It is watered by the Leek, Rhine, Vecht, and other smaller rivers, besides several canals; of which that extending from the village of Vreeswyk to Utrecht is one of the chief. The states here, as in the other provinces, are composed of the nobility and the towns; the latter of which are Utrecht, Amersfoort, Wyk, Rhenen, and Montfoort; but Utrecht bears the chief sway. The bishops of that city were anciently temporal lords of the province, as well as of Overysel, till Henry of Bavaria sold the sovereignty thereof to Charles V. In 1559 the see of Utrecht was raised to an archbishopric by Philip II. of Spain. In 1579 it acceded to the alliance of the other provinces, and became a free state. The provincial states are composed of 22 members, and three deputies are sent by them to the assembly of the States-general. The established clergy are divided into three classes, making 79 ministers, of whom a synod is held once a year at Utrecht.

UTRECHT, or Latin, *Ultrajectum*, *Trajectum vetus* or *inferius*, or *Trajectum Rheni*, capital of a province of the same name, so called from its ancient ferry or passage here over the Rhine; the word being compounded of *trecht*, which in Dutch signifies a "ferry," and *oud* or *olt*, i. e. "old." It is a fair, large, and populous city, the capital of the province, and the seat of the states, situated 19 miles from Amsterdam, 25 from Rotterdam, and 27 from Leyden. There were several large and rich monasteries, and other religious houses here, before the Reformation. The churches are magnificent, especially that of St Martin, formerly the cathedral, and usually called the *dome*. Over that of St Salvador or the old minister, where the British have a place of worship, is a museum of all sorts of antiquities and rarities. Here is a stately town-house, with a commandery of the Teutonic order, and a celebrated university, which was founded in 1630, since which

it hath flourished greatly, though it has not all the privileges of most other universities; being wholly subject to the magistrates of the city. The mall without the town, having five rows of lofty limes on each side, is very pleasant; and the physic-garden belonging to the university, is extremely curious. There are five churches here that have chapters; but the members of these purchase the places, of which some cost 6000 or 7000 guilders. The streams which run through several of the streets, contribute much to the beauty and cleanliness of the town; and the canal that is cut from the Leek, and passes through it to Amsterdam, will carry ships of any burden. Pope Adrian VI. was a native of this city. Here, in 1579, the memorable union was formed between the seven provinces; and, in 1713, the celebrated peace concluded between France on the one part, and the allies on the other. The Papists have a nominal archbishop of this city; and there is a silk manufactory carried on in it, which employs a number of hands.

VULCAN, in Pagan worship, the god of subterraneous fire and metals, was the son of Jupiter and Juno; and was said to be so remarkably deformed, that his father threw him down from heaven to the isle of Lemnos, in which fall he broke his leg, and there he set up his forge, and taught men how to soften and polish brass and iron. Thence he removed to the Liparian isles, near Sicily, where, by the assistance of the Cyclops, he made Jupiter's thunder-bolts, and armour for the other gods. Notwithstanding the deformity of his person, he had a passion for Minerva, and by Jupiter's consent made his addresses to her, but without success. He was, however, more fortunate in his suit to Venus; who, after her marriage, chose Mars for her gallant; when Vulcan exposed them to the ridicule of the other gods, by taking them in a net.

He had several names: that of *Lœnæus*, from the isle of Lemnos; *Mulcher*, or *Mulcifer*, from his art of softening steel and iron; and (among the Greeks) *Hephaistos*, from his delighting in flames. In the ancient medals of the Greeks and Romans, he is represented as a lame, deformed, and squalid man, working at the anvil, and attended by the Cyclops, or by some other god or goddess who comes to his assistance. But the Egyptians represented him as proceeding out of an egg placed in the mouth of Jupiter, to express the radical and natural heat diffused through all created beings.

It was customary with many nations after a victory, to gather the enemies arms in a heap, and offer them to Vulcan. His principal temple was in a consecrated grove, at the foot of mount *Ætna*, guarded by dogs, who are said to have had such sagacity as to distinguish his votaries, to fawn upon the virtuous, and to tear the vicious to pieces.

VULCANO, in natural history. See VOLCANO.

VULGATE, a very ancient Latin translation of the Bible, and the only one acknowledged by the church of Rome to be authentic. See BIBLE.

VULNERARY, in medicine, an epithet given to remedies proper for the cure of wounds and ulcers.

VULTUR, a genus of birds belonging to the order of accipitres. The beak is straight and crooked at the point; the head has no feathers; on the forehead being only naked skin; and the tongue is bifid. There are eight species. The most remarkable are,

Vulcan

Vultur.

1. The condor, which is not only the largest of this genus, but perhaps of all others which are able to fly. The accounts of authors in regard to its extent of wing are various, viz. from 9 to 18 feet, from the tip of one wing to that of the other. One gives it strength sufficient to carry off sheep, and boys of 10 years old; while another ventures to affirm, that it can lift an elephant from the ground high enough to kill it by the fall! M. de Salerne says, that one of this kind was shot in France in the year 1719, which weighed 18 lib. and whose extent of wing was 18 feet. But to come nearer the truth, perhaps it is better to abide by descriptions which bear a moderate proportion. In Hawkesworth's Voyages, mention is made of one of these birds shot at Port Desire, off Penguin Island, of which he gives the following description: "The head of this bird resembled that of an eagle, except that it had a large comb upon it. Round the neck it had a white ruff, exactly resembling a lady's tippet; the feathers on the back were as black as jet, and as bright as the finest polish could render that mineral: the legs were remarkably strong and large, and the talons like those of an eagle, except that they were not so sharp; and the wings when they were extended, measured, from point to point, no less than 12 feet." This last account seems by no means to exceed the natural size, since we have an account in the Philosophical Transactions of one of the quill-feathers of this bird, brought from Chili, which measured 12 feet 4 inches; the diameter of the quill half an inch; and the extent of wing 16 feet. This bird was met in lat. 33 south, not far from the island Mocha, in the South Sea, in the year 1691. The seamen shot it on a cliff by the sea-side; and taking it for a kind of turkey, made a meal of it. In this account we are told that the colour was black and white, like a magpie, and the crest, or comb, sharp like a razor.

It has been supposed, that these birds were peculiar to South America: but Buffon believes they are likewise inhabitants of Asia and Africa, and not unlikely of Europe also, if the lacmerger of the Germans be the same bird, which he seems inclined to think; and that the roc, or ruch, mentioned frequently in the Arabian Tales, may also prove to be the same.

Alberto Fortis, in his travels into Dalmatia in the year 1778, p. 245, says, that he measured a vulture himself, (one found near the mouth of the Cetina) whose extent of wings was above 12 feet; and in a note below says, that the fort found in the Swiss mountains, called *le vautour des Alpes*, is of the same race. We further learn, that the throat of the condor is naked, that is, bare of feathers, and of a red colour; the comb brown, but not indented; that in some the upper parts are variegated with black, grey, and white; and under the belly scarlet, as was that bird mentioned by Mr Salerne. Mr Brisson observes, that these birds vary in colour; which will account for the difference in the plumage by which authors have described them: which circumstance frequently happens in other birds, as well as in this species.

2. The phœnicopterus, or Egyptian vulture, is thus described by Mr Hæffelquist. They light in great flocks on the lay-stalls near the city of Cairo, and there promiscuously feed, together with the dogs and other brats, on dead carcases and other offal. They assemble with the kites every morning and evening, in the square

called *Rohneli*, below the cistern (which is the place for executing capital offenders) there to receive the alms of fresh meat, left them by the legacies of wealthy great men.

The appearance of this bird is as horrid as can well be imagined, viz. the face is naked and wrinkled; the eyes are large and black; the beak black and hooked; the talons large, and extending ready for prey; and the whole body polluted with filth: these are qualities enough to make the beholder shudder with horror. Notwithstanding this, the inhabitants of Egypt cannot be enough thankful to Providence for this bird. All the places round Cairo are filled with the dead bodies of asses and camels; and thousands of these birds fly about, and devour the carcases before they putrify and fill the air with noxious exhalations. The inhabitants of Egypt, and after them Maillet in his Description of Egypt, say, that they yearly follow the caravan to Mecca, and devour the filth of the slaughtered beasts, and the carcases of the camels which die on the journey; but we were not eye-witnesses of this. They do not fly high, nor are they afraid of men. If one is killed, all the rest surround him in the same manner as do the royston-crows; they do not quit the places they frequent though frightened by the explosion of a gun, but immediately return thither. Maillet imagines this bird to be the ibis of the ancients: but it is scarcely to be imagined, that a wise nation should pay such honours to an unclean, impure, and rapacious bird, which was not perhaps so common before the Egyptians filled the streets with carcases. If the ibis is to be found, it must certainly be looked for in the order of grallæ of Linnæus; and we imagine it to be the white stork, (*Ardea ciconia*), which is so common in Egypt. The Arabians call it *rochemes*; the French living in Egypt, give it the name of *chapon de Pharaon*, or *de Mahometh*.

3. The aura, or carrion vulture, according to Mr Latham, is about the size of a turkey, though it varies in size in different parts. The bill is white; the end black; irides blueish saffron-colour. The head, and part of the neck, are bare of feathers; and of a red, or rather rufous colour. The sides of the head warted, not unlike that of a turkey. The whole plumage is brown black, with a purple and green gloss in different reflections; but in some birds, especially young ones, greatly verging to dirty brown. The feathers of the quills and tail are blacker than the rest of the body. The legs are flesh-colour; the claws black.

This bird is very common in the West Indies, and both North and South America. It feeds on dead carcases, snakes, &c. like most of this genus; which makes the smell of it very offensive. In general, it is very tame in its wild state; but particularly so, when trained up from being young. This our author experienced in two birds sent home from Jamaica. They were suffered to run wild about the garden, and were alert and brisk during the summer months: but impatient of the least cold; for a rainy day, with the slightest degree of cold, obliged them to creep for shelter. In the West Indies they roost together of nights, in vast numbers, like rooks in this country. They are reckoned a most useful animal in the places where they resort; which secures their safety, added to a penalty for killing one, which is in force in Jamaica and other islands of the West Indies.

Vulture.

4. The *Agittarius*, or secretary, is a most singular species, being particularly remarkable from the great length of its legs; which at first sight would induce one to think it belonged to waders: but the characters of the vulture are so strongly marked throughout, as to leave no doubt to which class it belongs.

The bird, when standing erect, is full three feet from the top of the head to the ground. The bill is black, sharp, and crooked, like that of an eagle; the head, neck, breast, and upper parts of the body, are of a bluish ash colour: the legs are very long, stouter than those of a heron, and of a brown colour; claws shortish, but crooked, not very sharp, and of a black colour; from the hind-head springs a number of long feathers, which hang loose behind like a pendent crest; these feathers arise by pairs, and are longer as they are lower down on the neck; this crest the bird can erect or depress at pleasure; it is of a dark colour, almost black; the webs are equal on both sides, and rather curled; and the feathers, when erected, somewhat incline towards the neck; the two middle feathers of the tail twice as long as any of the rest.

This singular species inhabits the internal parts of Africa, and is frequently seen at the Cape of Good Hope. It is also met with in the Philippine islands.

The description was taken by Mr Latham from three that were alike, which he saw in England alive, some years since; two of which are now in the Leverian museum. From confinement, they had lost their two long tail-feathers; but this want was supplied by some accurate drawings by Mr Banks, taken from the life at the Cape.

As to the manners of this bird, it is on all hands allowed that it principally feeds on rats, lizards, snakes, and the like; and that it will become familiar: whence Sonnerat is of opinion that it might be made useful in some of our colonies, if encouraged, towards the destruction of those pests. They call it at the Cape of Good Hope, *slangeater*, i. e. snake-eater. A great peculiarity belongs to it, perhaps observed in no other;

which is, the faculty of striking forwards with its legs, never backwards. Dr Solander has seen one of these birds take up a snake, small tortoise, or such like, in its claws; when dashing it from thence against the ground with great violence, if the victim was not killed at first, it repeated the operation till that end was answered; after which it ate it up quietly. Dr J. R. Forster mentioned a further circumstance, which he says was supposed to be peculiar to this bird; that should it by any accident break the leg, the bone would never unite again.

VULVA, in anatomy. See there, n° 372.

UVULA, in anatomy. See there, n° 366.

UZ, or Urtz, the country and place of residence of Job. In the genealogy of the patriarchs there are three persons called *Uz*, either of which might give this district its name. The first was the grandson of Sem, by his son Aram, Gen. xxii. 23. who, according to Josephus, occupied the Trachonitis, and Damascus, to the north of Palestine: but Job was among the sons of the East. Another *Uz* was the son of Nahor, Abraham's brother, Gen. x. 21. who appears to have removed after passing the Euphrates, from Haran of Mesopotamia to Arabia Deserta. The third *Uz* was a Horite, from mount Seir, Gen. xxxvi. 28. and thus not of Eber's posterity. Now the question is, from which of these Job's country, *Uz*, took its name. Not from the first, as is already shown: nor from the second, because his country is always called *Seir*, or *Edom*, never *Uz*; and then called a *south*, not an *east*, country, in Scripture. It therefore remains, that we look for the country and place of residence of Job in Arabia Deserta; for which there are very probable reasons. The plunderers of Job are called *Chaldeans* and *Sabeans*, next neighbours to him. These Sabeans came not from Arabia Felix, but from a nearer Sabe in Arabia Deserta, (Ptolemy); and his friends, except Eliphaz the Themanite, were of Arabia Deserta.

UZBECK TARTARY. See TARTARY.

W.

W or w, is the 21st letter of our alphabet; and is composed, as its name implies, of two v's. It was not in use among the Hebrews, Greeks, or Romans; but chiefly peculiar to the northern nations, the Teutones, Saxons, Britons, &c. But still it is not used by the French, Italians, Spaniards, or Portuguese, except in proper names and other terms borrowed from languages in which it is originally used, and even then it is sounded like the single v. This letter is of an ambiguous nature; being a consonant at the beginning of words, and a vowel at the end. It may stand before all the vowels except *u*; as *water*, *wedge*, *winter*, *wonder*: it may also follow the vowels *a, e, o*, and unites with them into a kind of double vowel, or diphthong; as in *saw*, *few*, *cow*, &c. It also goes before *r*, and

follows *s* and *th*; as in *wrath*, *swear*, *thwart*: it goes before *b* also, though in reality it is sounded after it; as in *when*, *what*, &c. In some words it is obscure, as in *shadow*, *widow*, &c.

WAAG, a river of Hungary, which rises in the Carpathian mountains, on the confines of Poland, and running first from east to west, then turns south, and passing by Leopoldstadt, falls into the Danube, opposite to the island of Schut.

WAAL, a river of the United Netherlands, being one of the branches of the Rhine, which runs from east to west, through the Betu, in the province of Guelderland, passing by Nimeguen, Tiel, Bommel, and Gorcum; and continuing its course eastward, unites its waters with the Maas, and passing by Dort, falls

Wadd
Wake.

into the German Sea below the Briel.

WADD, or WADDING, is a stopple of paper, hay, straw, or the like, forced into a gun upon the powder, to keep it close in the chamber; or to put up close to the shot, to keep it from rolling out.

WADSET, in Scots law. See LAW, N° clxix. 1.

WAFERS, or Sealing WAFERS, are made thus: Take very fine flour, mix it with glair of eggs, isinglass, and a little yeast; mingle the materials; beat them well together; spread the batter, being made thin with gun-water, on even tin-plates, and dry them in a stove; then cut them out for use.

You may make them of what colour you please, by tinging the paste with brazil or vermilion for red; indigo or verditer, &c. for blue; saffron, turmeric, or gamboge, &c. for yellow.

WAGER of LAW. See (*Wager of*) LAW.

WAGER of BATTLE. See (*Wager of*) BATTLE.

WAGGON, a wheel-carriage, of which there are various forms, accommodated to the different uses they are intended for. The common waggon consists of the shafts or rails, being the two pieces which the hind-horse bears up; the welds; the slots, or cross pieces, which hold the shafts together; the bolster, being that part on which the fore-wheels and the axle-tree turn in wheeling the waggon across the road; the chest or body of the waggon, having the staves or rails fixed thereon; the bales, or hoops, which compose the top; the tilt, the place covered with cloth, at the end of the waggon. See MECHANICS, n° 58.

WAGTAIL, in ornithology. See MOTACILLA.

WAIFS, *bona waviata*, are goods stolen, and waived or thrown away by the thief in his flight, for fear of being apprehended. These are given to the king by the law, as a punishment upon the owner for not himself pursuing the felon, and taking away his goods from him. And therefore if the party robbed do his diligence immediately to follow and apprehend the thief (which is called *making fresh suit*), or do convict him afterwards, or procure evidence to convict him, he shall have his goods again. Waived goods do also not belong to the king, till seized by somebody for his use; for if the party robbed can seize them first, though at the distance of 20 years, the king shall never have them. If the goods are hid by the thief, or left any where by him, so that he had them not about him when he fled, and therefore did not throw them away in his flight; these also are not *bona waviata*, but the owner may have them again when he pleases. The goods of a foreign merchant, though stolen and thrown away in flight, shall never be waifs: the reason whereof may be, not only for the encouragement of trade, but also because there is no wilful default in the foreign merchant's not pursuing the thief, he being generally a stranger to our laws, our usages, and our language.

WAIGRATS STRAITS, situated between Nova Zembla and Russia, through which the Dutch failed to the north, as high as 75°; in order to discover a north-east passage to China and the East Indies.

WAINSCOT, in building, the timber-work that serves to line the walls of a room, being usually made in panels, and painted, to serve instead of hangings.

WAKE, the print or track impressed by the course of a ship on the surface of the water. It is formed by the reunion of the body of water which was separa-

ted by the ship's bottom whilst moving through it; and may be seen to a considerable distance behind the stern, as smoother than the rest of the sea. Hence it is usually observed by the compass, to discover the angle of lee-way.

A ship is said to be in the wake of another when she follows her on the same track, or a line supposed to be formed on the continuation of her keel.

Two distant objects observed at sea are called in the wake of each other, when the view of the farthest is intercepted by the nearer; so that the observer's eye and the two objects are all placed upon the same right line.

WAKE is the eve-feast of the dedication of churches, which is kept with feasting and rural diversions. Concerning the origin of wakes we have the following dissertation in Mr Whitaker's History of Manchester.

"Before a building could be used for divine offices, it was required to be consecrated by the bishop, formally sequestered from all secular applications, and dedicated to the purposes of public devotion. And every church at its consecration received the name of some particular personage, who was celebrated in the written annals or the traditional history of Christianity, and whose name had been admitted into that great roll of ecclesiastical fame, the kalendar of the church. This custom was practised among the Roman Britons; and they had the church of St Martin at Canterbury, and that of St Michael at Manchester. It was also continued among the Saxons; and the Saxon churches in York, London, and Manchester, were distinguished by the names of *St Peter, St Paul, and St Mary*. And in the council which was held at Cealchythe in 816, the name of the denominating saint was expressly required to be inscribed on the altars, and also on the walls of the church or a tablet within it.

"The feast of this saint became of course the festival of the church. And the connection betwixt the church and saint being enhanced by the fancifulness of superstition, and the former supposed to be under the patronage of the latter, the parishioners would naturally consider the day of their spiritual guardian with particular respect, and celebrate it with peculiar festivity. This conduct would as naturally be encouraged by the civil and ecclesiastical governors, because it substituted innocent and Christian festivals in the room of the impious and idolatrous anniversaries of heathenism. The common people, generally in all countries as much attached to the festivals as they are devoted to the principles of any religion, finding their annual feasts return as before, and being now able to join in them without guilt, would be the sooner weaned from their idolatrous attachments. And this would be the natural operation of the affections, equally on the continent and in the island, and equally among the Britons and Saxons. Thus, at the first commencement of Christianity among the Jutes of Kent, and with a view to promote the conversion of them and the rest, Gregory prudently advised what had been previously done among the Britons, Christian festivals to be instituted in the place of the idolatrous, and the suffering-day of the martyr whose relics were deposited in the church, or the day on which the building was actually dedicated, to be the established feast of the parish. Both were appointed and observed. And they were observed and appointed as distinct festivals. Bishop Ken-

Wake.

Wake.

net indeed, in his sensible account of our wakes, has invariably confounded them, and attributed to the day of dedication what is true only concerning the faint's day. But they were fully distinguished at first among the Saxons; as appears from the laws of the Confessor, where the *Dies Dedicatio* or *Dedicatio* is repeatedly discriminated from the *Propria Festivitas Sancti*, or *Celebratio Sancti*. And they remained equally distinct to the Reformation: the dedication-day in 1536 being ordered for the future to be kept on the first Sunday in October, and the festival of the patron-saint to be celebrated no longer.

"But the former could never have been observed by the people with the same regard as the latter. That was merely a feast commemorative of the church's commencement; and this was one previously kept by the nation in general, and the day of their own faint in particular. This therefore, in a high strain of pre-eminence over the other, was actually denominated the *church's holiday*, or its peculiar festival. And while this remains in many parishes at present, the other is so utterly annihilated in all, that the learned and sensible antiquary whom I have mentioned before, actually knew nothing of its distinct existence, and absolutely confounded it with this.

"Thus instituted at first, the day of the tutelar faint was observed, most probably by the Britons, and certainly by the Saxons, with great devotion. And the evening before every faint's day, in the Saxon-Jewish method of reckoning the hours, being an actual part of the day, and therefore like that resigned to the duties of public religion, as they reckoned Sunday from the first to commence at the sunset of Saturday; the evening preceding the church's holiday would be observed with all the devotion of the festival. The people actually repaired to the church, and joined in the services of it. And they thus spent the evening of their greater festivities in the monasteries of the north, as early as the conclusion of the 7th century. In that of Rippon, and on the anniversary of Wilfrid particularly, we see the bishops, abbots, and numerous trains of attendants, all convened at the monastery in order to celebrate the day, and all assembled the evening before it at the prayers of the church. And these services were naturally denominated from their late hours *peccan*, or "wakes," and *vigils*, or "eves." That of the anniversary at Rippon, as early as the commencement of the 8th century, is expressly denominated the *vigil*. But that of the church's holiday was named the *peccan*, or "church-wake," the *church-vigil*, or "church-eve." And it was this commencement of both with a wake which has now caused the days to be generally preceded with vigils, and the church-holiday particularly to be denominated the *church-wake*. So religiously was the eve and festival of the patron-saint observed for many ages by the Saxons; even as late as the reign of Edgar, the former being spent in the church and employed in prayer. And the wake, and all the other holidays in the year, were put upon the same footing with the octaves of Christmas, of Easter, and of Pentecost; and any persons repairing to the celebration of the day were, as all ordinarily resorting to the church were, under the immediate protection of the king, and consequently free from arrests in their way to and return from it.

I

Wake.

"When Gregory recommended the festival of the patron-saint, he also recommended something more adapted to gain a general reception than religious acts and exercises. He advised, that the people should be encouraged on the day of the festival to erect booths of branches about the church, and to feast and be merry in them with innocence. And as the authority of Gregory would certainly cause the encouragement to be given, so the smallest would be effectual. Nor would such churches only as had previously been heathen temples, but all immediately have the day of their guardian saint observed with this open festivity. As the people had been all idolaters, the reason would be equally forcible for one parish as another. And the strong tendency of the common people to every sensitive enjoyment would make the practice universal. In every parish, on the returning anniversary of the faint, little pavilions were constructed of boughs; and the immediate neighbourhood of St Michael's, and the church-yard of St Mary's, resounded with the voice of hospitality and the notes of merriment.

"But few persons are ever to be intrusted to feast; and fewer are to be allowed to meet in numbers together. There is a contagious viciousness in crowds. Though each individual among them, alone by himself, would act with a religious propriety; yet all together they act with irreligion and folly. The fire imperceptibly runs from breast to breast; each contributes to swell the tide of spirits beyond its proper bounds, and wickedness and absurdity enter at the breach that is made in reason. And this viciousness is always augmented in its force, when the grosser spirits, that are merely the result of feasting, mingle and ferment the tide. The feasting of the faint's day was soon abused. And it seems to have been greatly so before the reign of Edgar, as the intemperance of the festival was then creeping even into the vigil, and even mixing with the offices of religion. In the very body of the church, when the people were assembled for devotion, they were beginning to mind diversions and introduce drinking. And so gross an abuse of the eve could have arisen only from the licentiousness of the festival. The growing intemperance would gradually stain the service of the vigil, till the festivity of it was converted, as it now is, into the rigour of a fast. These disorders would be less obnoxious on the day itself, because they did not intrude within the church and profane the prayers. But they were certainly greater, and went on increasing in viciousness and folly, till they too justly scandalized the puritans of the last century; and numbers of the wakes were diffused entirely. Our own has been long discontinued. It was abolished in 1536 by the laws of Henry VIII. which appears to have had little or no influence on the general practice. It was put down by a particular and local order in 1579, and forgotten in the long and rigid reign of puritanism that was then commencing at Manchester. And Henry earl of Derby, Henry earl of Huntingdon, William lord bishop of Chelms, and others of the high commission under queen Elizabeth, assembled at Manchester in 1579; issued orders against pipers and minstrels playing, making and frequenting ales, bear-baitings and bull-baitings on the Sunday, or any other day of the week in time of divine service or sermons; and prohibited for the future all superfluous and superstitious

Wake.

tious ringing, common feasts, and wakes. But the wake of the neighbouring parish of Eccles is celebrated among us to the present day; and a considerable number of people resort to it annually from our own and the adjoining parishes.

"This custom of celebrity in the neighbourhood of the church on the days of particular saints, was introduced into England from the continent, and must have been familiar equally to the Britons and Saxons; being observed among the churches of Asia in the 6th century, and by those of west Europe in the 7th. And equally in Asia and Europe, equally on the continent and in the island, these celebrities were the causes of those commercial marts which we denominate *fairs*. See FAIRS. The people resorted in crowds to the festival, and a considerable provision would be wanted for their entertainment. The prospect of interest invited the little traders of the country to come and offer their wares, and the convenience of the accommodation promoted a vigorous sale among the people. And other traders were induced by the experience of these, to bring in different articles, and hope for an equal sale. Thus among the many pavilions for hospitality in the neighbourhood of the church, various booths were erected for the sale of commodities. In large towns surrounded with populous districts, the resort of the people to the wake would be great, and the attendance of traders at the celebrity numerous. And this resort and this attendance constitute a fair. Basil expressly mentions the numerous appearance of traders at these festivals in Asia; and Gregory notes the same custom to be common in Europe. And as the festival was observed on a feria or holiday, it naturally assumed to itself, and as naturally communicated to the mart, the appellation of *feria* or *fair*; the same among the Saxons, the French, the Germans, and the Britons, *seger*, *foire*, *fyers*, and *faires*: the word was derived from the same source in all these nations, the one ecclesiastical language of West Europe at this period. And several of our most ancient fairs appear to have been actually held, and have been actually continued to our time, on the original church-holidays of the places; as that on the festival of St Peter, at St Peter's church in Westminster; another on the feast of St Cuthbert, at St Cuthbert's in Durham; and a third on the holiday of St Bartholomew, at St Bartholomew's in London."

WAKE (William), archbishop of Canterbury, was born in 1657, and educated at Oxford. When he entered into holy orders, he was appointed preacher to the society of Gray's Inn; and in the reign of James II. attended lord Preston, ambassador to France, as his chaplain. Upon his return to England, he distinguished himself by several tracts against Popery; particularly against the bishop of Meaux's Exposition of the Doctrine of the Catholic Church. After the revolution, he was appointed deputy-clerk of the closet, and chaplain in ordinary to king William and queen Mary, and the year following was made canon of Christchurch. In 1694 he was collated to the rectory of St James's, Westminster; and in 1701 was installed dean of Exeter. In 1705 he was consecrated to the see of Lincoln, and in 1715-16, translated to the archbishopric of Canterbury. He died at Lambeth in 1737. Beside sermons, he published several pieces, particularly

an English version of the Genuine Epistles of the Apostolical Fathers, &c.

WALACHIA, a province of Turkey in Europe, bounded by the Irongate mountains, which separate it from Transylvania on the north-west, by Moldavia on the north-east, by the Danube, which separates it from the province of Servia, on the south-west. It is 225 miles in length, and 125 in breadth where it is broadest. In the last war between the Turks and Germans, the latter having lost the fatal battle of Crozka, were obliged to give up this district to the Turks, by the treaty of Belgrade concluded in 1739. The air is good, and the soil fruitful; producing corn, wine, oil, pastures, and all manner of European fruit; and has abundance of oxen and sheep, and an excellent breed of horses. The inhabitants are indulged with the free exercise of their religion, which is of the Greek church; and this circumstance renders them the more contented with their masters; because if the Roman Catholics had the ascendant, they would be sure of undergoing persecution.

WALCHEREN, an island of the Low Countries, and one of the principal of those of Zealand; being separated from the islands of North and South Beveland by a narrow channel, and from Dutch Flanders by the mouth of the Scheld. It is about nine miles in length, and eight in breadth; and though it lies low, has good arable and pasture land. The chief town of this island and the whole province is Middelburg.

WALDEN, a town of Essex, commonly called *Saffron Walden*, with a market on Saturdays, and two fairs on Mid-lent Saturday for horses, and November 1st for cows. It is remarkable for the plenty of saffron that grows about it, from which the owners derive great profit. This town was incorporated by Edward VI. and is governed by a mayor and 24 aldermen. It is 27 miles north-west-by-north of Chelmsford, and 43 north-east of London. E. Long. o. 15. N. Lat. 52. 5.

WALDO, a merchant of Lyons in the latter part of the 12th century, who applying himself to the study of the Scriptures, and finding no warrant there for several of the Romish doctrines, particularly that of transubstantiation, publicly opposed them. His followers, who from him were called *Waldenses*, being chased from Lyons, spread over Dauphine and Provence; upon which Philip II. is said to have razed 300 gentlemen's seats, and destroyed several walled towns, to stop their growth: but this, instead of suppressing, spread them over a great part of Europe. The articles of their faith, which they drew up and dedicated to the king of France, agreed in most points with those of the present Protestants. In the year 1200, those of them in the province of Albigeois in Languedoc, from whence they were called *Albigenses*, stood upon their defence; upon which Philip drove them into Bohemia, Savoy, and England. The crusade against them is said to have consisted of 500,000 men, who wore their crosses on their breasts, to distinguish themselves from those who went to the Holy Land, and wore them on their shoulders.

WALES, a county situated in the south-west part of Britain, into which the ancient Britons retired from the persecution of the Saxons. Anciently it was of greater extent than it is at present, and comprehended

Walachia
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Wales.

all the country beyond the Severn, that is, besides the twelve counties included in it at present, those of Herefordshire and Monmouthshire, which now are reckoned a part of England, were then inhabited by three different tribes of the Britons, namely, the Silures, the Demetæ, and the Ordovices. The Romans were never able to subdue them, till the reign of Vespasian, when they were reduced by Julius Frontinus, who placed garrisons in their country to keep them in awe. Though the Saxons made themselves masters of all England, they never could get possession of Wales, except the counties of Monmouthshire and Herefordshire, formerly a part of Wales. About the year 870, Roderic king of Wales divided it among his three sons; and the names of these divisions were, *Demetia*, or *South-Wales*; *Preafia*, or *Powis-Land*; and *Venedotia*, or *North-Wales*. Another division is mentioned afterwards in the records, viz. North Wales, South Wales, and West Wales; the last comprehending the counties of Monmouth and Hereford. The country derived the name of *Wales*, and the inhabitants that of *Welsh*, from the Saxons, who by those terms denote a country and people to which they are strangers; for the Welsh, in their own language, call their country *Cymry*, and their language *Cymraeg*. They continued under their own princes and laws from the above-mentioned period, and were never entirely subjected to the crown of England till the reign of Edward I. when Llewellyn ap Gryffith, prince of Wales, lost both his life and dominions. Edward, the better to secure his conquest, and to reconcile the Welsh to a foreign yoke, sent his queen to lie-in at Caernarvon, where she was delivered of a prince; to whom the Welsh, on that account, the more readily submitted. Ever since that time the eldest sons of the kings of England have commonly been created princes of Wales, and as such enjoy certain revenues from that country. But though Wales, from that time, was subject to the crown of England, yet it was not united and incorporated with it till the 27th of Henry VIII. when, by act of parliament, the government of it was modelled according to the English form; all laws, customs, and tenures contrary to those of England being abrogated, and the inhabitants admitted to a participation of all the English liberties and privileges, particularly that of sending members to parliament, viz. a knight for every shire, and a burgess for every three-town, except Merioneth. By other acts made afterwards, the country was divided into four circuits, and two justices were appointed for each, containing three counties; but at present there are only two circuits and four judges, two for each. In fine, the government here, both civil and ecclesiastical, is now the same as that of England.

As to the character of the Welsh, they are said to be a brave, hospitable people; and though very jealous of affronts, passionate, and haughty, yet are easily reconciled. The common people look with a suspicious eye on strangers, and bear an hereditary grudge to the English nation, by whom their ancestors were expelled from the finest parts of the island. The gentlemen are apt to value themselves upon the antiquity of their families; and with some reason, as they can generally trace them much higher than the inhabitants of most other countries.

All the better sort, both in town and country, can speak English, especially in the counties bordering upon England. The common people, in general, only speak their own language, which is the ancient British; and not only differs entirely from the English, but has very little affinity with any of the western tongues, unless we should except the Galic, Erie, or Irish. It is said to be a dialect of the ancient Celtic or Gomerian, and in many respects to resemble the Hebrew. Most of the clergy are natives of the country, and understand English so well, that they could exercise their functions in any part of Britain. The public worship, however, is as often performed in the Welsh as in English, excepting in the towns, where the latter is the prevailing language; nay, there, even most of the meaner sort understand it. The inhabitants, who are computed at about 300,000, are not, in general, wealthy, though the land-tax of Wales brings in 437,521.

The country, though mountainous, especially in North Wales, is far from being barren or unfruitful; the hills, besides the metals and minerals they contain, feeding vast herds of small black cattle, deer, sheep, and goats, and their valleys abounding in corn, as their seas and rivers do in fish. Here are also wood, coal, and turf for fuel, in abundance.

Wales is bounded on all sides by the sea and the Severn; except on the east, where it joins to the counties of Chester, Salop, Hereford, and Monmouth. Its length, from the southernmost part of Glamorganshire to the extremity of Flintshire north, is computed at about 113 miles; and its greatest breadth, from the river Wye east to St David's in Pembrokeshire west, is nearly of the same dimensions, being about 90 miles.

After the conquest of Wales by Edward I. very material alterations were made in divers parts of their laws, so as to reduce them nearer to the English standard, especially in the forms of their judicial proceedings: but they still retained very much of their original polity, particularly their rule of inheritance, viz. that their lands were divided equally among all the issue male, and did not descend to the eldest son alone. By other subsequent statutes their provincial immunities were still farther abridged: but the finishing stroke to their dependency was given by the statute 27 Hen. VIII. c. 26. which at the same time gave the utmost advancement to their civil prosperity, by admitting them to a thorough communication of laws with the subjects of England. Thus were this brave people gradually conquered into the enjoyment of true liberty; being insensibly put upon the same footing, and made fellow-citizens with, their conquerors.

It is enacted by this statute, 27 Hen. VIII. 1. That the dominion of Wales shall be for ever united to the kingdom of England. 2. That all Welshmen born shall have the same liberties as other king's subjects. 3. That lands in Wales shall be inheritable according to the English tenures and rules of descent. 4. That the laws of England, and no other, shall be used in Wales: besides many other regulations of the police of this principality. And the statute 34 & 35 Hen. VIII. c. 26. confirms the same, adds farther regulations, divides it into twelve shires, and, in short, reduces it into the same order in which it stands at this day; differing from the kingdom of England in only a few particulars, and those too of the nature of pri-

Wales
Wall.

privileges, (such as having courts within itself, independent of the procefs of Weftminster-hall), and fome other immaterial peculiarities, hardly more than are to be found in many counties of England itfelf.

When the polity of Wales was fettled in the reign of Hen. VIII. private courts of a limited, though extenfive, jurifdiction were erected all over the country; principally by the ftatute 34. & 35 Hen. VIII. c. 26. though much had before been done, and the way prepared by the ftatute of Wales, 12 Edw. I. and other ftatutes. By the ftatute of Henry the Eighth before-mentioned, courts-baron, hundred, and county courts, are there eftablifhed as in England. A feffion is alfo to be held twice in every year in each county, by judges appointed by the king, to be called the *great feffions of the feveral counties in Wales*: in which all pleas of real and perfonal actions fhall be held, with the fame form of procefs and in as ample a manner as in the court of common pleas at Weftminster: and writs of error fhall lie from judgments therein (it being a court of record) to the court of king's bench at Weftminster. But the ordinary original writs or procefs of the king's court at Weftminster do not run into the principality of Wales; though procefs of execution does: as do alfo all prerogative writs, as writs of *certiorari*, *quo minus*, *mandamus*, and the like. And even in caufes between fubject and fubject, to prevent injuftice through family-factions and prejudices, it is held lawful (in caufes of freehold at leaft, if not in all others) to bring an action in the Englifh courts, and try the fame in the next Englifh county adjoining to that part of Wales where the caufe arifes. But, on the other hand, to prevent trifling and frivolous fuits, it is enacted by ftatute 13 Geo. III. c. 51. that in perfonal actions, tried in any Englifh county where the caufe of action arofe, and the defendant refides in Wales, if the plaintiff fhall not recover a verdict for ten pounds, he fhall be nonfuit and pay the defendant's cofts, unlefs it be certified by the judge that the freehold or title came principally in queftion, or that the caufe was proper to be tried in fuch Englifh county. And if any tranfitory action, the caufe whereof arofe and the defendant is refident in Wales, fhall be brought in any Englifh county, and the plaintiff fhall not recover a verdict for ten pounds, the plaintiff fhall be nonfuit, and fhall pay the defendant's cofts, deducting thereout the fum recovered by the verdict.

New WALES. See *NEW BRITAIN*.

Prince of WALES. See *ROYAL FAMILY*.

WALKING. Celfus fays that walking, reading moderately loud, fencing, and playing with the ball, all ftrengthen a weak ftomach. Walking, he fays, is beft if it is up and down hill, except in cafes of great weaknefs; becaufe afcending and defcending exercifes the whole body more than the plain does. If the vifcera are weak, riding is to be preferred to walking. Walking preferves, and riding recovers health the beft.

WALKING Leaf. See *MANTIS SPECIOSA*.

WALL, in architecture, the principal part of a building, as ferving both to inclofe it, and to fupport the roof, floors, &c.—Walls are diftinguifhed into various kinds, from the matter whereof they confift; as plattered or mud-walls, brick-walls, ftone-walls, flint or boulder-walls, and boarded-walls. See *ARCHITECTURE*.

WALLACE (Sir William) a gallant general of the Scots, who endeavoured to refcue his country from the Englifh yoke; but being taken prifoner, he was unjuftly tried by the Englifh laws, condemned, and executed as a traitor to Edward I. in 1304. See *SCOTLAND*, n° 1033. *et feq.*

WALLACHIA. See *WALACHIA*.

WALLER (Edmund), a celebrated Englifh poet, was the fon of Robert Waller, Efq; of Agmondefham in Buckinghamfhire, by Anne, the fiftler of the great Hamden, who diftinguifhed himfelf fo much in the beginning of the civil wars. He was born in 1605; and his father dying when he was very young, the care of his education fell to his mother, who fent him to Eton fchool. He was afterwards fent to King's college in Cambridge, where he muft have been very affluous in his ftudies, fince, at fixteen or feventeen years of age, he was chofen into the laft parliament of King James I. and ferved as burgefs for Agmondefham. He began to exercife his poetical talent fo early as the year 1623; as appears from his verfes "upon the danger his majesty (being prince) efcafed in the road of St Andero;" for there Prince Charles, returning from Spain that year, had like to have been caft away. It was not, however, Mr Waller's wit, his fine parts, or his poetry, that fo much occafioned him to be firft publicly known, as his carrying off the daughter and fole heirs of a rich citizen, againft a rival whole intereft was efpoufed by the court. It is not known at what time he married his firft lady; but he was a widower, before he was 25, when he began to have a paffion for Sachariffa, which was a fictitious name for the lady Dorothy Sidney, daughter to the earl of Leicefter, and afterwards wife to the earl of Sunderland. He was now known at court, careffed by all who had any relifh for wit and polite literature; and was one of the famous club of which the Lord Falkland, Mr Chillingworth, and other eminent men, were members. He was returned burgefs for Agmondefham in the parliament which met in April 1640. An intermiffion of parliaments having difgufted the nation, and raifed jealousies againft the defigns of the court, which would be fure to difcover themfelves whenever the king came to afk for a fupply, Mr Waller was one of the firft who condemned the preceding meafures. He fhewed himfelf in oppofition to the court, and made a fpeech in the houfe on this occafion; from which we may gather fome notion of his general principles in government; wherein, however, he afterwards proved very variable and inconfiftant. He oppofed the court alfo in the long parliament which met in November following, and was chofen to impeach Judge Crawley, which he did in a warm and eloquent fpeech, July the 16th, 1641. This fpeech was fo highly applauded, that 20,000 of them were fold in one day. In 1642, he was one of the commiffioners appointed by the parliament to prevent their propofitions of peace to the king at Oxford. In 1643, he was deeply engaged in a defign to reduce the city of London and the tower to the fervice of the king; for which he was tried and condemned, together with Mr Tomkins his brother-in-law, and Mr Chalfoner. The two latter fuffered death; but Mr Waller obtained a reprieve: he was, however, fentenced to fuffer a year's imprifonment,

Wallace
Waller.

ment, and to pay a fine of 10,000*l*. After this, he became particularly attached to Oliver Cromwell, upon whom he wrote a very handsome panegyric. He also wrote a noble poem on the death of that great man.

At the Restoration, he was treated with great civility by Charles II. who always made him one of the party in his diversions at the duke of Buckingham's and other places. He wrote a panegyric upon his majesty's return; which being thought to fall much short of that he had before written on Oliver Cromwell, the king one day asked him raiillery, "How is it, Waller, that you wrote a better encomium on Cromwell than on me?" "May it please your majesty," answered he, "we poets generally succeed best in fiction." He sat in several parliaments after the Restoration, and continued in the full vigour of his genius to the end of his life, his natural vivacity bearing him up, and making his company agreeable to the last. He died of a dropy in 1687, and was interred in the church-yard of Beaconsfield, where a monument is erected to his memory. Mr Waller has been honoured as the most elegant and harmonious versifier of his time, and a great refiner of the English language. The best edition of his works, containing poems, speeches, letters, &c. is that published in quarto by Mr Fenton, in 1730.

WALLIS (Dr John), a celebrated mathematician, was educated at Cambridge; where he became fellow of Queen's college, and continued so till, by his marriage, he vacated his fellowship. In 1640, he received holy orders, and became chaplain to the lady Vere. While he lived in this family, he cultivated the art of deciphering; and it is said, that the elector of Brandenburg, for whom he explained several letters written in ciphers, sent him a gold chain and medal. In 1643 he published, "Truth tried; or, Animadversions on the lord Brooke's treatise called *The nature of Truth*, &c. The next year, he was chosen one of the scribes or secretaries to the assembly of divines at Westminster. Dr Peter Turner, Savilian professor of geometry in Oxford, being ejected by the parliament-visitors in 1649, Mr Wallis was appointed to succeed him in that place. In 1653 he published at Oxford a Grammar of the English Tongue in Latin. In 1655 he entered the lists with Mr Hobbes; and their controversy lasted a considerable time. In 1657 the Doctor published his *Mathematical Works*. Upon the death of Dr Langbaine, he was chosen custos archivorum of the university. After the Restoration he met with great respect, the king himself entertaining a favourable opinion of him on account of some services he had done both to his royal father and himself. He was therefore confirmed in his places, admitted one of the king's chaplains in ordinary, and appointed one of the divines empowered to review the book of common prayer. He complied with the terms of the act of uniformity, and continued a steady conformist till his death. He was one of the first members of the royal society, and corresponded with many learned men. In 1697, the curators of the university press at Oxford thought it for the honour of the university to collect the mathematical works of the Doctor, which had been printed separately, some in Latin, some in English, and published them all together in

the Latin tongue, in 3 vols. folio. He died in 1703. He speaks of himself thus: "It hath been my endeavour all along to act by moderate principles, being willing, whatever side was uppermost, to promote any good design, for the true interest of religion, of learning, and of the public good." Besides the works above-mentioned, he published many others.

WALLOONS, a name for the inhabitants of a considerable part of the Netherlands, viz. Artois, Hainault, Namur, Luxembourg, and part of Flanders and Brabant.

WALSH (William), an English critic and poet, the son of Joseph Walsh, Esq; of Abberley in Worcestershire, was born about the year 1660. He became a gentleman-commoner of Wadham college, Oxford, but left the university without taking a degree. His writings are printed among the works of the Minor Poets, printed in 1749. He was made gentleman of the horse in queen Anne's reign; and died in 1708. He was the friend of Mr Dryden and of Mr Pope; the former of whom esteemed him the best critic then living; and Mr Pope has celebrated his character in the *Essay on Criticism*.

WALNUT-TREE, in botany. See JUGLANS.

WALRUS, in zoology. See TRICHECHUS.

WALSINGHAM, a town of Norfolk, with a market on Fridays, and a fair on Whit-Monday, for horses and pedlar's ware. It is seated not far from the sea; and in former times was famous for its college of canons, and was greatly frequented by pilgrims who went to pay their devotions to the image of the Virgin Mary at the chapel, where there are two fine springs, called the *Virgin Mary's wells*. Not many years ago there were found here 100 urns full of ashes, by a husbandman, which was supposed to be those which the Romans filled with the ashes of the dead. It is 22 miles north-west of Norwich, and 117 north-north-east of London. E. Long. 1. o. N. Lat. 52. 56.

WALSINGHAM (Thomas), an English Benedictine monk of the monastery of St Alban's, about the year 1440. He applied himself to the history and antiquity of his country, in quality of historiographer to the king; and composed the History of King Hen. VI. with other works.

WALSINGHAM (Sir Francis), minister and secretary of state under the reign of queen Elizabeth, and one of the greatest politicians of his time, was descended from a noble and ancient family at Chislehurst. After having made great progress in his studies at Cambridge, he was twice sent ambassador to France, and at his return to England was employed in the most important affairs; became secretary of state, and was one of the commissioners for the trial of Mary queen of Scotland. Sir Francis undoubtedly one of the most refined politicians, and most penetrating statesmen that any age ever produced. He had an admirable talent, both in discovering and managing the secret recesses of the heart. He had his spies in most courts in Christendom, and allowed them a liberal maintenance; for it was his maxim, That knowledge cannot be bought too dear. In 1587 the king of Spain having made vast preparations, which surprised, and kept all Europe in suspense, Walsingham employed his utmost endeavours for the discovery of that important secret; and accordingly procured intelligence from Madrid, that the king

had

Walling-
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had informed his council of his having dispatched an express to Rome, with a letter written with his own hand to the pope, acquainting him with the true design of his preparations, and begging his blessings upon him; which for some reasons he could not disclose till the return of the courier. The secret being thus lodged with the pope, Wallingham, by means of a Venetian priest, whom he retained at Rome as a spy, got a copy of the original letter, which was stolen out of the pope's cabinet by a gentleman of the bed-chamber, who took the key out of the pope's pocket while he slept. After this, by his dexterous management, he caused the Spaniards bills to be protested at Genoa, which should have supplied them with money for their extraordinary preparations; and by this means he happily retarded this formidable invasion for a whole year. In short, he spent his whole time and faculties in the service of queen Elizabeth; on which account her majesty was heard to say, "That in diligence and sagacity he exceeded her expectations." However, after all his eminent services to his country, this great man gave a remarkable proof at his death, which happened on the 6th of April 1590, how far he preferred the public interest to his own, he being so poor, that excepting his library, which was a very fine one, he had scarcely effects enough to defray the expence of his funeral. His principal works are, 1. *Memoirs and Instructions for the use of Ambassadors*, with his *Letters and Negotiations*. 2. *Political Memoirs*.

WALTON (Bryan), bishop of Chester, a learned English divine, who gained great reputation by his edition of the Polyglot bible, with his *Prolegomena* in the beginning; which is more exact, says father Simon, than any other which had been published on that subject. He died in 1661.

WAMPUM, the money used by the North-American Indians. It is much used in all their treaties as a symbol of friendship. It is made of a shell of a particular species of VENUS.

WAPENTAKE, is all one with what we call a *hundred*; specially used in the north countries beyond the river Trent. The word seems to be of Danish original, and to be so called for this reason: When first this kingdom, or part thereof, was divided into wapentakes, he who was the chief of the wapentake or hundred, and whom we now call a *high constable*, as soon as he entered upon his office, appeared in a field on a certain day on horseback with a pike in his hand, and all the chief men of the hundred met him there with their lances, and touched his pike; which was a sign that they were firmly united to each other by the touching their weapons. But Sir Thomas Smith says, that anciently musters were made of the armour and weapons of the several inhabitants of every wapentake; and from those that could not find sufficient pledges for their good bearing, their weapons were taken away and given to others; from whence he derives the word.

Walton
Wapentake

W A R.

WAR is a great evil; but it is inevitable, and oftentimes necessary. If he who first reduced to rules the art of all the sciences: his fellow-creatures, had no end in view but to gratify the passions of princes, he was a monster, whom it would have been happy to have smothered at his birth: but if his intention was the defence of persecuted virtue, or the punishment of successful wickedness, to curb ambition, or to oppose the unjust claims of superior power, mankind ought to erect altars to his memory.

War, in the last case, is the most necessary and useful of all the sciences: the various kinds of knowledge which ought to furnish the mind of a soldier are not without great difficulty to be attained. Of most other sciences the principles are fixed, or at least they may be ascertained by the assistance of experience; there needs nothing but diligence to learn them, or a particular turn of mind to practise them. Philosophy, mathematics, architecture, and many others, are all founded upon invariable combinations. Every man, even of a narrow understanding, may remember rules, apply them properly, and sometimes draw just consequences from them: but the study of war is of another kind. Experience can so seldom be referred to rules, that nothing but a mind enlightened by diligent study can make a due application of rules to circumstances.

Most artists may join practice to theory, and make one perfect by the help of the other. The warrior has not always the like assistance: he spends part of his life in forming plans, of which humanity does not suffer him to wish the execution; and when he has an opportunity of judging from experience of the solidity

of his principles, the operations are so rapid, the motions so diversified, the actions so confused, that he has scarcely time for a glimpse of those things which require the most calm and close consideration.

In learning of every kind, theory is the completion; in the study of the military science, it is only the introduction. Many a man, depending on his rules, has found that the marches, the camps, the dispositions, the manœuvres, performed with exact and strict order in the closet, have not only been very difficult, but even impracticable in the field. A disposition good in a mountainous country, would be bad in an open one; a disposition proper for one open country may fail in another, for want of foreseeing that a manœuvre, which in one case may have been the cause of winning a battle, may in another occasion its loss: the circumstances of time and place almost always throw the best constructed systems out of order. It is therefore only by dint of study, and by the contemplation of cases incessantly varied, that the want of practice can be supplied, or action at least made less difficult.

A military man who would be master of his profession, has no hours to lose; in peace, he ought to study with the greatest diligence; in time of war, he will see his principles open themselves of their own accord: his ideas are then more distinct; he acts with clearness and certainty in all cases he has foreseen, and applies his rules to all those which now occur for the first time, and which till then had escaped his thoughts. Who does not know that bravery, courage, and comprehension, are useless, and often fatal, to a military man who wants knowledge of his business? Having no previous
helps

helps from study, it often happens that the braver he is, the more he is liable to mistakes, and the less able to foresee or avoid them.

The science of war branches out into so many particulars; it takes in so many different parts; there are so many reflections necessary to be made, so many circumstances and cases to be brought together; that it is only by a continual application, grounded upon the love of his duty, and an inclination to his profession, that any man can attain it.

To march an army in every sort of country, whether open, woody, or mountainous; to know how to form a camp in all those countries, with which the general must be thoroughly acquainted in order to do it with security; to make a proper disposition for a battle, whether with a view to the posture of the enemy, or to the situation of the country; to foresee events which depend in a manner upon chance; to be capable of making a good retreat on proper occasions; to direct the forages without fatiguing or exposing the troops; to send out detachments with precaution; to conduct the convoys in safety; to know how to canton an army; to establish magazines in places, both safe and within reach of the army, so that it shall never be in want of subsistence; these are the great ends of the military science. The Alexanders of Parma, the Spinolas, the Gustavuses, the Weimars, the Condés, the Turennes, the Montécucullis, the Vendomes, the Marlboroughs, the Eugenes, and all the great men who have gone before us, would never have been the subject of our admiration, if they have neglected this study in any of its branches. It is by courage, genius, and capacity; by having an head always cool, and an eye at once quick and exact; by a nice knowledge of the country, by skill in the choice of officers, and by strict discipline kept up in his army, that a general is enabled to take such just measures as will frustrate the designs of the enemy.

It is commonly thought sufficient for a military man to know how to obey; and it is also supposed that the success of a day cannot be dubious, if a general joins the confidence of the soldiers to all the foregoing qualities.

It is true, that, in cases of perplexity, many generals have in a great measure owed to their own capacity, and the confidence their soldiers have reposed in them, the advantages they have gained over the enemy; but is the officer who loves his duty, and who would make himself master of it, under the less obligation to know what qualifications his station requires? That he ought to have such or such a quality, in such or such a circumstance? that here only bravery is necessary, there only courage? and that he is not always obliged to have both at the same time?

These two virtues, which are often confounded in the same subject, merit a particular distinction; they are not so closely united, but they are often to be found one without the other. Courage seems fittest for a general, and all those who command; bravery more necessary for a soldier, and all who receive orders; bravery is in the blood, courage in the soul; the first is a kind of instinct, the second a virtue; the one is an impulse almost mechanical, the other a noble and sublime conception. A man is brave at a particular time, and according to circumstances; he has courage at all

times, and upon all occasions: bravery is so much the more impetuous as it is less the result of reflection; courage, the more it is the effect of reason, becomes more intrepid. Bravery is inspired by the force of example, infensibility of danger, and the fury of action; courage is infused by the love of our duty, the desire of glory, and zeal for our king and country: courage depends on reason, but bravery on the constitution. Achilles, such as Horace describes him from Homer, implacable, cruel, despising every other right but that of force, presents nothing to the idea but the hardness of a gladiator. But the Roman general, whose death would have produced the ruin of the army, the great Scipio, when covered by the bucklers of three soldiers, to avoid a shower of arrows which the enemy directed against him, approaches in safety the walls he besieged, and standing only a spectator of the action, and contenting himself with giving them orders, exhibits the idea of true courage. Bravery is involuntary, and depends not at all upon ourselves; whereas courage (as Seneca observes) may be taught and acquired by education; but yet nature must sow the first seeds of it. It would be easy to make the difference of these qualities better understood, by running over all the cases in which they make their appearance, were it not for the fear of going too far in so copious a subject. It is said of a magistrate who exposed his life and fortune in defence of the laws, that he has virtue. Cicero, sheltering himself from the hatred of Cataline, undoubtedly wanted bravery, but certainly he had an elevated firmness of mind (which is in reality courage) when he disclosed the conspiracy of that traitor to the senate, and pointed out all his accomplices; or when he pleaded for Deiotarus against Cæsar, his friend and his judge.

Coolness is the effect of courage, which knows its danger, but makes no other use of that knowledge than to give directions with greater certainty: courage is always master of itself, provided against all accidents, and regulated by the present occasions; never confounded by any danger so as to lose sight of the motions of the enemy, or of the means by which he may be most effectually opposed. At the battle of Cannæ, when Gisco seemed to be much astonished at the superiority of the enemy's number, Hannibal answered him coolly, "There is, Gisco, a thing still more surprising, of which you take no notice." Gisco asking him what it was, "It is (replied Hannibal) that in all that great crowd there is not one man whose name is *Gisco*." Plutarch observes, that this coolness of Hannibal greatly animated the Carthaginians, who could not imagine that their general would joke at so important a time, without being certain of overcoming his enemies.

Although bravery and courage are the most essential qualifications of a subordinate officer, yet he should not be deficient in those which are required in a general, and which have been already mentioned; obedience to the orders delivered to him is no longer a virtue than whilst he comprehends and knows the intention of them. War, says a celebrated author, is a business which, like all others, must be learned; it supposes some qualities to be born with us, and demands others which are to be acquired: but since all these qualities must have the original source in genius, a man who proposes war for his profession, should never en-

gaze in it without having consulted his natural bent, or without knowing the particular turn and power of his mind. Ability, whether in a general or an officer, is the effect of his genius, quickened by a natural liking to his business.

But some are by their birth engaged in the profession of arms before time has permitted them to consult their genius and their powers; are these men to quit it if they perceive that they are not endowed with every talent that profession requires? Undoubtedly no; because they may acquire them. Study and application will supply the defect of genius; docility may serve instead of talents, the love of glory be equivalent to a liking for their business, and the virtues of their fathers should always be present to their thoughts. When a man has no ancestors to imitate, he is, as may be said, at liberty to raise a reputation of more or less lustre: by being descended from celebrated ancestors, he is obliged to follow their example, and may often improve upon their virtues. Claudius reproached Cicero with being the first of his race. But you, answered Cicero, are the last of yours. An illustrious descent is oftentimes a burden; if it adds splendour to the man of virtue, it always disgraces him who knows not how to support it.

A quick eye is natural in some, and in them it is the effect of genius; others acquire it by study or experience; he who knows how to command himself, and has courage enough to keep himself cool on the most urgent occasions, has the readiest and quickest eye. A quick hot-headed man, however brave, sees nothing; or if he does, it is confusedly, and generally too late.

It is this quick eye which enables him to judge of an advantageous post, of a manoeuvre to be made, and of a good disposition for the troops, whether with respect to that of the enemy, or to the situation and nature of the country.

There is a quickness of eye which depends upon the enemy, and another independent of him: it depends upon the enemy when he has made such a disposition, that to attack him, another must be made upon the spot which renders his defective and weak in some parts; or when, being advantageously posted, the general obliges him to change his position, by making him fearful of being taken in flank, or being surrounded; or when it is so contrived as to render the troops on the right useless by attacking the left, without their being able to assist it.

It is independent of the enemy, when a commander being at a distance, knows how to take an advantageous position, and how to choose a camp strong by situation; when he sees at once what distances there are upon the right and left of the troops that may prevent their being either molested or surrounded, and observes the posts necessary to be occupied for their safety; when he marches with a detachment, and diligently surveys the ground by which he may retreat if he should be attacked and repulsed by superior forces, taking care that he may not be surrounded, and that the enemy may not be able to oppose to him a front more extensive than his own.

The quick eye is no other than that penetrating genius which let nothing escape it. A general who knows how to unite this quality with perpetual coolness, never is in want of expedients; he will see how

those events, which to any other would be the preface of his own defeat, may end in the overthrow of his enemies.

The army of Cyrus, in the presence of that of Cræsus at Timprea, took a clap of thunder for a bad omen: this impression escaped not the quick eye of Cyrus; but the coolness which on this occasion he knew how to preserve, suggested to him an interpretation which removed his soldiers fears. "My friends," cried he, "heaven declares for us; come on, I hear the sound of victory: Great Jupiter, we follow thee."

The choice of the general officers depends upon this genius, which discovers every thing; they ought to be the right-hand of the general, and as capable of commanding the army as himself.

Whatever good dispositions a general may make, they must prove ineffectual if not seconded by the general officers under his command; he cannot be every where, neither can he foresee all exigencies that may arise. He is obliged to give only general orders; it is therefore the business of those who command under him to know how to take the advantage of a wrong movement of the enemy; to take upon them to attack, or sustain the troops which are engaged; and, as circumstances vary, to make them advance towards the enemy, either to keep him back or to attack him. But still we must except the reserve, which ought never to march without an order from the commander in chief.

But the qualities already mentioned would be useless, if order and discipline were not severely observed: the most numerous and best composed army would soon become little else than a body of rangers, who being only united by the hope of booty, would separate as soon as that motive ceased; and trusting each to his own head, or indulging his own humour, would be cut in pieces party by party: so that, if the general does not keep up subordination (the soul and strength of discipline) his army will be nothing more than a troop of Tartars acting more from the hope of plunder than the desire of glory. What art and what genius is there not requisite to maintain this subordination? Too much severity disgusts the soldier, and renders him mutinous, discourages him and makes him desert; too much indulgence sinks him into idleness, and makes him neglect his duty; licentiousness causes that subordination to seem burdensome, which should never in any degree be given up: he loses that respect, and often that confidence, which he should have with regard to his officer; and indulgence often makes a well-disciplined body become a set of sluggards, who march against their will, and who, on the most pressing emergencies, think only on their own safety.

The ability, foresight, and prudence of a general, gains him the entire confidence of the soldier and officer: the soldier indeed judges but by instinct, and is determined only by the event; but his judgment is not less infallible: that of an officer is equally just, but he is determined only by full conviction; he puts event out of the question, and places his confidence in nothing but courage and prudence. Confidence is again to be acquired by assiduity to those who are subordinate to us, and by supplying their wants before they are complained of; these two motives for confidence afford a plentiful and certain harvest of laurels

rels to the general. M. Luxembourg, M. Turenne, Prince Eugene, Marshal Saxe, and many others, have partly owed the advantages they have gained over their enemies to the confidence of the soldiers, who, loving their general, considered it as their duty to please him, and had no joy in victory but as they shared it with him.

Besides these qualities, which are essential to a general, and which all who would attain that rank ought of course to have, there are still many others necessary to make a great man. A hero is always a good member of the community; he considers humanity as his first duty; he is just, open, and unbiassed; his temper may be fiery, but this ardour is always regulated by prudence: he gives advice with the same openness as he would ask it; and never asks but of those whose experience, which he estimates rather by their actions than their age, makes them capable of giving such as may be trusted; he is haughty only to his enemies, free to his equals, affable to his inferiors, brave without either arrogance or rashness, and easy of access to all.

The general ought to be acquainted with the interests and force of princes, (a science very necessary in judging of the power of princes upon whom war is made, that he may fall sooner upon the country of him who can obstruct his projects, than upon a prince who, by the situation of his dominions and force, can make no opposition). In a word, a general who would merit the title of a great man, ought to unite in himself all civil, military, and political excellence. It is by this that he will easily attain to make war with success: nothing will escape him; he will know without difficulty the genius of every country, and of the nations which compose the enemy's army, the abilities of the generals who command, and the nature of the troops under them. Without these precautions he would never think that he could act upon certain grounds; he knows he may venture a motion with some troops that he would not dare attempt with others that are equally brave. One nation is vehement, fiery, and formidable in the first onset; another is not so hasty, but of more perseverance: with the former, a single instance determines success; with the latter, the action is not so rapid, but the event is less doubtful.

No man is born a general, although he brings into the world with him the seeds of those virtues which makes a great man: Cæsar, Spinoia, Turenne, the great Conde, and some others, shined, even in their earliest years, such qualities as ranked them above other men; they carried within them the principles of those great virtues which they drew forth to action by profound study, and which they brought to perfection by the help of practice: those who came after them, with perhaps fewer natural talents, have by study rendered themselves worthy of being compared to them. Cæsar and all conquerors had this advantage, that they were able to make their own opportunities, and always acted by their own choice. A man may be a good general without being a Marlborough or a Turenne: such geniuses are scarcely seen once in an age; but the more they are raised above the rest of mankind, the more they ought to excite emulation. It is by endeavouring to surpass the intellects of the second rate; it is by striving to equal the most sub-

lime, that the imitation of them is to be attained. This passion in a soldier is neither pride nor presumption; it is virtue: and it is by this only that he can hope to be serviceable to the state, and add to the glory of his king.

How much soever the honour of commanding armies may be fought after, it degrades him who is not worthy of it; this rank, so much desired, borders on the two extremes of glory and ignominy. A military man who labours to make himself capable of commanding, is not to be blamed; his ambition is noble: by studying the art of commanding, he learns that of obeying and of executing. But it is astonishing in the highest degree to see soldiers thinking only on preferment, and neglecting the study of their business. It is perhaps less surprising if we see others, without having been tried, proposing to themselves to command in chief; because such attempts suppose in the projector an absurd temerity, founded on a profound ignorance of the talents he ought to have, and the virtues which he has not. Such boldness is the character of a man whose mind is too narrow to perceive his danger: We should rather approve the timidity that suffers itself to be dejected by terror, since it shows at least that he knows to what hazards he is exposed; both one and the other are blameable: modesty is the only proper quality of a soldier; it gives splendour to virtue, it argues diffidence of himself, and desire of arriving at perfection.

MarJonius, Xerxes's general, proposed himself to the king to command his armies; this conceit of his own talents ought to have been answered by a refusal: the innumerable troops which he led were defeated by a small number of Greeks, and his presumption served but to increase the misfortune of his prince. Cincinnatus, endowed with every quality both of a great man and a great soldier, was holding his plough when the Roman's came to intrust the fate of the republic to him: he set out; and Rome was delivered from her enemies.

The title of general would be less tempting, if proper attention was paid to the qualities it requires, and the duties it imposes; it would then appear a very honourable, but painful burden. The most firm and intrepid genius might be discouraged, merely by thinking that on the conduct of a general depends the fate of a state, the glory of his prince's arms, and his own reputation.

But yet the reward that follows such irksome labours ought to animate men to undertake them. Obstacles, however numerous they may be, are not insurmountable, since so many great men have got the better of them: difficulties should stir up a soldier's emulation, but should never terrify him; he should endeavour to copy such great originals, though he should not be able to equal them.

This treatise is divided into four parts.

In the first are mentioned all the greater operations of a campaign; and the means of executing those operations, in any kind of country, are endeavoured to be laid down.

In the second, the precautions that are to be taken to attack the enemy in all the forementioned operations, are considered.

PART I. Of the GREATER OPERATIONS in DEFENSIVE WAR.

SECT. I. *Of the Knowledge of a Country.*

A CAMPAIGN of which the plan is well formed, and the dispositions well concerted, may nevertheless prove unsuccessful, if the general, to whose direction they are intrusted, hath not a thorough knowledge of the country in which they are to be carried into execution. The marches, camps, convoys, forages, detachments, in short the most important operations, will be performed with impropriety, if this knowledge is not previously acquired: events are often determined by it.

There is one knowledge of a country, which for an officer to be without, should be considered as a reproach; that of the situation of cities, towns, villages, forests, streams, rivers, which is to be acquired by studying of geographical maps. There is another branch of knowledge yet more particular, such as, of the passes, or the boundaries of the country, the situation, the nature of the ground, whether it is plain, or divided by hollows, rivulets, hills, &c. which is to be acquired by the assistance of topographical maps. In the study of these last, care must be taken, not blindly to follow the marks they lay down. It very seldom happens, that topographical maps are perfectly exact: for, besides the many circumstances which may sometimes in a year alter a large extent of country, they seldom take notice of fords, bridges over the small rivulets, small hills, and hollows of little importance; neither can they mark whatever may be occasioned by recent inundations and disruptions of the earth: whereas any of these unforeseen circumstances may prove an obstruction to a great design, either by retarding the march of an army, preventing a column of troops from advancing, or leaving the enemy in possession of some passes from which he might have been driven.

It is nevertheless impossible for a map to explain every particular: for example, an hollow way may be marked, but its depth will still remain unknown; neither can it shew whether the ascent and descent of it be easy or difficult. A general, studious to avoid the imputation of negligence, ought, before he engages in an enterprise, to make himself acquainted with every particular relating to the country, and by that means make up for the deficiencies of the maps. In short, if he is desirous of fixing a camp in a position strong by situation, but unacquainted how that is to be done, or in what manner the wings can be supported, he should then get information whether there is any river by which the camp may be covered, whether this river can be passed easily, and what is the nature of its banks.

In order to avoid the errors into which a general may be drawn by the maps, the safest method is to apply to the inhabitants of the country, and go over it with the most intelligent of them, and remark every obstacle, however trifling in may appear.

For marching with greater security, a general ought to form a company of guides of the peasants,

be assured of their fidelity, and attach them to him by all possible methods, particularly by unbounded liberality. It is by money only that truly spies and faithful guides can be secured; the latter are less expensive, but full as necessary as the former. Parsimony should be avoided in war; for, as Vegetius observes, money should never be spared when expence is necessary to secure possession. In proportion as an army advances into a country, great care must be taken to change the guides.

The command of this company should be given to an intelligent man, who should be perfectly acquainted with every thing relating to the country, and who should also be fully able to answer any objections started by the general or officer that accompanies him. This company of guides will be capable of informing the general of whatever may have escaped his observation, of directing him in his inquiries, by which means his discoveries will always be to be depended upon. By this manner of proceeding, neither will the position, or the distance of one place from another, nor the situation of any particular city, town, or village, nor any circumstance be unknown to a general who joins their information to what he himself already knows: he will be informed of all the pathways, of the different roads leading into the country, and what number of them terminate at the same point; he will judge what number of men, either horse or foot, can march abreast, whether the enemy can prevent his pursuing his intended route, by taking the field, and to what distance he will be able to march in safety.

The general should send out detachments along with some of these guides to examine the streams which cross the country, whether or no their mouths are at a distance, into what river they empty themselves, from whence they take their source, whether they may be easily forded, if their banks are steep or sloping, marshy or covered with bushes; other detachments should be employed in examining the woods, in order to find out whether troops can pass through them or not.

A general ought himself to examine into the truth of the reports made to him by these small detachments, or send out others more considerable under the command of general officers: however certain a general may be of the fidelity of his spies and guides, yet he should not always rely upon their reports: mistrust, which in general is accounted a vice, may almost be esteemed a virtue in the business of war.

Furnished with these lights, a general can allot the easiest road to the artillery and baggage, the shortest to the infantry, and longest to the cavalry: he can at once judge, from the nature of the ground, into how many columns the army can be divided in order to expedite the march, and what dispositions will be necessary for the columns with regard to the enemy's position.

By the knowledge of the country, a general is informed of what camps the enemy doth or can occupy, and of those necessary to be taken to oppose his de-

signs;

signs; whether the enemy's detachments can easily approach, or how he can himself advance towards him, without being discovered; if there is forage in the neighbourhood of the enemy's camp, or whether he is obliged to draw it from a distance; where he hath fixed his magazines, and whether an attempt to carry them off is practicable or not; in what manner his quarters are disposed, and which of them is most exposed; what distance there is between himself and the enemy; where the enemy hath established posts, and which those are that himself ought to occupy with regard to the situation of his own camp and quarters, and those belonging to the enemy; which is the properest road for the detachments and the patrols to keep, in order to gain intelligence; and lastly, with what degree of ease the enemy can attack the army on its march, and whether in front or flank. This knowledge is essential to a general in every kind of country; but in a woody or mountainous country, it would become more particularly dangerous, and even impossible for him to march an army, if unacquainted with it.

By the maps, a general will know whether there be forests in a country: but if he does not endeavour to get a more particular information, he will be unacquainted with the nature of them; whether they are boggy, smooth, or rugged; and consequently, whether it be possible for the troops, artillery, and baggage, to pass through them.

In 1702, the duke of Burgundy, being desirous to attack the enemy who were behind Cleves, but not being perfectly acquainted with the forest in his front, he detached the marquis d'Alegre with 500 grenadiers, and 800 horse, to see if it was not possible to find some passage through it. M. d'Alegre met with a defile which was occupied by the enemy: he attacked and forced it; but being advanced beyond it, found it was not possible to proceed farther, by reason of the great number of defiles that succeeded to each other: he thereupon turned back, sent, and had another passage surveyed, where there were found still greater obstacles. He gave an account of this to the duke of Burgundy, who, not choosing to miss the opportunity of attacking the enemy, sent him out again with a larger detachment, that he might examine whether, by keeping along the side of the forest, it would not be practicable for him to march up to them by way of the heaths of Mook, on the side of Grave and Nimeguen. The marquis d'Alegre discovered a defile which led to these heaths: he took possession of it, and sent notice thereof to the duke of Burgundy; who ordered the army to advance, obliged the enemy to send their infantry into Nimeguen, and cannonaded their cavalry which had taken post on the glaciis, but were unable to maintain it; and the consequence was, that the enemy sustained a great loss in men, artillery, waggons, and baggage.

This example tends to prove, that maps are not always to be relied on. There can be no reason to doubt that the duke of Burgundy was furnished with the most exact; but yet it is probable that he might not have succeeded in this enterprise, if he had neglected sending M. d'Alegre to survey the passes, and examine two, before he proceeded to that through which he marched.

The following is a general rule: That it is upon

the ground, and not upon maps, that the roads thro' which an army is to march must be examined, as well as the situation of places where camps are to be fixed, and fields of battle chosen. An army should never move before ways are opened for every column: with regard to a detachment it is different, as there may arise circumstances which will prevent the general from foreseeing what road it may take. The command of a detachment should always be given to an intelligent officer, and one who has made his business his only study; who hath been particularly careful to acquire a knowledge of the country, and of whose genius the general should entertain no doubt. A particular choice stirs up emulation in young men, and induces them to exert their utmost endeavours to deserve so distinguishing a mark of approbation.

Into how many mistakes have even the greatest generals fallen, by not being thoroughly acquainted with a country, and by suffering themselves to be guided by general notions? M. de Feuquieres cites many examples of great enterprises which have miscarried by it.

Toward the end of the year 1673, when a considerable body of infantry, with only few cavalry, was on its return from Holland, under the conduct of M. de Luxemburg, the prince of Orange having assembled the whole force of the Dutch and the Spaniards (under his command) came upon the Maese, with an intention to fight M. de Luxemburg between Maelricht and Charleroy. This march made it necessary for the court to send an order to M. de Schomberg to assemble all the cavalry that were in Hainault and Flanders, and immediately join M. de Luxemburg, who was greatly inferior to the prince of Orange in cavalry. The prince's aim then should have been to prevent the two generals from joining, and to have fought one or other of them before their junction. The prince's being unacquainted with the country, made him mistake for real the feints made by M. de Luxemburg, whilst he was upon the river Ourte; as if his intention was to march by way of the Condros and the Ardennes, in order to gain Sedan and the Mezuris. The prince of Orange drew near Huy and Namur; and by that means was at such a distance from the high-road, that M. de Schomberg had an opportunity of advancing with his cavalry to Tongres; at the same time that M. de Luxemburg, by a forced march, passed the Maese at Maelricht, and arrived at Tongres, where the junction of the two armies was effected without any accident.

If the prince of Orange had made only two reflections upon the nature of the country, he would have avoided the mistake he fell into; the first of which is, that scarcely any body can be ignorant that the Condros and the Ardennes are sterile and mountainous countries; from whence it is evident, that M. de Luxemburg could not have subsisted his army, especially in the month of December: the roads in those parts, very bad in the summer, are almost impassable during the winter; consequently the carriages could not have passed but with the utmost difficulty.

The second reflection is, that if M. de Luxemburg had actually designed to pass through the Ardennes, why did M. de Schomberg advance towards Tongres, and so expose himself to the danger of being beaten, without a possibility of receiving help from M. de

Luxemb.

Luxemburg, who was on the other side of the Maefe? If the prince of Orange had had a thorough knowledge of the country through which M. de Luxemburg pretended he would pass, he would soon have perceived that it was only to throw him into a perplexing uncertainty with regard to the road which the enemy's general should naturally take: in a word, he would not have remained a moment in doubt on the part he had to act.

By this, then, it appears, that the prince ought to have continued on the side of Liege; by which position he would have stopped M. de Schomberg, who would have scarcely dared to advance to Tongres, nor would M. de Luxemburg have attempted the passage of the Maefe at Maëstricht: by this means, the junction would have been prevented; or, if either of the two armies had advanced, the prince could have attacked and beaten it; neither would it have been in the power of the other to have assisted it.

It is certain, that a thorough knowledge of the country would have induced the prince of Orange to have remained on the other side of Liege; by which position the junction of M. de Schomberg and M. de Luxemburg would have been impossible: this last would then have been, in a manner, compelled to continue his march by the Condros and the Ardennes; and the prince of Orange, without losing a man of his own army, would have made M. de Luxemburg lose a great number of his, who would have been unable to have resisted both hunger and cold.

With the company of guides, and an exact knowledge of the country, a general will be enabled to undertake an enterprise, that another with double the number of troops durst not think of attempting. These precautions will furnish him with stratagems, oftentimes more efficacious than force and courage: under the appearance of flight, a general will often get possession of an advantageous post, and decoy the enemy into one that may prove his undoing.

It hath frequently happened, and will continue to do so, that a general who knows how to take advantage of the knowledge of the country, although inferior in point of force, may change a defensive into an offensive war. In 1671, M. de Créqui, who began the campaign on the defensive, ended it with obliging the duke of Lorraine to pass the Rhine: that prince dispersed his army, and then M. de Créqui formed the siege of Fribourg.

The knowledge of a country is still more essential in retreats: there is more art and more precaution required in a retreat, than in any other action; that operation is the conclusion of all preceding ones. If a general, obliged to retreat precipitately, hath but a superficial knowledge of the country, how will he be able to reassemble his troops, reestablish order, or march with any degree of security?

Xenophon's retreat with the ten thousand Greeks, is one of the most useful lessons a commander can study: in that undertaking were united the virtues of a consummate general, and the most intrepid courage of a soldier; and in particular it exhibits the most profound knowledge of the country.

The knowledge of a country is as necessary for a private officer as for the commander in chief, because he is to execute in part what the general performs

with all the troops. When an officer, to whose conduct an expedition is intrusted, joins this knowledge, one of the chief branches of military science, to practice and experience, he will with so much the greater ease comprehend and execute the general's intention and plan; and he will be also enabled to take the proper measures for success: if, on the contrary, he begins a march, without being acquainted with the country, his mind misgiving him, will increase the danger, by the very means he takes to avoid it: he will suppose it in places where there is nothing to be feared, and often fall into it where he was least apprehensive of it.

The general who commands in the cantonments and winter quarters, and each officer who commands a particular quarter, will never be able to take proper measures if they are unacquainted with the country: they will be unable to preserve a proper strength when separated, or to assemble without difficulty on the first order; and for want of knowing the posts which it is proper to guard, they will occupy such as are unnecessary, and leave those defences that are most liable to be attacked; the troops will be greatly fatigued by increasing the number of posts without occasion, by superfluous or too numerous detachments or patrols. In a word, whatever precautions are taken within the quarters will never be in security, if the country round about them is not perfectly known.

Unless a general demolishes those bridges which from their distance he cannot guard; if he neglects getting possession of all the passes, occupying the country that is between him and the enemy with detachments, and cutting off all communication with the enemy and his camp, he will be liable to be surprised in it. A general should always know whether there are any rivers between his camp, his quarters, and the enemy's; he should constantly have detachments upon those rivers, to prevent the enemy from repairing the bridges or passing the fords; he should cause the woods to be carefully scoured; he should occupy the avenues and the defiles, and know at what place the roads begin, and where they meet: if any of these precautions are neglected, a general can never remain quiet, but will always lie open to some surprise.

SECT. II. *Of the Preparations before taking the Field, and the March of an Army on leaving its Quarters to go into Cantonments.*

THE time for an army to come out of winter-quarters, is always regulated by the plan which the general has formed for the ensuing campaign. It leaves them very early, when they are at a distance from the country where the war is to be carried on; but later, if, by their situation, the operations of the campaign can be commenced after having made two or three marches; but whether by the situation of the quarters the army is enabled to enter immediately on the campaign, or whether it must be first of all cantoned, the magazines should be so situated as to be always within reach, especially in that early season of the year, when there can be no forage upon the ground, and consequently the cavalry must be supplied out of the magazines. The magazines ought to be distributed about in different parts, that the troops may have less way to go for their forage. The general is to issue his orders

ders to the intendant of the army for whatever regards the magazines, and to mark those places to him where he would have them established; and, for the greater security of these places, there must be troops posted in them, the roads should be good, and the communication well guarded, by which means the convoys will arrive in safety.

The distribution of the magazines should be regulated by the movements which the general foresees the army will make on leaving its quarters, supposing it leaves them when there is only dry forage; but if the army is in an enemy's country, and there is forage upon the ground, it is certainly better to reserve the magazines entire, by which not only great trouble will be avoided in transporting the forage, but also a great expence saved to the government.

Of what nature soever the country may be (an enemy's country is supposed) it should be foraged in front, as much as possible, in order to reserve that which is in the rear, that, when the campaign is over, it may be found laid up in the barns; if this precaution is not attended to, the army will be destitute of forage at its return, and will of course be obliged to draw it from home, and consume those magazines which were before spared; consequently there will be nothing saved, the expence will only have been deferred, but it will be increased by transporting the forage from the magazines to the army.

The forming of the magazines should never be delayed till the time for opening the campaign approaches. The intendant, pursuant to the general's order, should lay in the provisions during the winter, and distribute them in the frontier towns, by which means they can easily be transported to whatever place the general shall order. By these precautions, the general will not only avoid the inconvenience of being obliged to wait till there is forage upon the ground, but he will be enabled to be first in the field.

The same precautions should also be taken with respect to the artillery; whether for that wanted for a siege, if it is intended to open the campaign by that operation; or whether for that which is necessary in the course of a campaign. It should be assembled upon the glacis of the frontier towns, or rather upon that of the conquered places: the more it is within reach of readily joining, the sooner the operations will be commenced.

From prudence in the execution of these dispositions, as well for the magazines and for the artillery, as for every thing that is necessary to an army, it follows, that a general hath often formed a siege, or at least invested a place, and completed his lines of circumvallation, before the enemy could be in a condition of coming out of his quarters: he will likewise have made many marches, and will have possessed himself of advantageous posts, without the enemy having it in his power to oppose him.

The success of the general's design is ascertained by his own forecast, and the dispatch with which his orders are executed; negligence and sloth are always productive of miscarriages.

Here would be the proper place to point out the order which an army should observe in its march to invest a town, and to mention the precautions necessary to be taken for doing it with security; but this would

be only repeating what has been already said by the marshal de Vauban, with regard to this grand operation. What could be said here would not in the least add to the depth and wisdom of his instructions: the reader is therefore referred to the writings of that great man, as this branch of military science doth not fall within the design of this work.

A general should observe, that, in order to make an army come out of its quarters, and cause it to be cantoned within a march of the country where he designs to commence the operations, he must make all the troops leave their quarters together; assemble them in many bodies, in different frontier towns; proportion the marching days to the distance of the quarters and the rendezvous that shall have been appointed for them, that they may arrive on the day appointed, and that from thence they may march in a body to the place where they are to canton.

All the bodies march, either in the number of columns that the situation of the country will allow, and arrive at the cantonment together; or else they march separately, and arrive on different days: but, in either of these cases, the cantonments for each regiment ought to have been marked out; and, if possible, forage for at least three or four days distributed to each quarter.

In the marching-orders which are sent to each commander, the situation and name of the place where each regiment is to canton, should be carefully expressed; whether on the right, the left, or in the centre: the discipline to be there observed, the place where to go and receive orders, and that where to receive forage, should also be particularly specified.

Troops, when upon a march, should always observe the most exact discipline; and never be suffered to advance, but in the same order, and with the same precaution, as if they were in danger of being molested or attacked.

Wherever an army is cantoned, it is generally in an enemy's country; therefore, for the greater security of the cantonments, there should at least be one place that may serve for a support. In 1746, Brussels was the centre of the cantonments of M. Saxe's army. In 1747, his quarters were supplied by Anvers on the left, Malines and Louvain supported the centre, and Namur the right. If no place of this sort can be found, the army must then march out together and encamp, instead of going into cantonments.

As the cantonments are properly nothing more than a halting place, where the troops are to remain till the season permits them to take the field, till the proper quantity of forage is collected, or till the necessary preparations for the intended operations are completed, they should necessarily be more connected than the winter-quarters. But as soon as the weather permits, and all the necessary preparations which should have been forwarded during the winter are finished, there is then no time to be lost; for an army will always find its advantage in encamping early, getting the start of the enemy as much as it possibly can, and beginning the campaign, no matter by what operations, before the enemy can have time to assemble.

The greatest generals of former times have constantly adhered to this rule; and, in our times, it hath always been followed by marshal Saxe. The cantonment.

ment of his army under Brussels in 1746, and the famous march he made in 1748 to invest Maëstricht on leaving his quarters, are examples which ought to serve as models; but in all these cases, the varying of circumstances must be attended to.

If any particular column, upon the march, presents its flank to any of the enemy's towns, although it is indispensably necessary for every column to observe all possible order and discipline on the march, yet this column is more particularly obliged to it; necessity makes it become a duty. But that it should not be too much exposed, some hussars ought to be appointed to march upon its flank, who should also be ordered to advance till they come within sight of those towns. This column, whether consisting of infantry or cavalry, must detach some troops to sustain the hussars, in case they should be attacked and repulsed. By posting these detachments upon the flank, the enemy will be kept at a distance from the column, and the hussars will be also sustained.

SECT. III. *The March of an Army in an open Country.*

If, according to the observation of Vegetius, an army is in a more dangerous situation upon a march than when it is drawn up in order of battle, because a soldier, not seeing his enemy, is not so much upon his guard, there is consequently a greater degree of precaution required in a general, that he may not be surprised by an unexpected attack, or fall into ambuscades, the likelihood of which should always make him proceed with caution.

It is upon a thorough knowledge of the country which is the seat of war, that a general should direct the march of armies; that he should concert the measures for conducting them in safety; and that he will be enabled to foresee the enemy's motions.

There are but three sorts of countries which may become the theatre of war, an open country divided by rivers, a woody, or a mountainous one. The dispositions for a march must be varied as the situations of places are different. Although the face of an open country is sometimes interrupted by woods or hollows, there are nevertheless fewer precautions necessary, because it exposes, or at least does not greatly conceal, the enemy's manoeuvres from the general. In a mountainous country the danger becomes more considerable, because those very obstacles which serve to impede the progress of an army may prove to many resources to the enemy, who can march without being seen, and lay snares at almost every step they take.

When an army is in an open country, the general may take whatever road he thinks most convenient, without being under a necessity of keeping the beaten road. If he chooses to march across the country, it may be done by cutting down the hedges, filling up the ditches, levelling the ridges, and filling up the hollow ways, thereby rendering their ascent or descent easy, and by building bridges over the streams and rivulets which divide the country. But nevertheless it is very imprudent for a general to suppose himself entirely free from danger upon a march; for the consequences of self-security are generally fatal. The effects of negligence in any military operation are pernicious, but more particularly so upon a march; and although a

general should never fear his enemy when in presence of him, he should nevertheless always apprehend the worst from him when he is out of his sight.

The number of columns in which an army can march in an open country is arbitrary, whilst it is advancing, and the enemy at too great a distance to attack or annoy it upon its march. But if, on the contrary, the enemy is near at hand, and there is a possibility of his attacking the army, it should then be disposed after such a manner, as to form in order of battle in a very short time, and to be able to take a favourable position for action upon the first signal.

The ill success of the French at the battle of Ramillies may perhaps be in some measure attributed to the neglect of this precaution, as it is certain that the French general preserved his original position, notwithstanding the Duke of Marlborough changed his.

If the army presents its flank to the enemy, the dispositions, without considering the probability of its being attacked, should be changed; for an army upon a march ought to be always prepared against any accident that may happen.

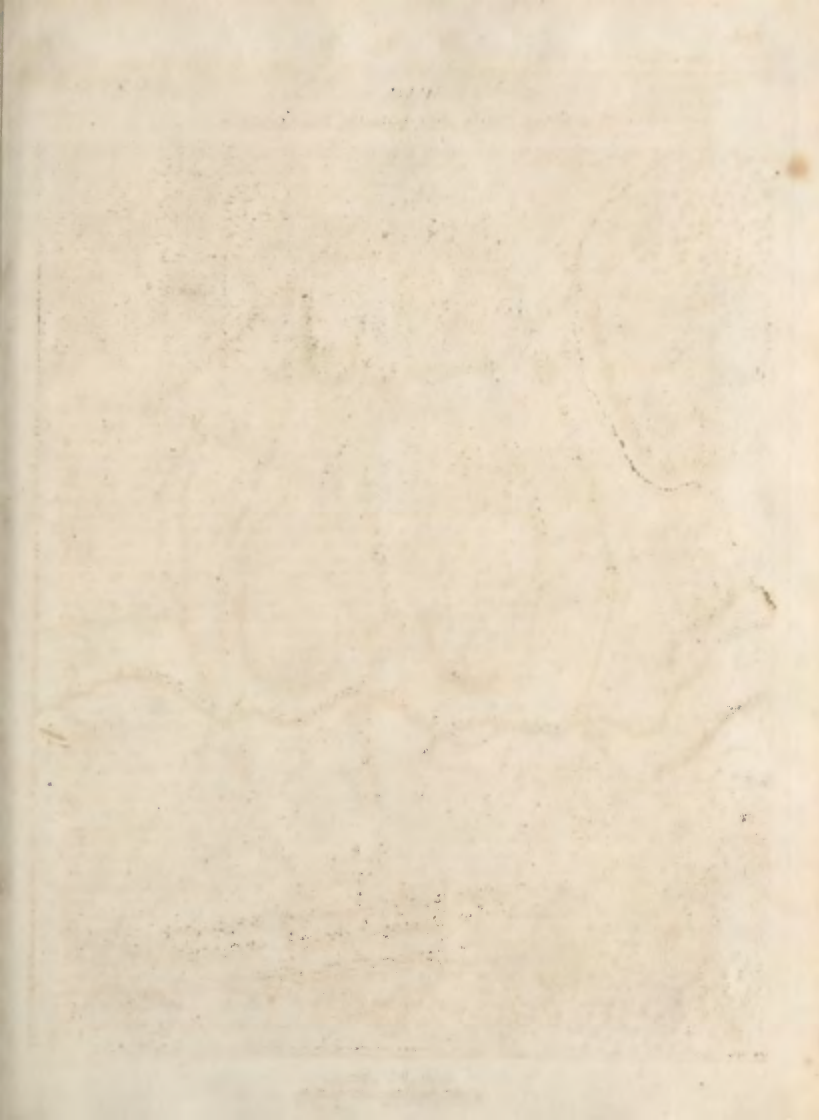
A general should never cause an army to move without having previously considered and examined the intended march of it, nor without a thorough knowledge of the enemy's position, and where he is, or without knowing particularly the ground intended to encamp on. An army ought never to move but with some design, either to seize on some advantageous post, to prevent an intended march of the enemy's, to draw him into a disadvantageous situation, to deprive him of subsistence, or to procure some for itself.

This maxim being established, let it be supposed, that a general would cause his army to march, and the enemy's distance to be also such as to secure him from any danger of attacks; the general hath it in his power to open four, six, or eight roads, in proportion to the number of the troops under his command: for the more number of columns, the less is the body of troops contained in each; consequently there will be less confusion, and the sooner will the army arrive at its destined camp.

The general having nothing to fear from the enemy, who, as hath been just supposed, is at a distance, orders the army to march in six columns; it seems probable he would cause it to be executed by the following dispositions, of which, however, only a general idea can be formed, the whole being dependent upon particular circumstances.

Before the march is planned, and the number of columns determined upon in which the army is to march, notwithstanding the general is acquainted with the country, he should send out a detachment some days before, to reconnoitre the intended route of the army, as well as the camp it is to occupy. This detachment is to be commanded by the officers of the day appointed for its setting out: they must have staff-officers and guides with them, to conduct and to inform them of the nature of whatever may prove an obstacle, of the places where the roads begin, and those where they terminate: they should also have labourers with them, to mend the ways, enlarge the roads, and make new ones, if necessary; to cut down the hedges, fill up the ditches, level the ridges of the hollows, and build or repair bridges.

When



Plan of the March of an Army in Six Columns.



Scale of 10 Leagues



A. Hall sculpt.

When the general commanding this detachment is ready to enter the different ways through which the army is to follow, he will divide his detachment into as many separate bodies as the army is to be divided into upon its march : if into four, the major-general takes the command of one, the brigadier of another, the colonel of the third, and himself will remain at the head of the fourth. This division being thus made, he will distribute staff-officers, guides, and labourers, to each detachment, with orders to meet again at the same place from whence they separated.

Each of these detachments should advance to the extremities of the woods, if they meet with any, and of the roads leading to the camp intended to be occupied : the commanding and staff-officers will then advance with an escort to reconnoitre its situation, and will leave part of their men in ambuscade in the woods, or concealed behind some heights, or in some hollows. The knowledge of the situation of the camp being attained, each detachment will return by the road it came ; but first, the commanding officer of each detachment will make a report to the general of the roads they have passed, what discoveries they have made, and, in short, will give him a particular detail of every thing they have met with on their way, whether woods, villages, hollows, bridges, and of every thing they have done to render the road easy for the column that is to pass through it. This detachment being assembled at the place appointed for meeting, will take the road to the camp, where being arrived, the lieutenant-general will make his report to the commander in chief of the army.

With these precautions the army may not only advance in safety, but the roads also for every column having been reconnoitred and repaired, no accident can happen to retard the march of the army.

The general must take care to have detachments of hussars or dragoons always in the front and upon the flanks, to observe and clear the march of the army ; neither should a general suppose himself to be in an entire security from the distance of the enemy : but whilst he sees all clear before him, it would show great weakness for him to be apprehensive of a surprise, especially when every necessary precaution for avoiding it hath been taken. It is certainly a mark of prudence to take precautions ; but multiplying them without cause is an undoubted sign of fear and anxiety.

It is proper to make the army march, as near as possible, in the same order in which it is to encamp ; by which means the troops may enter the camp without confusion. The army being supposed to march in six columns, the infantry will form three, the artillery and baggage the fourth ; the cavalry, with the remainder of the corps of hussars that are not detached, and the dragoons, the two last upon the flanks ; so that the army, on its march, will be in the following disposition : The column upon the right will consist of cavalry, the one adjoining to it of infantry, and that which comes next will be formed by the artillery and baggage ; then two columns of infantry, and the sixth closing, the left will be composed of cavalry. It is to be observed, that, if the baggage-waggons belonging to the army form too long a row, some of them may be sent into the rear of the columns of infantry, with express orders to the officers to make them march in the column.

There should be an advanced and a rear guard to each column, formed from the troops of which the column is composed ; there should be also detachments of light horse upon the flanks of the cavalry, in order to keep off any of the enemy's parties that might advance to annoy the army upon its march. The rear-guard to the column of baggage should consist of infantry, cavalry, or dragoons, besides the escort always appointed for it. The general officers who are at the head of the two columns of cavalry, should not march too fast, lest they should get too far advanced before the infantry ; a matter always to be avoided. The march of an army being disposed after this manner, every column will enter the camp at the same time, and find itself opposite to its ground. See Plate CCLXXXVIII.

If, by the enemy's position, although at a distance, the army should, on its march, present a flank to the enemy, without fearing its being attacked ; yet as the enemy may have stolen one or two marches, as hath happened on many occasions, there must be only two columns of infantry placed in the centre. The third must be placed upon that flank which the army presents to the enemy ; so that the army will find itself disposed upon its march after the following manner : Supposing it is the right which presents the flank to the enemy, the first column will consist of infantry, the second of cavalry, the third of artillery, the fourth and fifth of infantry, and the sixth of cavalry. The baggage will then be distributed to the three columns upon the left ; so that neither the two columns upon the right, or the artillery, will have the least embarrassment, in case an action ensues. The same disposition must be made upon the left, if it is that which presents the flank. Particular care must be taken that the artillery have orders, supposing the enemy advancing in full force to attack, to transport itself to the column of infantry, and to divide itself along the front, when it shall be in order of battle, and to keep up a constant fire, in order to give the general time to make such dispositions as he shall find necessary.

The column of cavalry should be divided into two, and be posted upon the flanks of the infantry that is drawn up in the face of the enemy ; the other columns must follow the orders which have been delivered to them, and execute them with the utmost dispatch.

If it appears, either from the proximity or position of the enemy, that the army is liable to be attacked in front, the disposition for the march should be in the same order as the army is to form in for action : the artillery must then be distributed among the columns of infantry ; so that, following the divisions where it is placed, the brigades will find themselves spread over the front of the first line. In this case, the infantry will form four columns, which will march in the centre of the two columns of cavalry upon their flanks ; so that the head of each column, as far as the centre, when placing itself in order of battle, shall make the first line, and the remainder, from the centre downward, the second ; and the reserve which follows shall form itself behind the other two lines.

It is necessary that an army disposed after this manner, should have orders to draw itself into order of battle on the very first signal, which should be a discharge of two or three pieces of cannon. The signal

being given, the first and second lines, and the reserve, will find themselves formed in a very short time. If, from the proximity and position of the enemy, and the facility with which he can attack, the general hath reason to imagine he will do it, the heavy baggage, with a good guard and escort, ought to be removed into the rear.

On this occasion the *campement* (A) should not be far before the army, the escort should be increased, and some detachments of light horse should march in front to cover it, and also to make observation at a distance. The remainder of the body of light horse shall continue upon the flanks of the army sustained by dragoons, who, on the signal being given, shall immediately go and form themselves in the place assigned to them during the action.

On the first sight of the enemy the *campement* should retire; for when fighting becomes necessary, all thought of encamping must be laid aside; but the escort shall put itself in order of battle, and the light horse shall approach the enemy as near as possible, in order to reconnoitre his disposition and strength. The officer commanding them will immediately send a report of the discoveries he hath made to the commander in chief, who on every occasion should be in the front, and even a little advanced, to survey the nature of the ground; it being very certain, that in these cases a man can much better rely upon his own than upon the judgment of others. This was marshal Saxe's method; particularly when he was apprehensive of being attacked upon a march, or had himself an intention of attacking. In proportion as the enemy shall advance, the escort of the *campement* must retire in good order; at the same time not neglecting the opportunity, if it offers, of harassing the enemy's advanced guard, so as to retard his march, and give more time for the army to form in order of battle, and to the general to make such dispositions as he shall judge necessary: after which, the escort having amused the enemy, or caused him to slacken the briskness of his march, must retire in good order; and when it shall be near the body of the army, each body shall return to its own brigade.

If, from his knowledge of the country, although an open one, the general knows there are any thickets, hollows, or heights, either on the right or the left, and that this spot may prove favourable to the enemy, he should try to possess himself of it. If that attempt is not practicable, as the enemy will undoubtedly take advantage of it, and post infantry either at these thickets or heights, the general must place a brigade of infantry at the head of each column of cavalry, which shall mix by platoons with that line of cavalry when formed in order of battle. This disposition was made by M. de Turenne at the action of Sinzheim, and at the battle of Enzheim.

If, by the situation of the country, the flanks cannot be sheltered either by an hollow, a morass, a river,

a town, or a village, the hussars and dragoons must be posted upon the wings, but sidewise, so as to be able to take the enemy in flank when he shall come down to charge the first line, or at least to keep back his second: these hussars and dragoons should be sustained by the infantry of the light troops belonging to the army. If the right can be formed next a village, and the left next an hollow, some infantry and artillery must be posted there: if there is only the right or the left that can be sheltered, that which cannot must be properly sustained; and the same disposition must be observed that hath been just now mentioned, with regard to an army whose flanks cannot be covered.

If, on leaving the camp, the army presents a flank to the enemy, who may have it in his power to attack it on the march, it must then march but in two or three columns at most. Each column should be disposed after such a manner, that by a motion to the right or to the left, according to the wing that is liable to be attacked, each battalion or squadron may find itself formed in order of battle before the enemy.

The advanced guard should be composed of light horse, sustained by dragoons; the rear-guard of cavalry sustained by infantry: there should be also some light horse upon the flanks of the cavalry, and some pieces of cannon with the infantry. The artillery should be distributed by brigades in the column of infantry nearest to the enemy; so that, performing the same movement as the troops, it may find itself placed in the front of the first line, ready to fire on the first order. The number of three columns is given to the army, in order that the first and second lines and the reserve shall be formed at the same time, which cannot be done if the army marches only in two columns: for troops must then be taken from these two lines in order to form the reserve, which would require a considerable time, and consequently retard the dispositions; whereas this reserve, forming the third column, is separated from the main body, and in a condition to act with readiness, according to the orders it shall have received. As the baggage, in this manner of marching, must necessarily be an embarrassment, it must be sent into the rear under a good escort, with orders to join the next day at the new camp.

It is necessary to observe, that every different species of troops should be placed in that part where it is to fight; consequently the two columns which are to form the two lines when the army shall be in order of battle, ought to be composed of cavalry and infantry; so that when the columns shall make a motion to the right from the left, the infantry may be placed in the centre, and the cavalry upon the wings, unless the nature of the country should make another disposition necessary: then the general should regulate his motions according to the situation of the country, and give such orders as will enable the troops to act with the greatest facility.

Sect.

(A) This is a French term, for which we have not a synonyme equally expressive in the English language. It is used to denote a certain number of troops, who proportion their time of setting out before the army, by the distance or proximity of the enemy, in order to trace or mark out the camp. For this purpose, a quarter-master and a trooper is draughted from every troop of every regiment of horse; and a sergeant and a corporal, in like manner, from every regiment of infantry, furnished with ropes and pickets, to lay out the ground for the tents and the intervals; so that every regiment will, on its arrival, find its ground properly marked out. A field-officer of every regiment also marches with the *campement*, besides the officers of each corps, who command the detachments.

SECT. IV. *The March of an Army in a mountainous and woody Country.*

If the situation of the places in a mountainous country furnishes a general with a greater variety of expedients to conceal his dispositions, it also renders more precautions, and a greater degree of knowledge, necessary to avoid being surprised. If these kind of countries, on the one hand, present greater advantages for the concealment of marches, they also, on the other, offer many difficulties in the transporting of the provisions and the artillery, and require a greater degree of vigilance for the safety of the magazines and the preservation of the communications with the frontier towns.

The general ought to dispose the march of the army according to the situation of the country: he should carefully guard against surprises, whether by night or by day; make himself fore of the passes, and turn them to advantage against the enemy; in a word, he must not overlook any one circumstance, and he should contrive to make even the obstacles themselves turn to advantage.

It is to be feared, that in mountainous countries, in roads that cannot be enlarged, the troops pressed too close together will not be able to move but with great difficulty; and as they will embarrass each other, the front, the rear-guard, and the flanks, must be equally secured; the columns must be unbroken and close, that there be no distance left between them; and halting should be particularly avoided, as that is a circumstance by which an army is most fatigued.

It is again dangerous, as the commentator upon Orosius observes, when troops find themselves straitened of room in a narrow road, for the general, in order to enable them to move with greater ease, to lengthen the columns too much: from whence would arise two inconveniences; the first of which is, that the columns would be weakened; and that in case of a surprise it would not be difficult for the enemy to separate them entirely, and it would also be impossible for them to rally; in the second place, these columns thus lengthened, in going round a mountain and descending into a valley, would take up a prodigious extent; from whence it hath often happened, that the windings of the road hiding the middle of the column, those who march in the front-rank can see only those who are in the last, and retard their march, because that, being deceived by distance, they will be scarcely able to distinguish whether they advance or whether they are halted.

In order to avoid these inconveniences, it is not barely sufficient for a general to have a thorough knowledge of the country: he ought immediately to inform himself of every particular, however minute, relating to it; he should take the same precautions which have been pointed out as necessary for a march in an open country, and send out a detachment, such as hath been supposed in the foregoing section. This detachment will examine the narrow passes, survey and sound the fords, run round the windings of the mountains; and if there are many roads, it will find out which is the most practicable, and that through which the army, the artillery, and baggage, can pass with the greatest ease; what streams cross it, and whether there are

bridges over them: it will examine whether they are sufficiently strong, and repair them, or build new ones. It often happens in a mountainous country, that the road which would be very short and commodious proves to be divided, either by the separation of two rocks or by hollows. As these breaches, however deep they may be, cannot be all of a certain breadth, therefore, in order to avoid marching over the unnecessary ground that going round them would take up, bridges should be thrown over, if possible, from one rock to another.

But as in a march, whether in an open or in a mountainous country, occasions for throwing bridges very often present themselves, it is very necessary to say a word or two relative to the manner of their construction.

Six or eight thick pieces of timber are laid across a rivulet, or any other bad place necessary to be passed, at six feet distance from each other; these must be crossed again by other pieces of timber not so thick, at the distance of three feet from each other; which must be fixed to one another by large pegs, and faggots well fastened together must be laid over them. When the bridge shall be thus covered, some earth must be thrown over it, which ought to be well trampled, in order to fill up the vacancies of the faggots; and then, for the greater firmness, new earth should be thrown over it, which ought to be well beaten down. The bridge thus made, the troops, the artillery, and the baggage, will pass over it with great ease.

It must be observed, that the bridges should be of the same breadth with the roads; they should be broader rather than narrower, because, exclusive of the danger the artillery and baggage would run if they were narrower, the ranks being obliged to be straitened and the column to be lengthened, the march would of course be retarded, and it would be difficult to avoid confusion. The labourers that accompany the detachment ought to be furnished with every sort of tool necessary for the removing of earth, the felling of trees, and working and fitting them for use.

This detachment being divided, as has been already observed, into as many bodies as there are roads through which the army is to pass, will meet again at the place from whence it is parted; and the reports of the commanding officers of the different bodies being given to the lieutenant-general, he must make a report of the whole to the commander in chief.

On this report, the general will order as many detachments as there are columns intended to set out, two or three hours before the time appointed for the march of the army. These detachments will march carefully over the ways already examined and prepared: they will scower every thing, hedges, narrow passes, entrances of passes, woods, heights, villages, in short all that may serve as shelter for troops in ambuscade; and for greater security, they will post guards in the villages, which guards are not to retire till the rear-guard of the army comes up.

The commanding officer of each detachment should possess himself of the heights on the right and left, and should distribute platoons of infantry at proper distances from the rocks and narrow passes: he should be careful of what may be done to oppose him, and be attentive even to the smallest paths. When the commanding officer of the detachment shall be advanced

ced to the end of the passes, or to the ground intended for the camp, he will establish his infantry in the most advantageous posts; he will place his light horse or dragoons in the front, but within reach of assistance; he will send out patrols of light horse advanced before the infantry. If he receives any intelligence of the enemy, he will send immediate notice of it to the general; but if, from the report made to him, the enemy does not appear to be sufficiently strong to annoy the army on its march, or only some parties were willing to try if they could enter the passes, his detachment will be sufficient to keep them at a distance, particularly as he is in possession of the heights and the passes.

These troops, in the situation they have been placed, should wait the arrival of the campement. As soon as they perceive it, they shall advance; and whilst the major-general, assisted by the staff-officers, marks out the camp, they shall possess themselves of the villages, passes, and roads by which it is probable the enemy might come and make an attack. These detachments shall remain in their posts till relieved by the proper officers, which will not be done till the guards of cavalry and posts of infantry necessary for the security of the camp are posted. Then, although the army should be yet at a distance, it may on its arrival enter the camp, which will be found covered by the guards which escorted the campement.

With these precautions, if the enemy is at too great a distance to attack the army, the march will be performed without any trouble: there will be no obstacle in the roads, or reason to fear that the waggons will be mired; and if the wheels or axle-trees of any of them should break, they will be repaired from those which have spare ones: if, on the contrary, the enemy should be so near as to give cause to apprehend an attack, the necessary precautions are taken for forming the troops in order of battle, and for the necessary dispositions during the action.

It has been already observed, that an army on a march should be divided into as many columns as the detachments have found openings or roads leading to the camp the general intends to occupy; suppose two, the army will consequently march in two columns. The disposition of the troops in their march differs entirely from what it would be in an open country; the advanced-guard of each column must consist of infantry, some must be distributed either in the narrow passes or on the heights, and there should be some advanced detachments of light horse to scour the narrow passes: the rear-guard should consist of infantry only; the remainder of the troops may be disposed after the following manner:

Four or five brigades of infantry, according to the number which composes the army, should be placed at the head of each column; the same partition should be made with regard to the artillery, which must follow the infantry; the cavalry must march next, and the baggage of each column, well escorted by infantry, must follow the cavalry; then the remainder of the corps of light horse which are not detached; and the dragoons are placed the last, in order to dismount and sustain the rear-guard in case it shall be attacked.

Each column should consist of the same number of troops as well infantry as cavalry. Platoons of infantry should be detached to march on the heights, at

proper distances, in order to cover the flanks on the right and left. Care must be taken to march very leisurely in the front, otherwise the rear will not be able to keep up; then, in order to give the rear time to come up, the front will be forced to halt, by which the march will be retarded and the troops fatigued. See Plate CCLXXXIX.

These dispositions are necessary, because as the enemy in a mountainous country will be able to attack with infantry only, it is necessary to oppose him with troops of the same nature: the reason why the artillery is posted behind the infantry is, that in case the enemy should attack briskly in front, and the road through which the columns pass is broad enough, some pieces of cannon may be sent into the front, which firing with grape-shot will soon thin the enemy's ranks, and abate something of his ardour: if the road is too narrow, and there is not room for more than four or five men to march abreast, consequently the artillery must be carried on sledges, which has been often obliged to be practised in the Alps. In this situation resolution must supply the want of that assistance which the cannon would give, and the enemy must be charged with bayonets; which is the easier to be performed, as the enemy will not be able to present a larger front than that opposed to him by the army, which is also supposed to be in possession of the heights. The cavalry does not follow immediately, because, not being able to act in this sort of country, it must be covered by infantry. The baggage which follows is sufficiently defended by the columns that cover it, and the infantry that escorts it: this infantry should nevertheless join as often as circumstances will permit, without being fearful of exposing itself, that upon the heights being to reinforce it in case the head of the army should be attacked. The remainder of the corps of light horse being as incapable of acting as the cavalry, is free from insult: the dragoons which have been posted behind can, by dismounting, assist it if it is attacked. Troops thus distributed will march on securely; by this means those troops who can act with facility cover and protect those who cannot, neither will they be in the least embarrassed.

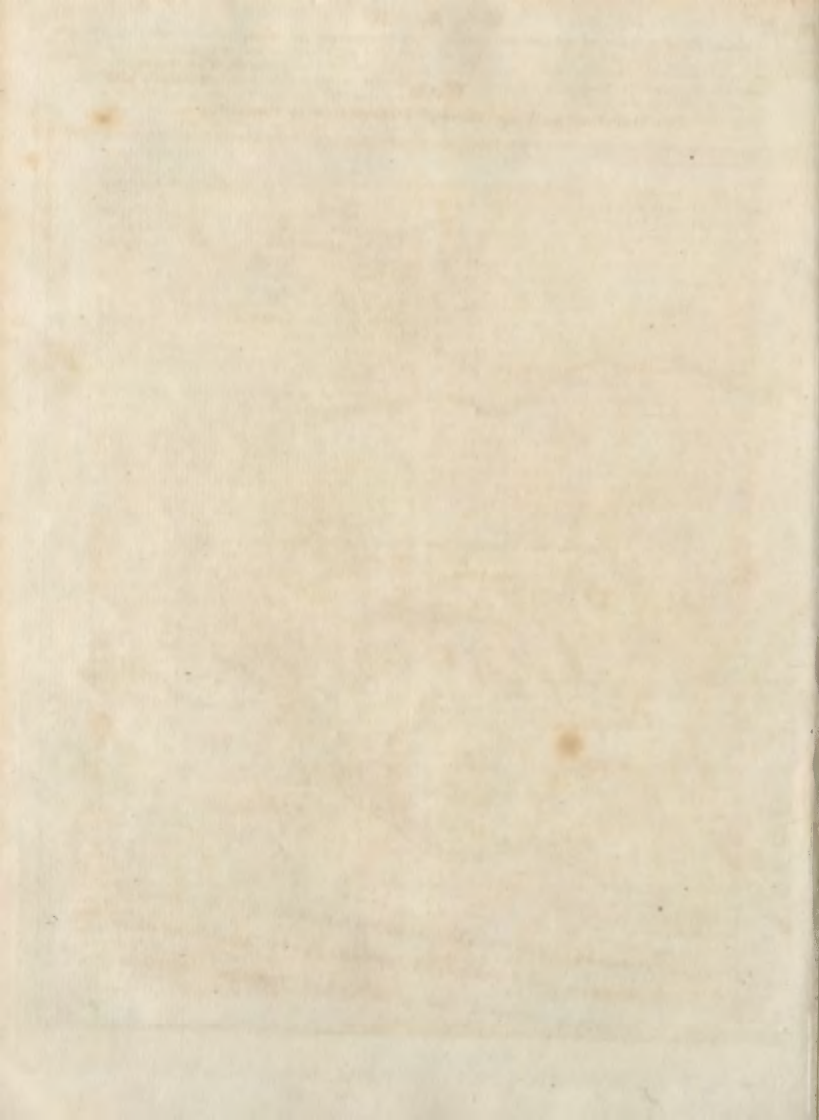
There are some mountainous countries so difficult of access, that it is impossible for the cavalry to follow, because some post must either be immediately seized, or the enemy, being in possession of the hills, must be driven from them before it can advance; or because it would be difficult for it to be substituted.

If the army can march in four columns, the dispositions should still be the same; but as the head of the columns will be weaker in infantry, the heights should be guarded accordingly, and the rear-guard sufficiently strong to resist the enemy: the same disposition should be made for one column only.

If the march is to be made through a woody country, the precautions which have been already mentioned in regard to examining the ways through which the army is to pass, and for the detachments which set out in order to be before the army, should still remain; but the disposition and order of the troops are different. If by the situation of the country the army is obliged to march continually through woods till it arrives at the camp, the cavalry and the baggage should be in three columns in the centre; but some infantry should

The March of an Army through a Mountainous Country.

*J. Bell del.*



should be placed at their head and their rear-guard: the infantry should march in two columns, one on the right, the other on the left of the cavalry and baggage; some brigades of artillery should be distributed to each column of infantry, the remainder must march at the head of the columns of baggage; the flanks of the columns must be covered by platoons of infantry, placed about at proper distances, which are to follow the columns at 40 or 50 paces distance, without ever losing sight of them. See Plate CCXC.

If by the knowledge which the general has of the country, or rather from the report of the officers who commanded the detachment sent out to view, open, and repair the roads, he knows that the country is interrupted by woods and little plains, the disposition ought to be wholly changed; it will then be sufficient that the second detachment, which in other cases ought to set out the evening before, sets out only two hours before the campement. This detachment should be composed of infantry, light horse, and dragoons; the infantry to scour the villages and the woods, the light horse to penetrate into the woods wherever they can enter, and clear the march of the infantry, and the dragoons to sustain the whole.

When the disposition for the march of the army is supposed to be in five columns, the infantry should form two, the cavalry two more, and the artillery and baggage the fifth. If it is thought there will be any occasion for artillery, a brigade or two may be distributed to the columns of infantry; and the remainder may march at the head of the effort of the baggage, which is to be defended by the regiment of artillery; to which must be added a detachment of infantry, which will form the advanced guard. The cavalry and dragoons are to keep the open country as much as possible, and the infantry the inclosed; the dragoons and cavalry should avoid the woods as much as possible, and the best and most accessible road should always be given to the artillery and baggage. In order that the columns may preserve the same length in marching, a brigade of infantry should be placed at the heads of the columns of cavalry; if this precaution, which fixes the head of the columns of cavalry, is neglected, the cavalry will extend a great way before the columns of infantry, which should always be avoided. The rear-guard should consist of infantry, cavalry, or dragoons; the light horse should always march on the flanks on the right and left, and before the army.

It is after this manner that the march of an army may be disposed through a woody and a mountainous country; but an army must always suit its motions to circumstances, and to the situation of the country where the war is carried on. Were the general always free to choose his own route, he should sooner be determined by the nature and number of the troops he has with him, than by the goodness of the road: it is not without great difficulty that cavalry can act in a woody country; in a mountainous one they are of no use; there infantry only can be serviceable. If the general is inferior in point of number, he should always make choice of defiles; because in them he can always present a front equal to the enemy's. Who can be ignorant that Leonidas with 8000 Greeks, at the straits of Thermopylae, stopped the almost innumerable army of Xerxes, who was unable to force him?

A mountainous and woody country, when thoroughly known, becomes a more favourable theatre for practising the wiles and stratagems of war than an open country; it is true that the knowledge of it is more difficult to attain, and that it requires more vigilance and readiness in the general. Hannibal was even drawn into ambuscades by his own guides; an example worthy the notice of a general who takes guides that have either but little regard for him, or are unacquainted with the country: it is impossible to try them too much, and their ignorance is often more fatal than treachery itself.

The general should choose brave and active soldiers for the forming of the detachments which precede the army. It has often happened that guides, and even entire detachments, seized with a panic, have imagined the enemy where he was not; and by that means have missed the opportunity of finding him where he really was.

The places where the enemy can lay ambuscades ought to be known: neither is it always in the most hidden and secret places that they are to be found; they are often in those that are most uncovered; for the more open a place is, the less suspicion will there be of any ambuscade in it.

The marches that require most precaution are those made in the night, those made in sight of the enemy, and those that should be kept secret.

The first should be avoided as much as possible, especially in a mountainous country, because surprises are more unavoidable, and the soldier's fear, which always magnifies the danger he cannot see, renders those marches more difficult, and very dangerous. If the army is beat, the retreat becomes more fatal than the action itself: should it get the better, that advantage becomes useless, because it will not be able to pursue the enemy; whether on account of the ambuscades he may have laid to secure his retreat, or whether from the fear of losing the way. The Numidians, who had more cunning than strength in war, attacked Marius in the night; because, said they, if we are beaten, the darkness will befriend us in our flight; and if we beat the Romans, it will not prevent our pursuing a vanquished enemy through a country of which they have no knowledge, and with which we are perfectly acquainted.

But if circumstances require and force an enemy to march over a mountainous country in the night, care should at least have been taken that the roads have been well surveyed during the day; that the guides march at the head of the army; that the ranks are kept very close together, that the men may not lose sight of each other: and that part of the troops do not mistake one defile for another, which may easily happen in the dark, if the advanced guard has marched a little too fast, and the officers hastened too much. The Greeks, according to Xenophon, on like occasions, gave the heaviest arms to the troops that marched at the head, thereby to oblige them to proceed leisurely.

In those marches that are made in sight of the enemy, beside the precautions necessary to be taken for the safety of the troops, and which have already been mentioned, the general should endeavour to deceive them by false appearances, and by an ostentation, often, in such circumstances, necessary: as extensive a front as possible should be given to the army; the intervals

of the ranks and columns should be widened, but not so as to weaken them; the general should take advantage of an height, possess himself of it, and post some troops in it, in order to make the enemy suspect there may be still more behind: advantage should be taken of a wood, and, by marches and countermarches, the same troops should be made to pass and repass, in order to make the enemy believe the army stronger than it really is. There have been instances of generals, who, on like occasions, have made such good use of their ground, that, by the arrangement of troops, they have seemed to multiply them in the enemy's eyes; and who, although inferior in strength, appearing to have the advantage of numbers, have kept the enemy in awe.

But still, unless it is to deceive the enemy, a general should conceal his force and management: his force, because, if superior, he will not fail to profit by that advantage; and if inferior, he should avoid a battle: he will conceal his management, because he will prevent the designs of the enemy's general, who will receive as much information from his successes as from his mis-carriages. Pyrrhus, who taught the art of war to the Romans, was in the end conquered by them. The Mexicans often turned the arts and wiles of Cortez and the Spaniards against them; and the czar Peter I. never regretted a defeat when it became the means of instructing him how to conquer in his turn.

It is impossible to lay down fixed rules for secret marches: it is by his address that a general will improve circumstances; it is by art and contrivance that he will evade the enemy's vigilance, and deceive his spies. The march performed by the great Condé and M. de Turenne, in 1674, may be seen, as related by M. de Feuquieres in his memoirs.

However difficult it may be to attain a thorough knowledge of a mountainous country, this march certainly supposes, in the two princes who executed it, the most digested study and the deepest knowledge: the justness of the orders, and the exactness with which each commander arrived, almost at the same time, on the spot where they were to assemble in order to make the attack; and the infinite precautions they must have taken for the subsistence of an army, that, during a march of eleven days in a barren sandy country, wanted for nothing, are circumstances not to be sufficiently admired.

If, in the passing of mountains, there is only one passage, it is often by art than by force a general can get possession of it. The duke of Valentino intending to pass through Tuscany, and fearing the passage of the Alps would be shut against him, sent to demand a passage of the Florentines; but during that negotiation he passed the Alps, without waiting for their answer.

If there are many issues, they must all be guarded, and not one of them neglected. In 1515, Francis I. desirous to pass into Lombardy, and being also apprised that the Swiss waited for him at the different openings of the mountain, sent detachments towards each of these places, as if he intended to force them; and whilst he, by this means, kept them in suspense, he passed with his army through another opening which was shown to him by a peasant. But if it is impossible to deceive the enemy, and if circumstances render stratagems ineffectual for concealing of the march, all possible care must be taken: any, even the most trifling

thing, may cause a discovery; the neighing of horses, the light in a pipe, the noise of the arms, &c. during the night; and in the day, the dust, and the sun-shine glittering upon the arms. During the march, all these inconveniences must be guarded against as much as possible, by recommending silence to the men, while in woods and passes; by leaving the horses and mares behind, if they neigh to each other, and also every thing that can contribute to noise.

But if, notwithstanding all these precautions, an enemy superior in force is in possession of a pass from which he cannot be dislodged but by art, a feint should be made of attacking some post, in order to draw the enemy; from the pass and possession should be taken of whatever the enemy abandons, or withdraws his troops from. The general should make diversions, pretend retreating, and even flight: he should observe whether there are any heights commanding those occupied by the enemy; add if there are, he should attack the enemy on the side next them; so that whilst the enemy is taken up in defending himself, the troops may seize on that post which overlooks him: art and force should be employed by turns, and should be blended together as often as possible. A Greek general set fire to a wood which was at the foot of a mountain in the enemy's possession, and which he wanted to go over; the flames and smoke forced the enemy to abandon it, and leave the passage free to him.

General rules only can be given of the dispositions to be made of troops upon a march; particular ones would be merely conjectural, because the general of an army must always depend upon circumstances: it is the situation and nature of the country, the number of troops, the nearness of the enemy, the facility of foraging, and the passes of which the enemy is possessed, that ought to determine him.

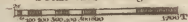
In a word, whatever is the order and disposition of the troops, it must be such, that they shall always be able to sustain each other; that the flanks shall be well guarded, and the fronts secured; the roads must have been surveyed and opened; and whatever the nature of the country is, all the columns should arrive at, and enter the camp at the same time.

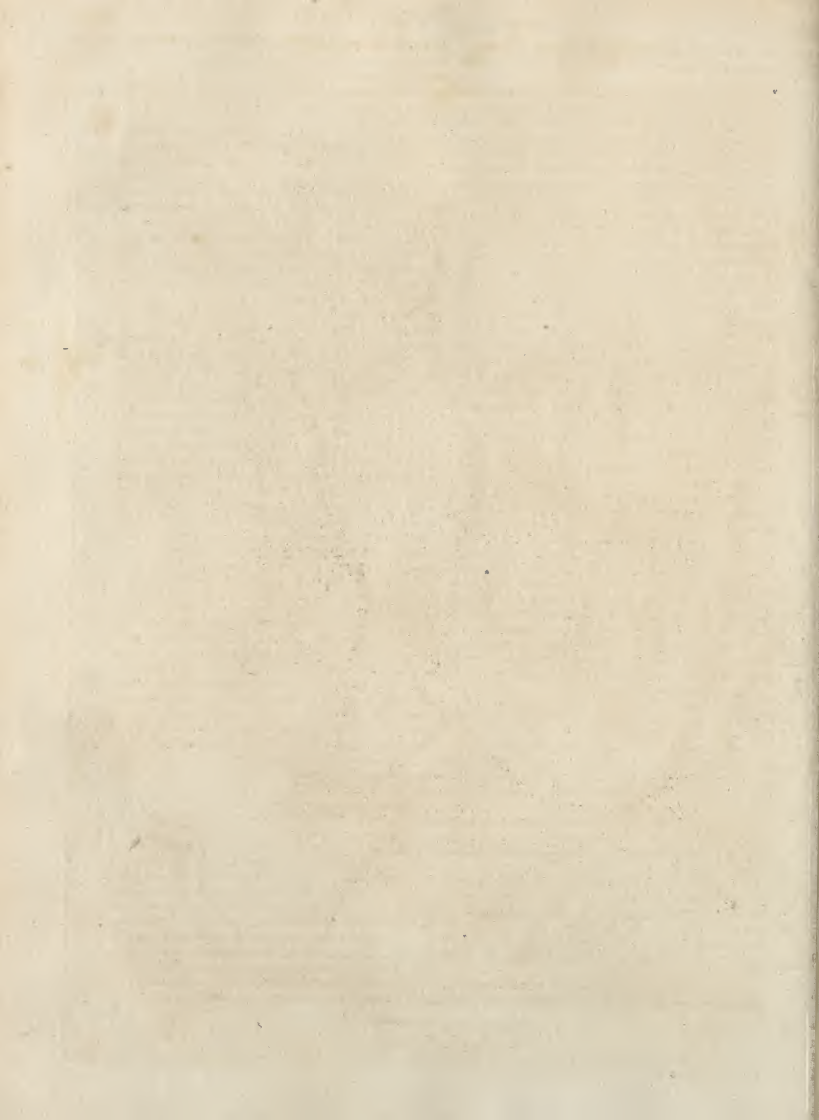
SECT. VI. *Of Camps in defensive War.*

It is in general more difficult to carry on a defensive war, but more particularly so in an open than in a mountainous country. In the former there is nothing to conceal the movements and dispositions of the army from the enemy, whereas in the latter the nature of the places prevents the enemy from discovering them: but whatever may be the nature of the country, the choice of a camp when on the defensive, and the art of pitching upon an advantageous situation, is what proves the genius and talents of a great officer. Exclusive of a thorough knowledge of the country, this operation requires a quick and penetrating eye in a general to enable him to seize the posts which from their situation may prevent the enemy either from attacking him or penetrating into the country. It is not difficult for a general to stop an enemy by his courage, when of equal force; it is still easier to prescribe bounds to him when he hath the advantage over him in number: but a general, under the necessity of receiving them, must seek for such expedients from his

own

Plan of the March of an Army through a Woody Country.

Scale of $\frac{1}{2}$ a League.



own talents and understanding as may serve to balance the enemy's superiority, or make himself equal to him in strength.

A general who acts on the offensive takes what state or circumstances he pleases; he may act as he chooses, and is not under a necessity of regulating himself entirely by the enemy's motions: whereas a general that is not sufficiently strong to attack, is commonly obliged to continue quiet till the enemy hath acted, and then to regulate his motions according to those made by the opposite army, unless his superior abilities give him a particular advantage over the enemy's general.

Although it is always necessary for a general to have a thorough knowledge of the country, this knowledge will yet become more necessary to him when acting on the defensive. He ought to prevent the enemy's entering his country and forming any siege there (a plan which he cannot execute, unless he is possessed of the most advantageous posts, and also of those which cover the towns liable to be threatened) by proper dispositions that secure his camp; by covering his fronts and rears, and keeping the communication between the camp and the places where the magazines are; by endeavouring to annoy the enemy in his convoys and foragings; by harassing him in his camp, and perplexing him with small detachments, to which the enemy will be obliged to oppose more considerable ones: these dispositions, properly managed, may destroy any enterprises the enemy may have formed against the army.

By the enemy's superiority, the nature of the country, and the success of campaigns, the general should determine whether or not his camp should be entrenched: the entrenching of camps requires much observation. It is easy, says Vegetius, to entrench a camp while at a distance from the enemy; but it becomes a very difficult operation when the enemy is near at hand. The Romans, according to him, used to keep all their cavalry and half their infantry drawn up in order of battle, in order to cover those troops that were employed in working at the intrenchments. Cæsar, when in Sapin, fortified himself after this manner under the eyes of Afranius and Petreus, without their having the least knowledge of it.

Before a general fortifies a camp in a plain, he must observe the position in which the ground will permit him to form his camp; whether or no it will be liable to be surrounded; if it will entirely cover the country it is to protect, and the towns for which there is most reason to be apprehensive; if the parts in the rear are open; if forage is in plenty; if provision can easily be brought; if there is wood and water; if it is impossible for the enemy to enter the country without forcing the camp; if all these circumstances concur, it is certainly most advantageous to entrench the camp.

A general should never be too secure by having a superiority of numbers; he ought not on that account to neglect fortifying his camp: even when he acts on the offensive, these entrenchments will not hinder him from marching out to the enemy whenever he judges it proper, and his army will by that means be sheltered from the enemy's attempts.

Cæsar, whose good luck was equal to his intrepidity, after having ranged over all the territory of Beauvais,

like a conqueror certain of victory, being distressed for forage, was consequently obliged to weaken his army, in order to increase the detachments which he sent out to forage; he therefore first took the precaution of surrounding his camp with all necessary fortifications.

If a general is fearful of fatiguing his troops or weakening his army by employing part of it at these works, he must, for that purpose, make use of all those who follow the army: they will work equally the same as the soldiers; for nothing will render men so industrious and laborious as the common danger to which they are all exposed: As formerly, at the siege of Carthage, the women, the children, and the old men, all worked; and their united labours retarded, at least for some time, the taking of that city: Cæsar, that he might not fatigue his troops, employed only peasants to entrench his camps.

There are many methods of intrenching a camp by lines beginning on the right, and covering the whole front of the camp to the left; these lines, in their extent, have redoubts and angles at proper distances; and the line being continued from one to the other, forms the curtains. In the front of them there is a large and also deep ditch; sometimes a covered way is added, which is a pallisadoed and floccaded throughout the whole front of the lines. To render them yet stronger and more difficult to be forced, there are pits sunk before the covered way. These pits are ranged chequer-wise, about six feet deep and five broad, and are in form like a reversed cone. Such were the lines which the duke of Berwick caused to be made in 1734, to the lines of circumvallation before Philippsburg; only with this difference, there was no covered way. Without doubt these lines are formidable, and even very difficult to attack; but a great deal of time is required for constructing them: and if there is not a sufficient number of peasants in the army to work at them, troops must be employed to expedite them; which will not only greatly fatigue them, but may also cost the lives of many; because removing of earth often causes great disorders, particularly where the ground is swampy or clayey. Besides the time which these lines take in raising, they are generally defective; and there are but few instances of their being attacked without being forced; and if the enemy penetrates at any one part, the troops which guard them are obliged to retire to avoid being attacked in front and flank.

The method practised by marshal Saxe seems much superior to these lines. It contained as large an extent of ground, without diminishing the labour; because, instead of lines, it consisted of redoubts, which require as much work to form the four faces and the covered way, as lines always continued. At the siege of Maestricht in 1748, he used these redoubts instead of lines; their distance from each other was 48 yards; they were floccaded, and the covered way pallisadoed. These redoubts present an angle to the field, and consequently were a mutual protection to each other; they were each of them capable of containing a battalion.

His design was, supposing the enemy was come to attack the army, to cause all redoubts to be occupied; to plant ten pieces of cannon between each, and to draw the army up in order of battle behind them: by this means the enemy would be obliged to force the

Defensive Operations

redoubts before they could attack the army, which could not be done without great loss. But supposing the redoubts to be forced, how would the enemy be able to enter the intervals without dividing? The army behind, in order of battle, would charge him, without giving him time to recover himself, and it is highly probable would beat him.

By following this method of entrenching a camp, if some of the enemy's battalions should, for example, force three of four redoubts, they certainly will not dare to advance as long as the remainder hold out; so that a general might, by detaching some brigades, and causing them to march to the assistance of the battalions that have been forced, retake the redoubts; or, without disordering the order of battle, may drive away the troops which are in possession of them with his cannon. In short, this method seems to be excellent, because it proves, that all the redoubts may be forced, and yet the army not be beaten, because it has not suffered in the action, but remained the whole time in order of battle with all its cannon; so that the enemy will be reduced to the necessity of beginning a second battle. Lines, on the contrary, have not the same advantage; all the troops, or the greatest part of them, must line them; the cannon is planted at proper distances either on the angles of the redans, or those of the redoubts. If one part only is forced, the army is beat, and the cannon taken, because the enemy makes the attack with his whole front; and the front of the army being broken and taken up, the troops which have entered, seize on the flanks of the lines, and consequently the army is surrounded, unless it immediately retires.

Lines are never good, unless when there is a large extent of country to be guarded, and some frontier to be covered from the incursions of the enemy: the front of an entrenched camp seldom exceeds six miles, more or less, whereas lines to cover a country have sometimes extended thirty miles in front. By some it is thought, that, in order to cover a country, it is sufficient to have certain holds, which shall be strong and well entrenched, with patrols continually going from one end of the posts to the other, and each post to be provided with signals both for day and night. It is unnecessary that these patrols should be strong, provided they follow and are continually crossing each other; this will be sufficient to prevent the enemy passing undiscovered. It is certain that the enemy will not dare to pass between these posts, whether he be strong or weak: if he pass in a body, he will be cut off behind, and his convoys intercepted; if he pass only in parties, they will be cut off with the greater ease. However, lines of this nature would require much labour, and also take up years to complete them.

The lines of Stolhofen are a proof, that however well fortified lines may be, they are not impregnable. The prince of Baden had employed a considerable time in the construction of them, had neglected nothing, to render them formidable, and they were deemed impossible to be taken: nevertheless, M. Villars forced them in 1704, without the loss of a man. There are many instances of lines, which, encompassing a large extent of country, having been forced: those of Flanders guarded by the French were forced by the duke of Marlborough in 1705, and many others

which are needless to mention.

Marshal Saxe's method for entrenching a camp in a woody country interperfed with small plains, seems also to be a very good one. The redoubts are to be erected in the plain; and lines thrown up in the woods according to the usual method, with redans placed on the side of each other, at 24 toises distance: there should be a palliaded ditch in the front, and the lines as well as the half-moons should be fringed with pointed stakes: behind these lines, which cannot be very extensive because they only cover part of the front of the camp, must be placed the troops necessary for defending them; a considerable intrenchment of felled trees must be made behind with the branches of the trees entangled with each other, and some openings must be left wide enough to permit the troops who guard the lines to pass through, in case they should be overpowered and obliged to retire: the cannon must be planted in the face of these openings; and the remainder of the army must be drawn up in order of battle, 100 paces at most behind the intrenchments of trees and the half-moons.

The retrenchments of trees are placed about 60 or 80 paces behind the lines, and not before them; because it will be a new and unexpected obstacle to the enemy. These retrenchments, carefully made, and with large trees, can be destroyed by cannon only, which would take up a considerable time: if they were in the front of the lines there would certainly be a rampart more; but that might be useless and perhaps hurtful, because the fire of the enemy to make a passage, would drive the splinters of the trees into the lines, which would do more harm than even the shot itself. See Plate CCXCII.

In a mountainous country the dispositions for intrenchments are different: it is impossible there to find plains sufficiently large to draw up an army in order of battle, and place it beyond redoubts, as in an open country; the avenues and the passes only can be entrenched; the redoubts would not be sufficient, because the avenues not only must be guarded, but the heights also occupied. Now, as it will often happen among mountains that there is not a foot of earth, how then can redoubts be erected there? A general must then make use of such assistance as the country can furnish him with, whether by heaping stones upon each other, or by retrenchments of trees well joined; and thus construct lines sufficiently strong to shelter the soldier from fire and all injury. In an open country, a general in a manner suits the ground to his dispositions; in a mountainous country, he must apply his dispositions to the ground; but in any country whatever, he must use all the assistance of art for entrenching of camps. In mountainous countries there are more inequalities of ground, which render the enemy's approach to the lines difficult; and although it is almost impossible for a camp in a mountainous country to be attacked in front, nothing should be neglected for its safety: but all the avenues by which it may be surrounded must be entrenched with care, and all the heights which overlook it secured; because the enemy, without intending to attack in front, will amuse him during the time necessary for troops to take a long round, in order to penetrate to the camp on another side. If Leonidas, with his 8000 Greeks, had been possessed of all the avenues, ways, and heights, by which he could be cut off, in the same manner as he was of the

pass

WAR.
Plan of the Position of an Army in the Camp.



of the Camp

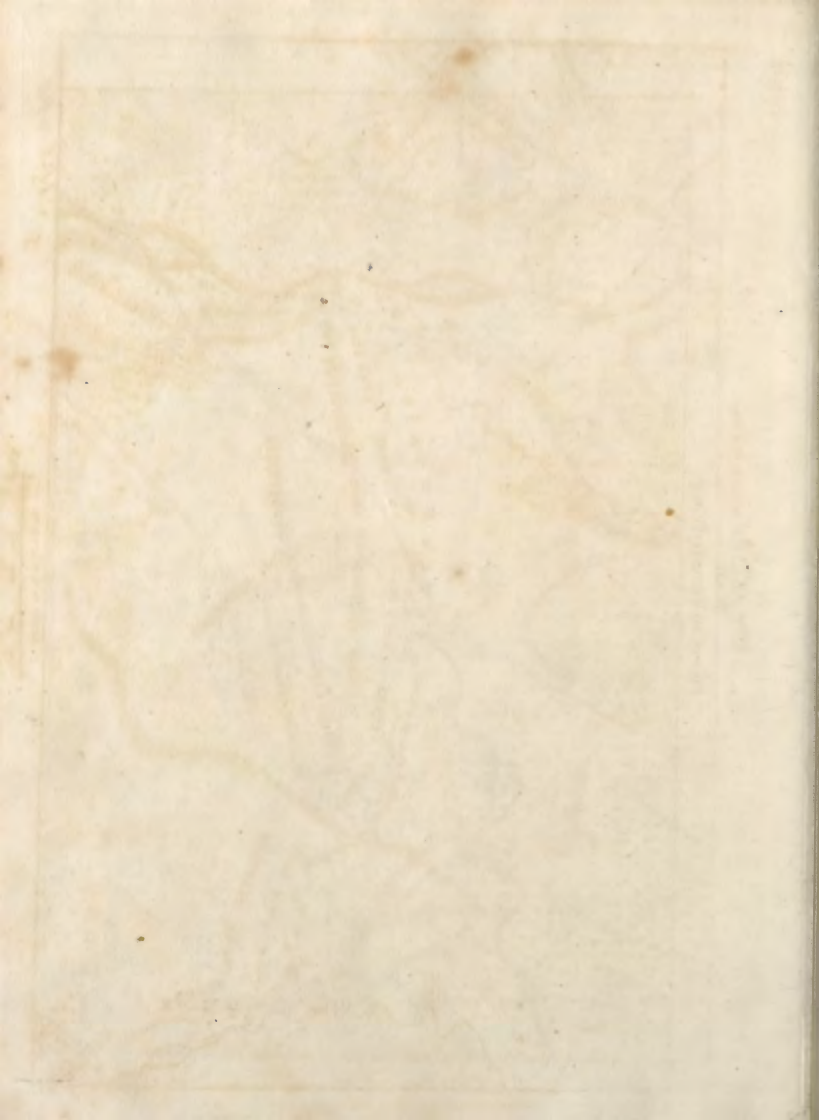
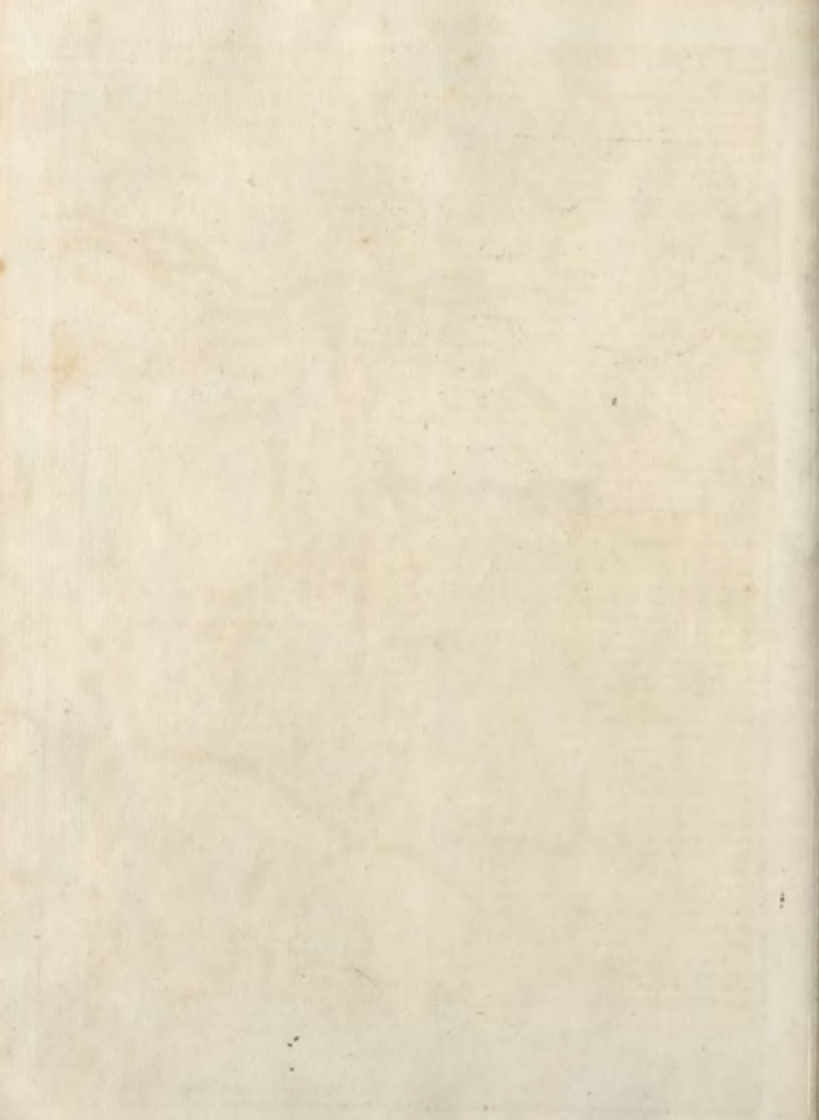


PLATE CCXCII.
WAR.
Plan of an Infringed Camp.



of the camp

Scale of 1/4 of a League



pafs of Thermopylæ, Xerxes with his innumerable army could never have forced him in the defiles which he guarded. The three actions of Fribourg are memorable examples of the necessity of securing all parts in the rear, and of occupying the posts by which they can be turned. M. de Mercy, attacked by two generals of the highest reputation, the great Condé and the viscount de Turenne, took such good positions in these three attacks, that, although forced to retire and followed from post to post, he could never be turned, but made his retreat quietly through the valley of St Peter, without the French army's ever being able to break in upon him.

The intrenchment should never be more than 250 or 300 toises, which make from 500 to 600 paces, distant from the camp, and which ought to be divided into three parts. This distance should be made, that the troops may be able to judge of the parts that can be carried with greatest ease, and of those which are most in need of assistance, that they may march there with greater order, dispatch, and facility: whereas if this distance is not observed, it will happen, as hath been sometimes seen, that the troops not having ground sufficient to range themselves in order of battle, the dispositions will be impeded by confusion and disorder, and the enemy will have forced the lines before the troops can be in a condition of opposing him.

But in a mountainous country, it is not sufficient for a general that he cannot be turned; that he hath profited so well by the advantages of ground, as to render the enemy's approach to the camp difficult; that the assistance of art hath been joined to nature, and that the country to be guarded is entirely covered: he must also be careful that the communication with the neighbouring towns where the magazines of war and provision are established, is safe and easy. If any one of these particulars is neglected, the camp is exposed, neither can the general continue in it the time that would be necessary to retard the march and designs of the enemy. As it hath been already observed, that there is scarcely any post that is not liable to be turned or overlooked, the camp should be entrenched only so far as the entrenchments may become an obstacle to the enemy, and as they may be a means of giving the general time to retire to occupy another post.

When the enemy undertakes the siege of some town, and the general, although with an inferior army, is willing to succour it, or cause the siege of it to be raised, he should seek out a spot naturally strong, and entrench it according to its situation: if an open country, according to the method above mentioned; if among mountains, according to the assistance that the nature of the country may give; and make use of these entrenchments as a sure asylum from whence to make sallies upon the enemy, to attack his forages and his convoys, and to oblige him to raise the siege as well by the fatigues of it, when it hath been drawn out to a greater length of time than was designed by the enemy, as by the want to which he is reduced by the continual inquietudes that the intrenched army hath given him.

When an army is in an open country, it generally continues in the same camp for some space of time; because it is certain the enemy cannot conceal his designs so effectually from the general, but he may be able

to circumvent them; but in a mountainous country it is uncertain whether an army will continue in the same post till morning that it occupied over-night. A general must then encamp in such a position, and after such a manner, that in case the enemy comes to attack him in force and with advantage, he may be able, without danger, to proceed to another post, and evade the enemy's designs.

It requires great skill in a general to judge when it is proper or improper to make choice of places which have a great many avenues on one side; because if he should be attacked in a camp inclosed by rocks, or deep in a valley which hath but one or two passages open, it will be very difficult for him to disengage himself from the enemy: on the contrary, if there are many small passages or avenues to the ground of which he is possessed, and by which the enemy may easily invade his camp, it will require a great number of men to guard them. But on these occasions a general should be ever careful to make a good disposition of his troops, to maintain strict order and discipline in his camp, and to find out his patrols with the greatest regularity; by which means he will free himself from all apprehensions of being surprised.

There ought to be no difference between a well-governed town and a well-ordered camp; the exactest order should be observed, and the strictest discipline kept up: if a soldier is at liberty to quit or enter it at pleasure, the enemy's spies will not fail to make their advantages of it. If the camp is unhealthy or distressed for provision, water, wood, or forage, and the soldier hath real cause of complaint, every method should be tried to avoid the danger that will attend his being discouraged. It is often owing to the little order existing in the camp, that the soldiers are seized with a panic, occasioned by the absurd and groundless reports that are diffused throughout it; troops thus terrified, are in a manner vanquished before they come to action.

In a mountainous country, such places should be avoided as are subject to be overflowed, either by the melting of the snow, or by torrents which, at some seasons, appear no more than trifling rivulets, but which, at others, swell and carry off every thing they meet with in their way: of this nature were those mentioned by M. de Feuquieres, which he found near the rock that he attacked and took in 1690 near the Badouais. Situations in the neighbourhood of woods are generally to be feared, because the enemy may set them on fire, and the flames be communicated to the camp. The general ought also to satisfy himself with regard to the nature of the springs, which may agree very well with the inhabitants, but prove very unwholesome to strangers: such, according to the reports of the French, is the nature of the springs in many parts of Italy. The water belonging to certain streams or rivers will be pernicious, while that belonging to the fountains and wells in the same country will be very wholesome and salutary.

The reader may see in Vegetius, Santa-Cruz, Montécuculli, and Puyégur, the kind of order necessary to be observed in a camp, whether entrenched or not: it is impossible to use too many precautions for its security; they depend upon the general's ability, and upon the discipline he causes to be observed.

SECT. VII. *Of escorting Convoys.*

THE conducting of convoys is one of the most important and most difficult of all military operations. In the escort assigned them, and the number of horse and foot of which this escort is composed, the general ought to be guided by the distance of the town from whence they set out; the dangers to which they are exposed from the different parties they may meet; the distance and strength of the enemy, and the extent and nature of the country they have to travel over, whether an open or a mountainous one; the number of waggon, and the quality of the convoys, whether they consist of money, or ammunition for war or provision; and whether they are extraordinary or daily. When escorts are too numerous, the troops are fatigued, and no end answered; and when they are too weak, they are liable to be beaten. M. de Puyégur observes, that it is as dangerous to give an escort of 2000 men to a convoy where only 1000 are requisite, as to give but 500 to one where 1000 are absolutely necessary; in the first the troops are unnecessarily fatigued, and in the second the convoy is exposed to the danger of being carried off.

All these considerations suppose the general to be a man whose natural parts are matured by experience, and who is sensible that, without a thorough knowledge of the country, the foundation of all conduct, it will be impossible to make a proper disposition of troops. If a general is ignorant of the places most proper to form ambuscades; of those where there are bridges and fords; of the passes which are most dangerous, and those which will favour the enemy's approach in order to attack, and whether in head, flank, or rear, he acts but as chance directs, and his dispositions will have no meaning, either with respect to the situation of places, or the nature of the ground; the orders will be ill executed, the evolutions performed without exactness, and the disposition of the troops will be faulty; the separate bodies being, consequently, unable to sustain and assist each other, will soon be beaten and dispersed, and the convoy carried off.

The general officer commanding the convoy ought, for its security, to distribute his troops after such a manner that they may be a mutual assistance to it. The choice of the troops to form the escort is undetermined, as it is by the nature of the country their quality should be decided. In mountainous and woody countries, only infantry, hussars, or dragoons, can be made use of; the hussars or dragoons are to march in the front and on the flanks, to scour the woods, examine the avenues, and make sure of the defiles: in an open country, the escort should be composed of infantry, cavalry, hussars, or dragoons. But whatever may be the nature of the country, the convoy ought never to advance without first sending out detachments to reconnoitre at a distance.

If the convoy marches through a mountainous country, a large body of cavalry would not only be useless, but also an embarrassment, as it would be unable to act, except with great difficulty; whereas, in an open country, cavalry is very serviceable. In any kind of country a convoy can be escorted with infantry, especially when the enemy can only act with his; but as in an open country it is necessary for the infantry to

be supported, the cavalry must be used for that purpose. In a mountainous country, infantry can carry on war alone.

In this last case the officer commanding the escort ought to place a body of infantry at the head, another in the centre, and a third at the rear-guard; to distribute small bodies at proper distances on the right and left, and he should be particularly careful to possess himself of the heights. The hussars must be distributed to the advanced and rear guards, and, in order to be more certain that every part hath been strictly examined, as the convoy advances, notwithstanding the hussars of the advanced guard have already scoured the avenues, woods, valleys, villages, and hollows, the hussars belonging to the rear-guard should again look into those places, to see whether any thing hath escaped the notice of the advanced guard. These precautions are never without their use, and do not in the least retard the march of the convoy.

The small detachments should advance as far as possible into the country, without exposing themselves to the danger of being cut off, the hussars with pistol or musketoon, and the dragoons with their carbine in hand, in order that if they should meet the enemy, they may, by firing, give the officer commanding the escort notice of it, so that he may have time to make his dispositions for defending and preserving the convoy. The convoy may continue marching on, till the enemy is discovered: but on the first notice of him, it must stop, and the officers belonging to the convoy should park their waggons; or, if the ground will not admit of that, they should cause them to keep very close together, and double them up with the distance of four paces, which should be filled with infantry, between each waggon. By this movement the length of ground taken up by the waggons will be contracted, the troops will be brought closer together, and will form a stronger and heavier body, capable of assisting each other with more ease.

In a mountainous country it is very seldom, and almost impossible, for the enemy to attack the advanced and rear guards and the centre at the same time. Nevertheless, if he should find an opportunity of forming these three attacks at once, by following the dispositions above mentioned, he will find troops at every part to receive him: neither will he be able to make himself master of the heights without attacking them, and the troops already in possession of the ground will easily repulse him; and by the assistance which the officer commanding the escort should endeavour to send them, they will be enabled to maintain themselves in them, to protect the convoy, and the enemy will be unable to attack by more than one or two passes.

If the enemy forms but one attack, only a part of the troops must be opposed to him, because it is to be supposed this attack may be made only with a design to draw the whole strength of the detachment to that part, and which, by being altogether in that one place, will give the enemy concealed in ambush an opportunity of falling with ease upon that part of the convoy that is unprovided with troops, and which will of course be incapable of making any defence. The troops of the centre should never march to the assistance of the advanced guard, if it is that which is attacked, nor those of the rear-guard to the assistance of the

centre;

centre; but a party from those troops which cover the flanks of the convoy should be collected in a body, and sent to assist the part that is attacked. However narrow and confined the country may be, a convoy may be easily conducted by infantry, when it would be impossible to do it with cavalry.

When any pass or avenue crosses the road on which the convoy marches, it should be covered by a body of infantry, which will remain there till the rear-guard is come up; then it will fall into the post assigned it for conducting the convoy. It is always to be supposed, that this pass hath been examined by the advanced detachments. If the escort is composed of infantry and dragoons, the latter should be dismounted, in order to give an additional strength to the guards, and their horses may be tied to the waggons. The hussars, if the nature of the country renders them unserviceable on horseback, may also be dismounted; by which means, instead of being an embarrassment to the infantry, they will become useful to it. The nature of hussars is such as will admit of their being employed on every occasion; and although the difference of their arms will not permit them to be as serviceable as dragoons, they may nevertheless amuse a party of troops belonging to the enemy in such a manner as to enable the infantry to beat them, or at least to oblige them to retire.

Hussars are more particularly necessary in the escorting of convoys, because they scamper about on all sides, and are very active and ready in scouring a country thoroughly; they leave no place till they have perfectly examined it, unless the thickness of the woods, or any other unavoidable obstacle, should prevent their penetrating as far as they would otherwise do; and even then they protect the infantry, who can with greater ease pass into those places where the hussars cannot. Whatever country the convoy passes through, there should always be hussars with it; otherwise the officer commanding the escort cannot be certain that the country is thoroughly surveyed, because for want of hussars he must employ cavalry on that service. Not that there can be any doubt of the cavalry's exposing itself to danger with as much cheerfulness and courage as the hussars; but as the horses belonging to the cavalry are naturally heavier than those of the hussars, and often encumbered with forage, they cannot venture to a proper distance without running the danger of being taken, because they cannot retire with that expedition which is requisite: On the other hand, the hussar being more active, and more accustomed to reconnoitre, knows how to go over a country with proper caution and care to himself: besides, the trooper who is used always to march in a body, and to be under command, will have a very imperfect idea of the method of scouring a country. Although the disposition of the troops should always be regulated by the nature of the country through which the convoy marches, and by the nature and number of the enemy by which it is liable to be attacked, yet the general should never neglect, whatever his situation may be, to secure the head, centre, and rear. Before the convoy begins its march, the disposition in case of an attack should be settled; by which means the commanding officers of different corps will know where to post themselves, and after what manner to act at the time the attack is made,

By the knowledge which the commanding officer ought to have of the country, he will form a judgment of those places where it is most probable he may be attacked, and of course make his dispositions accordingly. In any disposition that may happen, a general should always foresee in what manner the attack, defence, and retreat, will be conducted.

When a convoy marches through an open country, the advanced and rear guards should consist of cavalry sustained by infantry; the infantry in the centre should be continued on the right and left of the waggons, and the cavalry divided into troops should be distributed on the flanks, at 100 or 150 paces from the infantry; squadrons of horse, intermixed with platoons of infantry, should be placed at proper distances on the flanks of the remaining part of the convoy. By this position, if the convoy should be attacked in head, centre, or rear, these squadrons and platoons should have orders to march immediately to the assistance of the party that is attacked.

The advanced detachments of hussars, and those upon the flanks, by giving notice that the enemy is at hand and coming to attack, will furnish time for parking the waggons and uniting the troops; in which case the infantry must form in the park, and the cavalry post itself on the flank of that front which expects to be attacked, and the hussars place themselves upon the flanks of the cavalry.

The attack of a convoy is always sudden and rapid, and the success of it is generally decided in the first onsets; and as the enemy, whether he succeeds in his attempt or not, must retire with great expedition, for fear of any succour that may arrive, it is evident that it can be attacked only by cavalry, hussars, or dragoons; there have indeed been some instances where the cavalry have brought infantry behind them. If the convoy has had time to park itself, the effort of the infantry can only be turned against that which is entrenched behind the waggons. The enemy's cavalry and that belonging to the escort attacking each other, will fight upon equal terms: but with regard to the infantry, it will be different; that which is sheltered by the carriages having a great advantage over that which attacks it. On the contrary, if the enemy's infantry is sustained by hussars only, they will be briskly attacked by the cavalry and hussars belonging to the escort, who will take them in flank and rear. The enemy's hussars being hemmed in, his infantry, for want of being sustained, will be easily beaten: part of the cavalry and hussars belonging to the escort, should be left in pursuit of the enemy's hussars, and the remainder ought to take his infantry in flank. If the enemy is beaten, as it is probable he will, his retreat seems impracticable, or at best very difficult; because, being deprived of his cavalry, he will be forced to make head against the infantry that attacks him in front, and to repulse the cavalry that harasses him in flank.

If the convoy, in an open country, is obliged to march upon a causeway, these precautions will still become more necessary: the hussars which are advanced, ought to examine the country very exactly; for it may happen that the country not allowing the carriages to be taken off the causeway in order to be parked, they must consequently be obliged to remain upon it; in which case they can only be doubled up,

the extent of ground contrasted, and the troops drawn nearer to each other, in such a manner as to become stronger and more closely knit together. The dispositions will then, in a great measure, depend upon circumstances; but they should nevertheless be so managed, that each corps may mutually contribute to the preservation of the convoy; and that from the resistance with the enemy shall find in every part, there may be time sufficient to send succour where it shall be most needed.

If the enemy gives ground, the general should be cautious of pursuing him too far, lest, if he should receive a reinforcement, the troops in pursuit of him, finding themselves at too great a distance, will not only be beat, but also be deprived of every method of retreating.

There are some occasions on which the enemy must not be pursued at all; such as when the armies are very close to each other, or the convoy draws near to some of the enemy's posts; because then, by the nearness of the army, the enemy's infantry can come to the attack without being under the necessity of mounting behind the cavalry, as it happened in 1747; when the French convoys which set out for Antwerp for Bergen-op-Zoom, were continually attacked by the infantry that was posted from Breda quite to Voude: in which circumstances the same dispositions should be used for its defence; and in case the enemy should be forced to retire, the commanding officer ought to be contented with having saved the convoy, and not pursue him, for fear he should find advantage from the nearness of the quarters, and receive assistance that might prove fatal both to the convoy and its escort. A general to whose care a convoy is intrusted, should never seek any other advantage than the conducting it in safety, even though he should be sure of beating and taking a detachment belonging to the enemy; a real advantage is often given up by endeavouring to follow an uncertain victory. There is less shame in being beat, when an officer hath done his utmost, and acted with propriety, than there is glory acquired in conquering when he hath exceeded the limits of his duty. An officer is no longer praise-worthy, than whilst he acts up to the orders he hath received with exactness and discretion; whereas he who, depending too much on his own courage, rashly suffers himself to be drawn on by the appearance of success, is not only charged with, but ought to be answerable for, the consequences.

If the convoy hath a bridge or a defile to pass, it is not only sufficient that the country, as far as the bridge or the defile, should be known, but also necessary that the hussars should pass over it, and take a survey of the country a great way beyond it. The time in which the hussars are reconnoitering, should be employed in making the waggons double up by four, eight, or ten in front, if the ground allows of it, in order to unite the troops belonging to the escort. The troops in the centre must join the advanced guard, and cover the carriages; the rear-guard form in order of battle, and face toward the country they have marched over; and the squadrons and platoons of infantry which marched on the side of the convoy, place themselves on the flanks, in order to cover them. When the country in front shall have been thoroughly examined,

the advanced guard and the troops belonging to the centre, covered by hussars, shall pass over the bridge, and advance far enough on the other side to give room for the carriages either to double up or to be parked. The corps of cavalry and infantry which marched on the sides of the convoy must be placed on the flanks, to protect them. As soon as the convoy and the escort have passed, the waggons must proceed, and the troops fall into the same disposition they were in before the passage; that is, if there is no alteration in the nature of the ground to make another disposition necessary: in that case, the commanding officer must give such orders as he shall find necessary. For the greater security of the convoy, a detachment of hussars should be left near the bridge, or the opening of the defile, till the rear-guard hath marched to some distance, which detachment will afterwards join the escort.

There still remains another disposition to be made in an open country, whether the convoy marches on a causeway or in the high road, which is to divide the escort into many equal parts, with troops of every sort belonging to each; the first body should set out an hour before the convoy is to begin its march, the second half an hour after, with orders to the commanding officers to scour the adjacent country with great exactness, and to be careful not to be cut off by any detachments the enemy may have in the country; for which reason these two bodies should never be more than three quarters of a league distant from each other, by which means they will be within reach of assisting each other. The body which sets out last should never be more than half a league before the advanced guard of the escort.

As the convoy is supposed to march through an open country, the above-mentioned distances are allotted between the first and second bodies, and between the second body and the advanced guard of the convoy; but if the country should grow rough and unequal, these bodies should draw closer together, and always keep sight of each other, so as to be able to assist one another in case of an attack.

When these bodies are set out, the general must put the convoy in motion, and form the advanced guard of one of the divided detachments belonging to the escort; the infantry of which detachment will remain at the head of the waggons, the cavalry shall march by troops 300 paces in advance, and the rear-guard must be formed equal to the advanced; but besides this rear-guard, there should be a body of hussars and dragoons reserved, to march a quarter of a league or more, according to the nature of the country, in the rear of the convoy; the remainder of the infantry shall be distributed at proper distances on the sides of the convoy, and the remainder of the cavalry shall be placed on the flanks of the convoy, about 300 paces distance.

The commanding officer should take care to keep some hussars with him, to scour the country round about the cavalry that are on the flanks and the rear-guard; and thus by running over the country again that hath already been examined by the advanced detachments, the commanding officer will be certain there is no enemy at hand.

There have been often instances of a swarm of hussars falling upon the rear-guard from woods, which have been reconnoitred, and where no enemy hath been

been found, and where they themselves were not half an hour before.

When a convoy happens to be of such importance that its being taken may influence the operations during the remainder of the campaign, the general should not only assign a stronger or more numerous escort to it, but should also send off detachments, which, without having orders to attack the enemy, should keep between him and the road that the convoy keeps, in order to oppose and baffle any designs the enemy may have formed carry it off. The following examples will show both the security and necessity of this method.

During the campaign of 1746, marshal Saxe, being encamped on the Orne, was in expectation of a considerable convoy from Judoigne. As its safe arrival in the camp was of great consequence, he caused the marquis of d'Armentieres, then major-general, to set out with a large detachment, in the night preceding the day on which the convoy was to begin its march, with orders to march on the side of Ramillies. At the same time, he caused another detachment to set out from the camp of his serene highness the prince of Clermont, with orders to march on the side of the abbey of Rame: these two detachments, by amusing the enemy on one side, and by entirely concealing the march of the convoy on the other, enabled it to proceed in security, and it arrived in the camp without having been at all molested.

In the beginning of the campaign in 1748, the same general having a design to lay siege to Maelstricht, and consequently having occasion for all his troops, was willing to throw a supply of provisions into Bergen-op-Zoom, as he was going to a distance from that place, and could no longer be in a situation of assisting it. For that purpose he ordered a considerable convoy, which set out from Antwerp for that town under a good escort; but in order to prevent an attack, which circumstance had often happened during the winter, and that with loss, the allies at that time occupying a chain of quarters from Breda as far as Voude, he detached the count d'Estrees with a considerable body of cavalry to march on the side of Breda, with orders to push on detachments almost to Voude. This detachment had two objects in view; one of which was to keep the allies in suspense with regard to the siege that was to be formed, and the other to cause them to remain near Breda. This large body of cavalry kept the allies, who were in the neighbourhood of that town, in suspense; during which interval marshal Saxe marched to Maelstricht, the allies not daring to attack the convoy, because they would have put themselves between the escort and the troops under count d'Estrees. From these two examples may be concluded the necessity of covering convoys of importance by detachments, independent of the escort assigned them. In short, a general should do every thing that will contribute to the security of his dispositions; and precautions ought never to be thought superfluous when they are managed with prudence, and have for their end the success of a well-concerted plan.

SECT. VIII. *Of Detachments for forming a Chain of green Forage.*

Those operations whose object is the subsistence of

the troops require the exactest precautions; for famine, as Vegetius says, proves oftentimes more destructive to armies than battles, hunger being more fatal than the sword. A general can defend himself against an enemy, however superior; but when forage and provision are wanting, there can be no hope remaining.

It is very difficult to provide a large army with forage; and a general often exposes it to inevitable danger, if he is not thoroughly experienced in this operation, or if he is destitute of that knowledge which at once presents all the wants of an army, and the means of supplying them, to his view.

Foraging parties, like convoys, are attended with a greater or lesser degree of danger, according as the country is more or less accessible, and the forage at a distance or near at hand. The disposition for the chain in an open country is different from what it must be in a mountainous one. When forage is within reach of the camp, and the enemy at a distance, fewer troops and attendants are required; because, in case of an attack, there is assistance near at hand: but in proportion as the forage is farther from the camp and nearer to the enemy, the precautions should be increased, and more troops should be allotted to the chain, which should also sometimes be furnished with cannon.

A general should never forget that maxim which says, The enemy must always be opposed by troops of the same nature as those with which he makes the attack: if the forage, therefore, is in an open country, the chain, as it is certain the enemy will be more numerous in cavalry than infantry, should consist chiefly of cavalry, and only have infantry sufficient to occupy such posts as are necessary to be guarded: in a mountainous country the dispositions will be quite different; because, as it is impossible for cavalry to move easily, the chain should be strongest in infantry. In short, the number and quality of the troops for the chain should be regulated in the same manner as in regard to the convoys; in proportion to the nearness or distance of the enemy; by the extent of ground to be foraged; and by the nature of the country: and as marshal Puysegur observes, before the ground to be foraged is examined, there should be a calculation made of the number of horses to be fed, and of the fertility of the ground that is to be foraged; for if it is a plentiful spot, a less extent will be sufficient; if it is not plentiful, a larger must be taken; but in either case the chain must be always proportionable.

Before a forage is undertaken, the ground on which it is to be performed should be always thoroughly known; in order for which the general should send out in the evening, or the day before, the officer who is to command it, with a detachment, to survey the situation of the country; the places where he must post his troops of cavalry and dragoons; the posts which the infantry must occupy; the ground necessary for the foragers; that where the corps of reserve must be posted; and what part in the front of the chain it will be necessary for the hussars to scover. After having examined all these particulars, the officer makes his report to the general, who, from the account given him, will order the troops necessary to secure the forage, and render the execution of it easy. The chain of forage should be in proportion to the number of troops

troops that are to forage, as well as to the quantity of fown fields and the thickness of the grain. Besides the horse, dragoons, and infantry, there should be hussars to scour the country in the front of the chain: the number of them is undetermined, as it will be sufficient for them to cover and protect the front, and give the commanding officer immediate notice of every thing that makes its appearance.

If the forage is to be made at a distance from the camp, the troops destined for the chain should set out at day-break, or the evening of the foregoing night, as was done by marshal de Coigny in the campaign of 1735. This general being desirous of foraging under the cannon of Mentz, the troops taken from the army to form the chain, one body under the command of the count de Belleisle, and the other under the command of the marshal de Dreux, set out after retreat-beating, and at break of day the chain found itself properly placed. When the distance is not so great, it is sufficient that the troops set out at day-break, and the general will have time enough to establish his chain, especially as the ground and the posts necessary to be occupied have been surveyed two days before. The commanding officer must take care to establish the chain before the foragers arrive, and also that the hussars have scoured the country; first, because the foragers should not, by waiting, fatigue the horses; and secondly, that no trooper or servant shall pass; which will undoubtedly be the case if there is any vacancy where troops are not placed.

The whole of the troops should be disposed after such a manner, as to be able to see one another; and the vedets also, that are placed between the troops to prevent the foragers from passing, should be within hearing. The infantry should be posted in hollows and villages and behind hedges, with horse or dragoons to sustain it and support the flanks; and the disposition of the chain will be still better, if these troops can be mixed with it, provided the infantry can be sheltered by any hollows, hedges, or bushes.

Grenadiers, sustained by horse and cannon, if there are any, should be posted on those sides which, either from the situation of the country or the nearness of the enemy, are most liable to be attacked; but in reinforcing these posts, the commanding officer must be careful not to weaken the chain too much in any particular part. When an enemy attacks a foraging party, he generally attempts to penetrate at different parts; but if he forms only one attack, the disposition of the chain becomes useless, as all the troops must be brought to that part where the attack is made. But as it is naturally to be supposed the enemy will form many attacks, particularly if his general acts like a man understanding his business, he must be strong in every part; the reserve, which is in the centre, will, with expedition and speed, send assistance to the parts which are attacked.

Before the commanding officer fixes the chain, he should detach some hussars to survey and scour the great exactness the woods, villages, hollows, and all such places, for at least three quarters of a league or a league in front, as may be capable of containing ambuscades: and during the time of this surveying, the troops destined for the chain will remain in

order of battle, in the front of the ground that is to be foraged, in order to cover it and protect the hussars, in case they should be attacked.

When this examination is finished, the commanding officer may begin to establish his chain, and the hussars will remain in the front till the foraging is finished; and will detach small bodies to march round about the chain, crossing each other, halting at times, and sending some hussars before them to patrol.

If the hussars gain intelligence of the enemy's being either in march, or placed in ambuscade, they will send immediate notice of it to the commanding officer of the chain, who should always fix himself in a particular spot, that there may be no time spent in seeking him; his post should be in the rear of that part of the chain that is nearest to and most in front of the enemy, and he will regulate the dispositions for his defence according to the report made to him. When an ambuscade is discovered, and troops marching to attack, a general should always suspect there may be more ambuscades, and more troops in march, to form different attacks; he must therefore, instead of weakening the chain in any part, strengthen it as much as he can, by causing either the whole reserve, or part of it, to march where circumstances shall require.

The avenues and the heights in a mountainous country should be occupied by infantry; the avenues, in order to prevent the enemy from penetrating into the valley or plain where the forage is made; the heights, in order to observe the enemy at a distance, and to prevent his getting possession of them, and flanking the troops which guard the avenues. In this case there should be a greater number of infantry than cavalry; no more of the latter being requisite than what is necessary to sustain and support the infantry, in case it should be attacked, repulsed, and obliged to retire through a valley or plain. Then, if it hath no cavalry to support it, the wings will be entirely exposed, and the enemy being superior, can at the same time attack the front and the flanks; whereas, by the means of horse, which can act with ease in a plain or a valley, this inconvenience will be prevented, and the infantry greatly assisted.

If the forage is made at a distance from the camp, and in the neighbourhood of the enemy, the infantry guarding the avenues should throw up some entrenchments in its front, which will be soon done; and it is then cannon becomes necessary, as there should be two or three pieces planted at each avenue. The heights also must, on every occasion, be occupied, which should be constantly observed as a general rule, whether the enemy is at a distance or near at hand, in every disposition that is to be executed in a mountainous country.

When the forage is made in an open country, the chain should be more numerous in cavalry than infantry; but some infantry is absolutely necessary to guard villages, hollows, and such other places as it would be difficult for cavalry to guard. In short, the number of the troops should always be in proportion to the extent of ground to be encompassed, and their species determined by the nature of the country that is to be foraged; and as it is generally known with what troops the enemy will attack, he must always be opposed by those troops from whom the best defence may be expected; and it would be still better to force him

in some measure, to use troops of the same kind as those by which he is opposed.

If the enemy forms one or more attacks, the small efforts belonging to each regiment must join on the first order, and cover the foragers as much as possible, who should at the same time assemble in the centre by regiments. The foragers should always be provided with their carbine or sword; and although they may not be very formidable against troops completely armed, yet there have been instances where they have charged with success.

If it is in a plain, and the enemy, having formed but one attack, charges the chain in one particular part, the troops of horse and dragoons which are opposite to him should march up resolutely and sustain his efforts: if they are repulsed, they will be supported by the infantry that hath remained in its post; the hussars which were in front will unite, and place themselves upon the flanks of the troops which are attacked, in order to cover them, and endeavour to defeat the enemy by charging him in flank and rear. If the general is certain that the whole of the enemy's troops are engaged in this one attack, he may then bring up all the troops belonging to the chain, both cavalry and infantry, in order to oblige him to retire the sooner: which if he does, some hussars, sustained by horse and dragoons, should be sent in pursuit of him, till his retreat becomes certain; but with caution not to pursue too far, lest he should rally upon those troops, who, being too far from the chain, cannot receive assistance so soon as would be necessary; and besides, the making and accomplishing the forage being the grand object, the commanding officer should be contented with succeeding in that, without seeking for any other advantage unconnected with the original destination of the troops.

As soon as the enemy is retired, and the commanding officer is certain of his retreat, for he may return in greater force and with fresh troops, he will re-establish the chain, at the same time neglecting nothing that may contribute to its security. But if the enemy, instead of being forced to retire, should break into the chain, the commanding officer, who, on the first notice given him that the enemy was marching to attack him, had caused all the foragers to assemble in the centre, and to retire in good order, the small efforts forming their rear-guard, will then assemble his troops as readily as possible, and oppose them to the enemy, in order to cover the retreat of the foragers; always taking care to regulate his dispositions by the enemy's, and according to the nature of the ground.

If the enemy forms more attacks than one, the foragers, who, as hath been already observed, must be assembled in the centre, should have orders to take the road to the camp, and will re-enter it covered by the small efforts from the rear-guard: but as a forage should never be abandoned till the last extremity, they should be ordered to draw up in order of battle, when they are within a quarter of a league of the camp, in order to return and complete the forage on the first order. But if the enemy is in force, and by his superiority all hope of obtaining the forage is destroyed; or if it is made at so great a distance from the camp that the troops belonging to the chain cannot expect to be

readily assisted; the commanding officer ought to make a retreat, with every disposition a good officer is capable of, and to join courage and vigilance with knowledge and experience.

If, on the contrary, the enemy is weaker, or of equal force with the chain, he should be charged without hesitation; because the enemy, regulating his attack by his defence, will be obliged to contract himself, in order to make his attack heavier and more considerable; so that the troops being united, will charge the enemy: and if, by the assistance of the hussars who are advanced, and act after the manner already mentioned, the enemy is forced to retire, he must be pursued in the manner above directed; after which the troops must return and complete the forage.

As a commanding officer is, in case of a forced retreat after being beat, obliged to submit to circumstances, and regulate his dispositions by the enemy's; he must retire with the greatest order possible, causing the infantry to march in the centre, either in columns or in order of battle, as the situation of the ground will best allow, the horse and dragoons upon the wings, the hussars upon the flanks, that they may not confuse the dispositions, but serve as a support for the chain, and prevent its being taken in flank; and the disposition of the troops should be so managed, that the enemy shall not be able to present a larger front than that which is opposed to him: and although it is impossible for a general to foresee, for certain, what will be the dispositions for an attack and retreat, because they must be changed according as those of the enemy alter, or as the nature of the ground varies; they should nevertheless be so ordered, that each body shall be supported, and capable of acting without confusion. It is only on occasions thus pressing, that the commanding officer should suffer the forage to be abandoned; and even then it will be some satisfaction to the commanding officer that he hath been able to place the foragers and their horses in a state of security.

If, during the retreat of the chain, it should receive assistance from the army, it should charge the enemy, notwithstanding it may be too late to go on with the foraging; and if this charge should prove successful in either beating or causing the enemy to retire, he should be pursued without intermission, in order to deprive him of all desire for repeating the attack. In order to improve this advantage to the utmost, it seems probable, that the commanding officer should leave a large detachment, consisting of infantry, cavalry, dragoons, and hussars, to continue all night upon the spot, and the next morning betimes, the foragers, properly escorted, will come to take away the forage; and as soon as the effort is arrived in the front of the chain, the detachment which hath remained there all night, must return to the camp.

There still remains many other precautions to be taken for the security of foraging parties. If the nearness of the enemy renders the execution of them difficult, a greater number of troops should be employed to form the chain. Forages thus considerable should not be often repeated, because the army must necessarily be fatigued, by the number of troops absolutely requisite to form the chain; and the great distance will harass the horses, particularly on their return, as they will then be heavily loaded.

These.

These forages are not usual, except in cases where the general is willing to spare the forage in the neighbourhood of the camp, that he may, in the end, be provided nearer home. As a general cannot be certain how long he shall remain in the same camp, M. de Montecuculli, in this state of uncertainty, always advises foraging at a distance, and so by degrees to come nearer and nearer home; because, in proportion to the economy used with regard to forage, an army is enabled to remain longer in the same camp, and the troops less under a necessity of making fatiguing and fruitless movements: by foraging at a distance, the enemy is deprived of the means of subsisting, and is often obliged to quit an advantageous situation, in order to supply his necessities elsewhere.

Care must also be taken that the foragers, in entering the ground they are to encompass, do not occupy more than is absolutely requisite, and that they do not spoil more grain than they carry away with them; first, because by extending the chain it would be weakened, and become easier to be forced; and in the second place, every prudent officer should be an economist in the article of forage; the officers commanding the small efforts which march at the head of each regiment should be charged with the care of this. These officers will cause their troops to march as much as possible through roads and over grounds which are untilled, till they arrive at the place intended to be foraged. If all the grounds are sown, the commanding officer must cause the cavalry to dismount at the place where the chain halts, and part of the troopers furnished with scythes must go and cut the grain, while the remainder hold the horses, and when there shall be no farther room to fear damaging the forage, the cavalry will remount and take it up. Each place should be marked out for a brigade or a regiment, which distribution should be made by the staff-officers before the troops arrive.

The general officer commanding the chain should not assemble his troops till such time as all the foragers are gone off the ground; but nevertheless, in proportion as they retire, he may contract the chain, in order to give himself greater strength: the officers commanding the small efforts are not to depart without leave of the general, nor till the regiment they belong to hath completed its forage; then they will form the rear-guard, and on their arrival at the camp go and make a report of the forage to the brigadier and their colonel.

As soon as all the foragers are gone, the general commanding the chain will assemble all the troops of it, form a rear-guard, and cause the remainder to march with as large a front as possible; the rear-guard to the whole will be composed of some troops of hussars, and will keep at such a distance as not to embarrass the rear-guard in case it should be attacked briskly and repulsed; the remainder of the hussars will be placed on the flanks of the rear-guard, which must be composed of infantry, horse, or dragoons; those hussars which form the rear-guard of the whole should have orders to retire, in case they are attacked, to those upon the flanks of the rear-guard, and not to the infantry that forms it. By this disposition, if the general should be attacked in his retreat, the troops will be able to perform all the necessary evolutions, and to sustain each other, without the order of march being in the least destroyed.

SECT. IX. Of the Detachments for forming a Chain of dry Forage.

If there is great exactness and knowledge required in the conducting of parties for green forage, those for dry forage perhaps require more; and, in general, every thing that regards foraging parties, whether green or dry, excites a particular attention in the commander in chief; and, according to the chevalier Folard, all success in war depends upon secrecy, diligence, activity, and the thorough knowledge of the country.

The dispositions for forming a chain of dry forage, which differ from those for forming one of green, will direct the means for extending the chain in proportion to its strength, and at the same time place the foragers in security; although, in parties of dry forage, the foragers generally take up less ground, according to the distance of the villages, that are to be foraged, from each other.

The dispositions for a chain of dry forage are also varied according to the nature of the country; but whether it be open or mountainous, each different body should be placed in that part where it can act with the greatest facility; the infantry therefore should occupy the villages, and the cavalry the plain in front, and should be disposed after such a manner as to be able to retire easily to the protection of the infantry. Before the foraging is put in execution, the commander in chief should mark out the villages to the general officer who is to command the foraging party, and regulate their number by the quantity of troops that are to forage. The first dispositions will be the same with those mentioned in the foregoing section in relation to green forage: therefore the general who is to command the forage, ought to set out with a detachment in order to examine the ground, the posts necessary to be occupied, the villages which are to be foraged, their situation, the rivers which cover or run through them, the bridges to be guarded, the distance from one village to another, and with what degree of ease the communication with them may be secured. After having thoroughly examined into these particulars, he can with ease form a judgment of the number of troops that will be necessary to form the chain and secure the foragers: after having done this, he will order the bailiff or burgo-master of every village to come to him, and inquire of them the number of husbandmen, and how many ploughs each husbandman hath belonging to him; by which he will be able to calculate the number of sheafs reaped by each husbandman.

The general may, for every plough, reckon about 30 acres of ground; and, in proportion to the fertility of the ground, every acre will produce from 120 to 160 sheafs: by this method may be computed the number of sheafs reaped by an husbandman who hath three or four ploughs; and from this calculation the general will judge whether the number of sheafs, supposed to be in each village, will be sufficient for the troops coming to them.

Let every acre of ground be supposed to yield 144 sheafs; then a husbandman who hath three ploughs, will have reaped 12,960 sheafs; so by reckoning 12 sheafs to a truss, and every truss to weigh 600 pounds weight, this husbandman will supply sufficient for 124 trusses. It is true, that some deduction should be made from

from the number of trusses that every acre may yield, as the husbandman or farmer may have preferred or consumed some either for daily use or for feed.

It is very necessary that the general should take care to leave sufficient grain, not only to enable the husbandman to live, but also to sow his grounds; particularly if he foresees a probability of the next campaign being carried on in the same country.

Nevertheless, as this manner of reckoning may be attended with inconveniences, because there are some villages which keep up a particular trade of forage and grain, and therefore the granaries and barns may sometimes be found empty, yet the quantity of sheafs and grain remaining in the village may be calculated by the number of inhabitants to be subsisted. Marshal de Puyfégur's method, which consists in informing himself of the number of horned cattle and horses, and by deducting the time they graze, is a very good one; but still there must be some deficiency in this calculation, as it will be impossible to fix with certainty the time of their grazing.

When the general shall have arrived at a tolerable certainty of the quantity of forage; the ground where to establish his chain; the posts which the infantry are to occupy; and taken a note of the quantity of forage; he will carry away one or two of the bailiffs or burgo-masters, as hostages for the security of the forage: he will also direct them to inform the inhabitants, that if they conceal or purloin but even a single sheaf from the whole, he will cause their village to be first pillaged, and afterwards set on fire; so that the peasants, on whom these threats have often great effect, will scarcely give the enemy information of the intended forage. The general must leave some companies of infantry, sustained by a detachment of hussars, in every village, who, by constantly patrolling on the outskirts, will stop all comers and goers; while the infantry will keep a strict guard on the inside of the village, and permit no person to go out of it; nor suffer the bells to be rung, colours to be hoisted upon the steeple, or fires to be lighted; and will put a stop to every thing that may be supposed to be a signal agreed on with the enemy. When the general hath completed all these dispositions, he will return and give an account of them to the commander in chief.

The same general shall, upon the day appointed for the forage, set out at day-break, with the troops destined for the chain, and the staff-officers. As soon as he shall be got within sight of the villages, he will not fail to have them examined, notwithstanding he left troops in them the foregoing evening. When they are all examined, he will leave them in the rear, march on into the front, and draw up in order of battle; after that, he will form the chain, regulating the dispositions of it by the situation of the ground, and of the villages examined over-night. The hussars will advance three quarters of a league or a league, in order to scour the country; during which time the staff-officers, instructed by the general of the quantity of sheafs contained in each village, will, attended by the bailiffs or burgo-masters, make a distribution of the forage by regiment or brigade, and assign a barn to each, or one to two. When this distribution is made, the staff-officers will make a report of it to the general commanding the party.

In forming of the chain, the infantry must occupy the villages, hollows, and hedges, which may be found in the circumference of the chain, and the horse and dragoons will be left in the plain in the front of the villages, but within reach of being assisted and supported by the infantry; and care should be taken to have a reserve of such troops as can with the greatest ease transport themselves to those parts where assistance is needful: this reserve should be placed in the centre, or nearest to the part that is most exposed, or most liable to be attacked.

As all the villages marked out to be foraged are not in the same line, those which are in the rear, and covered by others in which there is infantry, and by the chain of horse and dragoons in the front, require but a small number of troops; and if a detachment of infantry is posted in them, it is more with a view of preventing the troopers and servants from marauding than any thing else.

The effort belonging to each regiment, commanded by a captain, should remain upon the spot where the regiment forages, and, with the assistance of the infantry, prevent disorder among the foragers, and send off those who are loaded. As soon as a regiment is set off, the captain commanding the small escort must report it to the general officer commanding the forage; after which he will follow, and form the rear-guard of it.

As soon as the general shall be apprised by the staff-officers, and the captains commanding the small escorts, that a village is evacuated, he may contract his chain, and draw it nearer together, till the foragers are gone; which when they are, he will assemble his troops, and detach as many platoons of infantry as there are villages: or rather the body of infantry posted in each village during the forage, should leave a party to make a strict search after all stragglers and marauders; the first they should keep with them, and make the others prisoners, and punish them severely on their return to the camp. When all the different bodies shall be re-assembled, and the officers commanding them have made the report, the general will order the hussars to be called in, and form a rear-guard according to the manner directed in the foregoing section, and return to the camp in the same order, and with the same dispositions, as if he expected to be attacked.

There still remains another disposition that will be executed with greater expedition, and prove more secure for a dry forage; that is, to observe exactly the same precautions which have been already mentioned, with regard to the detachment's setting out the evening or two beforehand, in order to get information of the quantity of forage, of the nature of the ground for the disposition of the chain, and the enemy's distance.

If the forage is to be performed at a distance from the camp, the general commanding it should set out in the evening at retreat-beating, with the troops destined for the chain, the staff-officers, and the majors or adjutants belonging to the regiments which are to forage: but if the forage is to be performed near to the camp, it will be sufficient for them to set out at break of day; and the commanding officer should always take care never to advance quite up to the villages, till they have been examined, notwithstanding

troops have been left in them the preceding evening; these precautions are always necessary, and can never prove useless. As to what remains to be done after, the same precautions which have been directed for the first manner of foraging must be observed.

These first dispositions being made, the general, from the knowledge he hath acquired the evening before of the quantity of forage contained in each village, will allot one to one or two brigades, or in proportion; he will next send the staff officers, with the majors or adjutants, to every village, and order them to make the peasants take all the forage out of the barns, and lay it in one or more heaps on the outside of the village; not in front, but in the rear of it, in order for the greater security, and every heap will be for a brigade. If the villages are so nigh each other, as to admit of the heaps of forage being placed together in the same field, the disposition will certainly become better; because the chain being more united, and taking up less ground, will undoubtedly become stronger, and that with fewer troops. But if the nature of the ground will not allow of this, the second method is in appearance the best; that is, to cause the forage to be placed in as many heaps, on the outside of the villages, as there are brigades; taking care, as in the first disposition, to have the hedges, hollows, avenues, &c. occupied by the infantry, while the horse and dragoons remain posted in the plain: the forage will be sooner completed, confusion avoided, and all marauding prevented; and if any information should be received of the enemy, the foragers can assemble with greater ease than if they were distributed in the villages. All the troopers and servants should have express orders not to enter the villages, under pain of being treated as marauders; and the general should be very strict in punishing all those who break through this order. Whichever method the general makes use of, whether that of leaving the forage in the barns, or that of placing it in heaps on the outside of the villages, it is necessary

the distribution should be made before the foragers arrive; and great care should be taken not to make them wait, which fatigues the horses more than the burthen they carry, although it is 600 or 700 pounds weight, the trooper included.

If this forage is made in a mountainous country, the disposition should be changed: the villages of mountainous countries are either in the avenues, at the entrance into the valley, or very much inclosed in them, or bordering upon the mountains. There are some mountains where villages are more frequent than in many plains; but in others they are scarce to be met with, and are more dispersed; therefore, in the first case, the extent of the forage will be less, but in the last it will be increased: but in either of these situations, a great deal of infantry is required, because, besides its taking possession of the villages which are to be foraged, it must also occupy the avenues leading to them, and the heights and roads in the front, which may be in these avenues. Among mountains, it is unnecessary to have any cavalry in the chain, unless there should be some plain where it can act and support the infantry, supposing it should be repulsed by the enemy's. None of the precautions above mentioned should be neglected; and if the general can pursue the method the proposed, and by means of waggons transport the forage of many villages into a valley or small plain, and then divide it into as many heaps as there are brigades, there should not at most be more than three hours taken up in the performance of it; and then it will be unnecessary to leave troops in the villages which are in the avenues, and already foraged; and it will be sufficient to place infantry in the entrances of the avenues, which may be in the plain, and on the heights by which it is overlooked.

When the foragers are gone, the general commanding the chain will assemble the troops, and march toward the camp in good order, as hath been already mentioned with regard to foraging in an open country.

PART II. OF the OPERATIONS of OFFENSIVE WAR.

JUSTICE and humanity having been considered, in this article, as the first principles of war, the chief intention of the first part hath therefore been, rather to convey maxims for a just defence, than to lay down rules for attacking. According to the original laws of nature, man, weak and fearful, was not desirous to attack; peace and self-preservation being in that state, according to M. de Montesquieu, the first natural law: but that timidity hath by degrees, and by the prevalence of the passions, been converted into fury; and man now imagines the security of his own being to depend upon the destruction of his fellow-creatures, his liberty upon their bondage, and his grandeur upon their depression. It is even possible that the authority which some have usurped over others, and the desire of appearing formidable, was originally owing to solicitude for their own safety; neither would it be impossible to prove, that the bravery and courage which have immortalised so many heroes, were, in reality, nothing more than the specious coverings of fear. This truth, seemingly paradoxical, is not less striking, if the cruelties, which have been at all times exercised against the

conquered, are properly considered. If conquerors fought only in defence of justice, and to punish vice, why should they be so strongly bent upon the destruction of their enemies? It is because, blinded by passion, they dread becoming themselves the victims of their revenge another time. Thus even attack may be proved to be only a necessary precaution for avoiding those dangers with which a man imagines himself threatened, and it may be also said to differ from defence only in superiority of force. This is one reason why the subject of attack has been reserved for the second part. By observing the various operations from the opening to the closing of a campaign, it may be seen, that the whole is nothing more than a series of defence, and that the fear of being attacked is the real source from whence these precautions for attacking spring.

SECT. I. Of Spies.

It is impossible for a general, or even for any officer charged with the command of a detachment, to act with certainty, if they have not spies or secret intelligence.

telligence dispersed about the enemy's army; they will have the mortification to see all their designs miscarry, and all their precautions will become useless, because they will be improperly taken.

Strade, Turenne, and Vauban, strongly recommend having them, whatever expence they may occasion: Vauban also adds, that a general had better be in want of many particulars, however necessary, than be destitute of spies. Nothing, says M. de Puysegur should be spared to procure them; and even the promises made to them should be observed with the most inviolable integrity.

M. de Feuguieres observes, that spies are of many sorts. They are to be found in the cabinets of princes, in the closets of ministers, amongst officers of the army, and in the councils of generals; in towns belonging to the enemy, and in monasteries: some offer of themselves; others are formed by the generals, or by the ministers; but the desire of gain is what chiefly encourages and tempts them to undertake this business.

Besides the spies of the cabinet, there are again others who make it their business to go from one camp to another, and give an account of all the enemy's transactions. Care should be taken that they are unacquainted with each other, and particularly that they are not known to any general or officer: they should be always spoken to alone, and never be suffered to meet each other.

The general should study their character, and prove them by repeated trials; he should sound them by degrees, beginning with things not difficult to be explained, and which, if discovered, will not be of great consequence; he should engage them in long conversations, thereby to form a judgment of their parts and comprehension; and he should also employ them often in bringing him intelligence.

Although a general should always be upon his guard with a spy whom he hath cause to suspect of treachery, he may nevertheless draw great advantage from him, provided he knows how to deceive him properly; because he may be very certain he will inform the enemy of all the resolutions which have been taken.

The emperor Leo, in his *Tactic*, advises a general, who hath reason to imagine his counsels are betrayed to the enemy, to conceal his real designs, by speaking in a manner quite opposite to them: For, says he in the maxims at the end of his book, an enemy must be deceived who receives intelligence from spies or deserters directly contrary to what is actually resolved upon; and should not the enemy give credit to their reports, he will of course neglect their intelligence, and then the general may take his precautions accordingly: but should the enemy repose confidence in them, he will be deceived, and consequently fall into the snare laid for him. But, adds he, should these spies be entrusted with the general's real intention, he should, by some alteration in his operations, endeavour to persuade the enemy they have deceived him; upon which he will grow mistrustful of them, and be obliged to look out for others, no longer daring to confide in the former.

If a spy employed by the enemy is discovered, and brought to the general, he ought to take him in private, question him with mildness, speak to him with a sort of confidence, and, instead of threatening, should

promise him a reward if he will discover to him what he knows of the enemy's intentions. If the general finds him intelligent, he should endeavour to engage him in his service; and, provided he can gain him over by force of money, a thing not difficult, he may derive great advantage from him; but he should be careful how he employs him, till he hath very good reason to be assured of his fidelity.

There are many different methods of trying the veracity of a spy: if, for example, the general receives information, that, on such a day, a detachment of the enemy is to set out on some expedition, he should then send out troops to double the number of those detached by the enemy; by which means, if the spy's intelligence is true, the enemy will not only be balked in his design, but may also be beat by the superior detachment. If the enemy's detachment has but a trifling object in view, it will be sufficient to send just troops sufficient to examine into the truth of the spy's report. The general may also pretend to appoint a foraging within two days, and order but few troops for the chain; in which interval, if the spy is false, he will find an opportunity of giving the enemy notice of it: but, instead of the few troops publicly ordered, the general will privately add another body to them, which will be placed in ambuscade behind the place where the pretended forage is to be made. If the enemy, in consequence of this information, should come and attack the chain, it should immediately retire, as if too inferior in number to continue the forage, toward the troops in ambuscade; when, being joined, they will fall upon the enemy on all sides, who will certainly be surprised at seeing the troops which he attacked so prodigiously increased, and attacking him in flank, front, and in rear. If this attack is made with vivacity and resolution, there may be great reason to expect it will terminate in a complete victory.

If, on the contrary, the spy does not appear intelligent, or affects stupidity, the general should punish him with death, and cause him to be hanged in the sight of the whole army, in order to deter others, which may be dispersed in the camp, by his fate. It would be needless to question him concerning the enemy, because it would appear inhuman to execute a man who had given intelligence of importance, whether extorted from him by fear, force, or perhaps a promise of pardon.

Spies are as necessary to a general, as arms are to an army: but it is money only that can secure their fidelity; and if a general finds himself ill served, it is because he has been too sparing of the funds intended by his sovereign for that purpose. Notwithstanding it is the duty of a good subject to manage his master's finances as much as it is in his power, yet there are intelligences of so great importance, that it is scarcely possible to pay sufficiently for them. A man is sufficiently indemnified when, by means of the intelligence he has received, he has concerted his measures in such a manner, as to beat the enemy, gain some marches over him, or to be beforehand with him in some enterprise.

The emperor Leo, in his *Sentences*, says, that spies should be resolute, industrious, and active. Spies thus qualified will be exact and true in their reports; but if they are trifling, vain, and timid, it is to be feared they will never be able to relate the truth.

Spies, when discovered, should not always be punished with death; great advantage may be made of them, by pretending ignorance of their real quality, especially if they are not sufficiently disguised. Tacitus, in his *Annals*, says, that Vitellius's party got information of Otho's designs by means of his spies, who, by endeavouring to dive too minutely into their enemy's secrets, did not sufficiently conceal their own.

Vigétius's method for discovering spies who are suspected to be ranging about in a camp, is to order all the soldiers and servants into their tents during the day, and the spies will be taken immediately.

The general should be careful that the spies are unknown to each other; for spies having a knowledge of each other may occasion great inconveniences, which may be very prejudicial to the schemes of a general or any particular officer. When spies are strangers to each other, a general is better served, and he can depend with greater security upon what they say; because, by being unknown to each other, he can try the fidelity of one, by comparing what he says with the reports of others: If they all agree in the same story, their intelligence should be looked on as certain; whereas, if they know each other, they can with ease cook up a tale among themselves, and not vary in their relation. Besides, a spy conscious of being known, always fearful of being sold, acts neither with confidence or resolution.

When a general is ignorant of the enemy's designs, he should always affect a knowledge of them; but whenever he is informed of them, he should, on the contrary, pretend to be ignorant of them; by which means the enemy, being easy with regard to his spies, will not alter his designs, or suspect the general of having any knowledge of them.

If the general can procure such spies as, by their employment, are near the person of the enemy's general; as, for example, a secretary, or any others who are near him, and who consequently can give intelligence more to be relied upon than those who are constantly passing from one army to another; and as it is very often by means of these people of consequence that common spies gain their intelligence, their service may be turned to a very great account.

If a general discovers an enemy's spy to be one of those who, by their employment, are near his person, he can receive great advantage, by forcing him to write a letter of false intelligence, thereby to divert the enemy's attention from the plan he would execute; but he should cause him to be hanged immediately after, for it would be very imprudent to use him above once. The prince of Orange, when he came to attack M. Luxemburg at Steinkirk, having discovered one of his musicians who gave the enemy intelligence of every thing he intended, made use of this stratagem; and although it was rendered abortive by the vigilance of M. de Luxemburg, and the courage of his troops, there are nevertheless but very few instances where it hath failed: and even M. de Luxemburg would have been beaten, if he had not had timely notice given him by his advanced detachments; by which means he had time sufficient to make his dispositions, and to avoid being surprised.

There is a stratagem which may be made use of when spies are wanting, and which is less expensive;

that is, to send supposititious letters by the first peasant that comes in the way, who will have nothing to fear; and to far from concealing himself, he must take a road where he will be sure of falling into the enemy's hands: these letters should be directed to the general officers commanding a body of troops, or even to the general of the army, supposing they come from an advanced body. They should contain schemes that are good, and practicable in their execution, but quite opposite to what is intended and will really be undertaken: it often happens that the enemy, too credulous, abandons his original designs to pursue chimerical ones, which to him appear very good, and do not present any obstacle to those which the general designs to execute. Prince Eugene succeeded, by this stratagem, in raising the siege of Coni, formed by the French in 1691.

But nevertheless a general should take care that, through a fear of being deceived by supposititious letters, he does not himself too much neglect the intimations which are given him: a general ought, says Onozander, to listen to every body at all times, and upon all occasions. Alexander, when at a great distance from his own country, not being able to receive his couriers till very late, refused to give attention to a peasant, who came to inform him of a shorter route; but soon repenting of what he had done, he sent to seek after him, but in vain.

The same reason that should make a general always have spies in the enemy's army, should also make him suspect that the enemy has some in his; therefore he should endeavour to deceive them, he should keep his intentions secret, mention them to very few, and always talk openly, contrary to what is really designed. Onozander observes, that it shows great folly in a general to mention his designs publicly, especially when they are on the eve of execution; for deserters generally go over to the enemy, at the time an action is unavoidable.

But if it is discovered that the enemy has received information, Vigétius says, that the dispositions must be immediately changed. Polybius, on like occasions, particularly recommends silence and dissimulation; he even stretches this rule as far as the thoughts themselves, which he says must sometimes be repressed, for fear our actions should sometimes betray and discover them. Metellus answered one of his friends, who, on an important occasion, asked him the reason of certain dispositions, "that if his shirt knew what he thought, he would burn it."

To avoid the danger of treachery, sealed orders have been used with great success, which have been sent to officers, with express orders not to open them till at such a time and at such a place: this is an established rule at sea, and can also be practised on shore when employed in an expedition which it is essential to conceal from the enemy.

SECT. II. Of Ambuscades from the Army.

A GENERAL who loses a battle, says Vigétius, may attribute his ill luck to fortune, although these kind of events are generally the effects of art and skill; but he who suffers himself to be surprised, and who falls into the snares laid for him by the enemy, has no excuse to make, because, by his vigilance, and the goodness of his spies, he might have avoided them.

A design should never be formed for an attack upon marches, detachments, convoys, forages, or upon one or many quarters, without knowing the ways which are to be passed, and the places where ambuscades may be formed; whether to avoid, or whether to conceal troops in them, in order to facilitate a retreat, or to draw the enemy into it. A general who receives information from his spies that some enterprises are intended upon some bodies detached from the army, upon one of his convoys, on a forage, or upon his quarters, ought also, on his side, to form ambuscades in the ways leading to it. The number of troops in ambuscade ought to be regulated by that of the detachment intended to be surprised; it should be sufficiently strong to attack the enemy on all sides, that is, in head, flank, and rear. The troops who set out to form an ambuscade should always march by night, unless it be in a country so covered that the enemy cannot perceive them.

A general, according to Santa Cruz, should endeavour to form as many ambuscades as possible; so that, if the enemy should not fall into one, he may not escape the others: they ought to be disposed after such a manner, that one can neither attack or be attacked without being heard, sustained, and assisted by the others: this junction is a stratagem which the enemy could not expect, and which will assure the victory. If, from the fewness of the troops, or the fatigues of the campaign, it is impossible to form many, there should at least be one sufficiently strong to resist the enemy it would attack: but still it is not requisite that it should be as numerous as the enemy, because troops in ambuscade, who charge a detachment that is unprovided on all sides, ought, by this surprise, to have a particular advantage, and consequently supply the place of number; which will certainly be the case, particularly if the enemy falls into the ambuscade during the night, and that care hath been also taken to place a great number of drums and trumpets, that when the troops in ambush charge, they may serve to increase the numbers in appearance, by the terror which noise always raises in the night-time.

In order to deceive the enemy who is in detachment, small bodies should be sent out towards him, with orders to retire to the troops in ambuscade as soon as they meet him.

Ambuscades should always have some object. Before they are undertaken, it should be known whether the enemy is in the field; if he intends either to attack or molest the quarters; whether it is proper to wait for him or to seek him; without these precautions the troops will be fatigued, and no end answered.

Ambuscades may be composed of infantry, hussars, or dragoons; but it is the situation of the country that must determine which. These troops may be mixed together or sent separately; but that must be according to the design intended to be executed, or according to the nature of the troops employed by the enemy in his detachments.

If the design is to attack a convoy, all these troops are necessary, because the effort of it will undoubtedly consist of infantry, cavalry, or dragoons, and also some hussars to clear the march; if a green forage, infantry is very necessary, but it should always be left in the rear to secure the retreat: cavalry, with hussars or dragoons, is sufficient to attack a forage, to beat

the effort of it, or at least to prevent the foraging being executed. If a dry forage is to be attacked, it must be done with infantry, because, as it can only be performed in the villages, it is certain they will be occupied by infantry, and that there will be a chain of cavalry in the front, which will be protected by it: if a detachment, it is according to the nature of the country through which it marches; if an open country, horse, hussars, or dragoons, must be employed; but in a woody or mountainous country, infantry must be made use of. After all that can be said, it is impossible to lay down fixed rules for the kind of troops which should be employed: there are some woody countries where hussars and dragoons can act with ease, and be of great service: there are mountains where they can act securely, because very fine plains, divided by woods, are to be found in the bodies of them, where they can place themselves in ambuscade; but care must be taken to secure their retreat. There are, on the other hand, plains so divided by hollows and canals, that infantry only are capable of acting; therefore it is the general's business to discover from which kind of troops, in either country, he may expect the greatest advantage.

An ambuscade, seasonably and properly formed, may overturn the best concerted enterprise; it is a spring of great resources during the course of a campaign; it is by the assistance of that a general attains the completion of those strokes which are owing to vigilance, and which will never happen when, by a negligence to be condemned, or through pretence of consulting the ease of the troops, they are suffered to linger away their time in camp or in quarters, without being sent out in detachments.

Forethought and activity are the first steps toward great actions; a general endowed with these qualities may accomplish all, or at least a great part of whatever he undertakes. The more difficult an enterprise appears, the more should a general try his genius to find out such expedients as may do honour to the imagination of a great soldier. A general, with a genius and a liking for his business, will find resources on every occasion: want of strength will be supplied by art, and stratagem will prevail over stratagem.

There is no country but presents some place proper for forming ambuscades; hollows, a rotten place, from which it is easy to fall, the least height, woods, hedges, ruins, vineyards, sometimes corn-fields, marshes covered with reeds, all present expedients to a general who knows how to take advantage of them: he must only be careful to place the ambuscades after such a manner that they shall not be discovered by the enemy's parties; and that they are not themselves discovered by the inattention of any of the soldiers, by noise or by other accidents.

If the ambuscade consists of hussars or dragoons, the horses must not be together, their neighings may prove very prejudicial. Even a peasant, attracted by the barking of a dog or the neighing of a horse, may go into a wood, discover an ambuscade, and, often induced by the hope of a reward, will go and give the enemy information of the whole. Every person passing near an ambuscade should be stopped, and that without noise; the peasants should be tied to trees, and guarded by sentries. If the ambuscade is formed in an hollow way, behind an high ground, or in any place.

places whatever, the general must cause every body that is taken to be tied together, and well guarded.

The troops in ambuscade must fall on all parties of the enemy that pass near them, unless when the design is to carry off a convoy or to attack a large detachment. It should in that case continue silent, and let them pass: but if these parties, by making a strict examination, discover the ambuscade, as there can no longer remain any hope of attacking the convoy or detachment, it should fall upon and endeavour to surround them, and, if possible, take them prisoners; and if the troops in ambuscade are so lucky as not to let any of the enemy escape, the ambuscade may remain in its first situation, but always pursue its first object, because here will be no reason to apprehend the enemy's having received intelligence of it.

The troops in ambuscade should attack these parties sword in hand, and not with their fire-arms, and, if possible, prevent them from using theirs. From this manner of attacking, there will result two considerable advantages. The first is, that a brisk and unexpected attack astonishes, and scarcely gives them time to think of their defence. The second is, that, by firing, it is to be feared, that if there are any other parties farther off they will hear it, and send and give notice. It is true, that if those who have heard the firing come to the assistance of the first, and if the troops of the ambuscade find themselves the strongest, this would then be an advantage; but if the enemy's parties should be stronger, the advantage would then turn on their side. Again, should they not come, the enterprise on the convoy or detachment will fail, because there is no doubt, that being sensible of their inferiority, they are gone to seek fresh assistance: in this case, the ambuscade must change situation, and place itself in some other part, but not abandon its original project till the last extremity, and till there is no longer any hope of succeeding otherwise.

The least thing, as has already been said, may be the occasion of an ambuscade's being discovered. The fire of a pipe may be seen at a great distance in the night-time: besides, however small the number of soldiers who smoke may be, the wind may carry the smoke and the smell of the tobacco toward that part where the enemy patrols. The ambuscade should not be cumbered with servants, or any thing else that is unnecessary; orders should be given that the horses are filled with care, and that a profound silence is observed by every body. As it is very difficult for hussars or dragoons to march without leaving marks behind them, by which means the road leading to the ambuscade may be discovered, they should try to enter it by some bye-way, or at least by as dry a one as possible. In order to efface the marks of the horses' feet, eight or ten hussars or dragoons may tie branches of trees to their horses' tails, and, by marching behind the detachment, in as large a front as the whole body, will destroy any marks that are made: as soon as they shall have entered the wood, they will close up the entrance with the same branches, of which they will make a sort of hedge.

If the wood is large, it may be entered at different parts, and the hussars and dragoons may also be made to enter it separately; the footsteps will be more troubling: although the marks which are left by the infantry are not so plain, it may yet practise the same me-

thod of entering the wood. If the detachment intended to form an ambuscade, whether infantry or cavalry, is obliged to march upon a high-way, as soon as it comes near the place appointed, the commanding officer should detach a body on before, with orders to take up the same front as the whole detachment. As soon as it shall have proceeded a quarter or half a league, it will return by another way; and it should also make a large circuit, so that the enemy's parties, coming the same way, will not perceive that they shall be stopped by any troops in that place. This body will rejoin the troops which are in ambuscade, by a road the most out of the enemy's view, never in a body, but scattered, so that they may leave fewer marks behind them. Sentries should be concealed behind bushes, in the front of the ambuscade, so that they may be able to see the country and ways about them, without being seen themselves: two or three soldiers should also be made to climb into trees, in order to see at a great distance, and give notice if they perceive any troops; the same method must be observed with regard to hussars or dragoons.

Before the commanding officer enters the wood where he would form his ambuscade, he should detach two or three patrols to scower it, for fear the enemy should happen to be there in ambuscade himself; after every part has been searched, the troops must enter the wood, and range themselves according to the order that shall have been given them. The commanding officer will form three bodies of his detachment, and place them at a distance one from another; one will be destined to attack the advanced guard, the other the centre, and the last the rear-guard. If the detachment consists of cavalry, the half of each corps should be on horseback; no persons should slip or pass the sentries or vedettes under pain of being declared deserters. During the night, the cavalry should be mounted, and the infantry under arms: in the day-time, half those on foot will relieve those on horseback every three hours; and the same should be done with the vedettes, as well as the infantry and sentries.

If the ambuscade is behind a height or small mountain, sentries must be placed on the top, lying on their bellies, and without hats: in other respects the same dispositions ought to be observed, whether on the march or for the conducting of ambuscades, always paying a proper regard to circumstances and the situation of the country.

There are divers methods of drawing the enemy into ambuscades. The general commanding the army or quarters sends out a detachment under the command of an intelligent officer, to form an ambuscade, at the distance of one or two leagues, more or less, according as the country is fitting for those sort of dispositions, or according to the distance of the enemy. The general must acquaint this officer, that two hours after he is set out, he will send out another detachment, of less force, with orders to go on the side where the enemy is, to endeavour to meet him, and at first sight to make a feint of charging him; but, as if finding him too strong, he will begin his retreat, directing it toward the place where the troops are in ambuscade: furnished with these instructions he will set out.

Then the general will send for the officer intended to command the detachment that is to go in search of the enemy, and inform him of that which is set out to form

form the ambuscade, and of the place where it is; he will order him to advance as near to the enemy as he can, and to draw him by a feigned retreat upon the troops in ambuscade.

These two officers should be the only persons informed of the design: but nevertheless the commandant of the detachment which is to go towards the enemy, may communicate it to the principal officers under his command; so that in case he should be taken or killed in the retreat, he that succeeds in the command may be able to act according to the general's intentions. He must be particularly careful, that no soldier, troopier, hussar, or dragoon, penetrates into the design of the detachment, as it would then be in the power of a single deserter to make the ambuscade miscarry. It may, as has been already said, be composed of different kinds of troops without distinction, or of one sort only: the situation of the country ought to determine whether it should consist of hussars, dragoons, or infantry; but the detachment which is to go and seek the enemy, in order to draw him into the ambuscade, ought to be composed of hussars, unless the country be of such a nature that infantry only is capable of acting.

During the time that the hussars are gone before, endeavouring to draw on the enemy, the troops in ambush will be on horseback, and waiting in silence for their commander's order to go out and charge. As soon as they shall have charged and beaten the enemy, for fear lest another detachment, at a little distance from that which has been beaten, should come to its assistance, they will take the shortest way, and march leisurely, but with order, towards the camp or the quarters. The detachment which drew the enemy into the ambuscade, must form the rear-guard of it, and will march slowly on, while the rest of the troops will retreat, conducting the prisoners with them. If the enemy sends any succours, as soon as the rear guard perceives them, it will double its pace, but with order: there will be no reason to apprehend the enemy's coming too briskly upon it, because he will be fearful of falling into another ambuscade: thus the rear-guard will retreat with ease, and the troops who conduct the prisoners have time enough to reach the camp, without any molestation.

It is on these occasions that a man should know how to keep his courage within proper bounds, and be sensible that flight is glorious: the despair of an enemy that is surprised, and even beaten, is always to be feared, when he is not entirely defeated. A man should always be content with one victory, without attempting a second: he may, by pursuing the enemy too eagerly, fall himself into ambuscades more dangerous than that he has just drawn the enemy into.

Robert, count of Artois, having discovered a ford, obtained permission of St Louis to pass it, in order to facilitate the passage of the Christian army, with a promise of undertaking nothing till such time as it should be passed. He passed it safely; but, contrary to his word, he threw himself with eagerness upon a detachment of 300 Saracens, who fled before him. Carried away by his courage, he followed them to their entrenchments, which he forced; and, not being content with this success, more glittering than solid, he still pursued them to a ruin which he saw open: he en-

gaged himself in it, contrary to all the remonstrances of the most intelligent generals of the army; he entered, followed by his soldiers, who at length, busied in plundering, were charged in their turn by the Infidels, who had rallied. In short, the count of Artois, the generals who had not been able to stop him, the Hospitallers, and the Templars, who accompanied him, perished on that unfortunate attempt; a loss which was the cause of the taking of St Louis, brother to the count, and of the calamities which the Croisies sustained in that campaign.

If there is reason to apprehend that the enemy, having notice from some deserters, are coming in full strength, the ambuscade must then change its situation and draw nearer to the place from whence it set out: so that, if the enemy should be stronger than the ambuscade, it will have less way to retreat, because it is certain that he will march cautiously; that he will not go towards an ambuscade which he knows to be formed, but with design to attack; and his superiority cannot but prove fatal to the troops forming the ambuscade.

It may again happen that the enemy, not finding the ambuscade in the places pointed out by the deserters, will imagine it to be retired, and, in that belief, will neglect the precautions necessary in such a situation. In this case, the detachment must change place and post itself a quarter of a league, at most, from where it first was, in order to fall upon the enemy, who will march on with confidence: but the detachment in ambuscade should be sufficiently strong, to be at least able to retreat before the enemy, if he is superior, and support itself by its own strength. Detachments of 1000 men have been often known to retire in order from before others of double or treble their number, which undoubtedly proceeds from the advantageous positions which the commander has known how to take; from the disposition he has made of his troops; the order he has established among them; and from the resolution with which he has inspired them: with these qualities, a commander may at least be certain that his troops will not be beaten, although they do not get the better, unless by a force so much superior, as to prevail over courage and a wise and judicious conduct.

An ambuscade that is successful, may cause the destruction of a whole army. The example cited by M. de Feuquieres, in his Memoirs, on that head, is striking. M. de Luxembourg, still attached to the prince, took all the baggage belonging to M. Turenne's army, because the lieutenant-general who commanded the escort did not foresee that the enemy, shut up in his lines of circumvallation before Arras, having two armies near his camp with a design of attacking him in his lines, could think of sending out a large detachment of cavalry on an enterprise of such a sort. In the mean time M. Luxembourg, who was in ambuscade, within reach of the column of baggage, seeing that the lieutenant-general was gone on before with the head of the escort, imagining the baggage in security, marched speedily to the head of that column, whole march he stopped, and turned toward St Pol, where he concluded the whole baggage belonging to M. Turenne's army, without his knowing any thing of the matter. It is thus that, by the negligence of an officer, and by an ambuscade seasonably placed, an army finds

finds itself stripped of all its baggage, and, as may be said, not in a condition of continuing the campaign.

If this lieutenant-general had been provided with spies, detachments in front and on the flanks, these detachments would have discovered the ambuscades, and, by the precautions usual on such occasions, he would have placed the baggage of the army in safety. Again, his spies would have given him notice, that a large body of cavalry was detached from the camp before Arras, consequently he would have been upon his guard; instead of which, being full of a false confidence, he marched as if in a champaign country, and, by this unpardonable remissness, occasioned the loss of the whole baggage.

An officer who commands a detachment for any expedition whatever, cannot possibly take too much care to foresee the checks that may happen to him; if he is beaten, it should be wholly owing to a superiority of force. He who, after having taken all the precautions possible, is beaten by an enemy who has the advantage of number, has nothing to reproach himself with: but he who, with ability, has nevertheless neglected certain precautions, and is beat because they were not taken, is certainly culpable in the eyes of intelligent men. But if this check induces him to neglect nothing necessary to the avoiding of a second, he cannot pass for a bad officer; that appellation is only applicable to him who, suffering himself to be blinded by conceit, or the false lights which self-love makes him take for the effects of a superior genius, suffers the enemy to obtain an easy victory.

A general overcome, as Pompey was at Pharsalia, is not the less deserving of laurels and statues, provided that he does not suffer himself to be discouraged, like that great man, after his defeat: but he who is beaten like Antony at Actium, raises compassion of none but a freed man or a mistress.

Misfortune is an addition to the glory of an illustrious soldier, when he knows how to derive instruction from it for the future. The marshal de Créquy, before losing the battle of Conarbrick, was a great general; afterwards, he was a great man. This was the judgement formed of him by the great Condé, who notwithstanding did not love M. de Créquy: "Sire, (says he to Lewis XIV.) your majesty has just acquired the greatest man that ever professed the science of war."

SECT. III. *Of Camps in offensive War.*

To take an advantageous position for an army; to make choice of a spot that by its situation is strongly secured; to establish a camp there, and to be also able to have the army within distance of marching easily to the enemy, without fear of being molested; in short, to throw such difficulties in the enemy's way as may prevent his harassing the army, is one of the most essential branches of knowledge for a general. He who is endowed with this talent can, with an inferior army, not only make head against, but also cause his enemy's designs to miscarry; fatigue him the whole campaign by marches and counter-marches, which lead to nothing; oblige him to remain inactive, and at length draw him into a favourable position, where he will be morally sure of beating him; as was done by Mr Turenne in 1675, who, after having exhausted every expedient wherewith his military knowledge

could furnish him to draw M. de Montécuculli into a disadvantageous post, at length succeeded, found an opportunity of attacking him, and gloriously fell at the instant victory declared itself in his favour.

Before a general takes the field, he ought to be very certain what number of troops he shall have, that his magazines both of war and provision are ready, as well as the waggons, pontoons, and all other implements whatever that are necessary for an army; for events may happen that it is almost impossible to foresee, and which often alter the best concerted designs. There have been instances of generals who, having taken the field with an intention of acting offensively, have been obliged to change their plan to the defensive; because the magazines which they had ordered, have, through the negligence of those intrusted with the care of them, not been collected; or because the army has been weakened by detachments necessarily sent from it, either to the assistance of allies, or to some towns threatened by the enemy: by such kinds of accidents the plan of a campaign is entirely destroyed.

But let it be supposed that the general has the troops necessary for acting on the offensive, or that the events of the foregoing campaigns force the enemy to keep on the defensive; that the heavy artillery, the field-pieces, and the carriages of all sorts, are ready to march; that the magazines are filled, and the roads free and safe; that the pontoons and the boats got together, either for the passing of the troops, or the transporting the provision, in case the country should be divided by rivers; then a general possessed of the necessary talents, can foresee the event even before taking the field: he will know beforehand the marches he is to make, the camps he is to occupy, and those which the enemy will endeavour to seize in order to oppose his designs.

An offensive war is undoubtedly carried on with greater ease in an open, than in a mountainous country. In plains an army acts openly, forage is in greater abundance, the provisions can be conveniently transported from one place to another, and the marches are performed with more ease. Among mountains, he who is best acquainted with the country, who has a head fraught with expedients, and is the most vigilant, hath often the advantage, although inferior in numbers; at least he maintains himself in and preserves the posts of which he is in possession with greater ease; and an attention to seize such advantages as the ground offers will put such a general upon an equality with his adversary.

But whether in an open or in a mountainous country, and however superior the army be to the enemy's, the least negligence in the choice of situation may render the superiority of troops useless, and even hurtful: useless, if, from a desire of taking up too much ground, the enemy is so divided that the enemy may fall either upon the right or left without a possibility of its receiving succour; hurtful, if, from a desire of assembling the army in too narrow a spot, the troops too close together are unable to act without embarrassment to each other. This superiority should not cause a general to be neglectful of the safety of his troops in their camp; he should always be assiduous in preserving the strictest order and discipline among them; one or two checks are generally sufficient to discourage the soldier, and take away that confidence which he ought to have in

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Whatever situation the army is in, it ought always to avoid presenting a flank to the enemy, and should also use every endeavour to take a camp in a situation that is naturally strong; the wings should be sheltered, and every part both before and behind should be covered by detachments: but whatever the nature of the country is, an army should never fix upon a camp where there is not wood, water, and forage, within reach.

It is to be observed, that a camp ought never to be fixed on the banks of rivers; but a sufficient space should always be left between them and the camp, to draw out the army in order of battle. If this precaution is not taken, it may happen that the enemy, encamped either near to or at a distance from the other side of the river, being informed of the position of the army, will come in the night to alarm the camp, and by a discharge of artillery and small arms throw the whole camp into confusion, without risking the loss of a single man: but again, by encamping an army upon the banks of rivers, how will there be a possibility of drawing it out in order of battle, or posting advanced guards? For these reasons, a camp should always be placed at least eight or ten hundred yards from a river; so that the guards may be advanced without being exposed, and within the circumference of the camp and compass of the guards the army may be supplied with forage for at least four days, and more if possible.

There are some situations for a camp which are in appearance strong, but may notwithstanding prove very dangerous, if care be not taken to examine whether or not the army can with ease come out of it, to form itself in order of battle; or whether the enemy can prevent it, by blocking up the avenues and outlets. If this precaution be not taken, an army may be the means of shutting itself up; as was done at Senefé in 1674, and by the allies at Alschaffenbourg in 1743.

If the war is carried on in a woody country, the same precautions must be used for the security of the camp; but the dispositions must be changed according to the nature of the country: there is scarcely any country so entirely woody but has some plains in it. The choice and strength of a camp depend on the position of the enemy and situation of the country: a general should always avoid encamping the cavalry in a wood, and should be particularly careful that the wings are sheltered; the woods should be occupied by the infantry, and entrenchments thrown up in front, according to the designs intended to be put in execution. If the wings are sheltered by a village, it should be entrenched, and infantry posted in it; and the camp should be covered by a river as much as possible, unless the intention is to march towards the enemy; then all the obstacles that can prevent the army coming up with him should be avoided: but if, from some success of the enemy, or from his superiority of troops, the general cannot determine upon opening the campaign offensively, he must use other

means to bring it about; and in the mean time should strengthen himself in his camp, establish posts on the banks of the river, and cover them by continual detachments of light horse, who, by extending themselves, will prevent parties of the enemy from passing to seize on the hind-parts of the camp, molest the convoys, and attack the foragers. If there are woods at a small distance from the camp, posts of infantry must be established in them. Guards of cavalry are never advantageously posted but in a plain; but if there should be any space between two woods where cavalry can act, and from whence it can take surveys at a great distance, a guard of cavalry should be placed there; but posts of infantry should be placed in the woods to protect it, and to which it may retire in case it is attacked.

Whatever may be the nature of the country, it is often necessary to have corps detached from the body of the army, to cover or keep open a communication with some place, in order to prevent the enemy from foraging too near the camp; to preserve the forage; to raise contributions at a distance; to occupy some advantageous post; to oblige the enemy to divide his forces in order to oppose that body; to cover the camp either in the front or on the flanks, according to that side which is left most unguarded and exposed: in a word, there should always be continual detachments toward the enemy, as hath been the practice of many generals, and of marshal Saxe in the late war. The strength of this body is to be proportioned to the use designed for it by the general; but it is usually composed of light horse, some regiments of light infantry, and a brigade or two of dragoons. In the end will be seen what use should be made of this body; but in whatever situation it is to be placed, the communication between it and the army must always be kept open, that it may always be able to join it on the first order; and its camp must be so chosen, that the general may always receive intelligence from it of the least movements made by the enemy. See Plate CCXCI.

If the war is carried on in a mountainous country, there are generally some small plains or valleys where an army may be encamped, if not altogether, at least some part of it: besides, in these sort of countries a general is almost always obliged to separate his troops; to send out many detachments in order to guard the passes and communications between each other; to endeavour to out-flank the enemy, or for such like dispositions; so that the army not being all together, it must be discerned where to fix the most considerable body.

A general who carries on war in a mountainous country, and who by the superiority of his army is enabled to act offensively, ought to endeavour by the positions which he takes to surround the enemy; to render his foraging difficult; to harass him by continual small detachments, which the enemy will be forced to oppose by others more considerable: he should endeavour to steal a march of him; and although a general should never expect success from the enemy's negligence, there have nevertheless been seen instances where armies, by activity and dispatch, have gained a march or two on their enemies, although commanded by able generals.

If the enemy's vigilance prevents the general from suc-

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succeeding, he must employ new stratagems, and never give up his point; he should try all those that lead to the same end, although by different channels; either attacking some detached posts, oblige the enemy to send succours to it, and by that means weakening other places which he should endeavour to force; or decamping, and feigning to penetrate on some other side, to oblige the enemy to abandon a camp that is advantageously posted, and by that means to draw him into some post that is weaker either from situation or from the extent of country he is obliged to defend; and by this method find an opportunity of attacking him with advantage.

In short, in whatever country, and on whatever occasion, a camp is always defective if the wings are not sheltered, or are to be easily distressed by the enemy; if the front is not guarded and the rear well covered; if the communications with the frontier-towns are not secure and easy; if there is any want of forage, wood, and water; and if there are not detachments in front, to prevent the enemy from approaching the camp.

A general who joins experience and study together, ought to see into the intention of the enemy's general, and judge of his designs by any of his proceedings, however trifling.

All those who are destined to the command of armies cannot be endowed with this quick and exact eye, that ready power of judging of a good motion or a good position upon the spot. Some generals have excelled in marches, others in the position of camps; these in the arrangement of troops in order of battle, those in their conduct in time of action; others in providing subsistence; others in projecting a campaign. There have nevertheless been some of these great men, whose genius and temper have united and carried these qualifications to the greatest degree of perfection; but the rarer these examples are, the more a man ought, by continual study, to endeavour to augment their number, and strive to merit the honour of being enrolled among those heroes, the ornament of mankind, their country's support, and their master's glory.

SECT. IV. *Of the Attack of an Army on its March.*

HOWEVER difficult certain operations in war may appear, they are nevertheless not impracticable when a general knows how to take the necessary precautions for softening those difficulties. The attack of an army on its march seems to be above all reach of attempting; whereas the success of such an attempt depends only upon knowing how to take proper measures, on choosing the ground, and of seizing a favourable opportunity. It seems more difficult to surprise an army on its march, than to attack it openly: the number of the enemy's troops; the precautions which their general shall have taken, the order, the care, the secrecy which must be observed, present obstacles almost insurmountable; but yet, by taking the bye-roads, by concealing his march from the enemy, a general may attack him in force in the rear or upon the flank, at the same time that he causes his advanced guard to be attacked by some infantry, cavalry, and even cannon, to make him the less suspicious that the attack upon the flank is the real one.

When an army would attack another upon its march, it should endeavour to be beforehand with it, and, by

the means of stolen marches, come up with it before it can know any thing of the matter: some parties should be detached, who must place themselves in ambuscade, in order to stop all the comers and goers, so that the march and designs of the army may be kept secret from the enemy. Whenever a general hath determined to attack his enemy, he should send off all the baggage, both great or small, belonging to the army; and it should be left in the rear under a good escort, near enough to join after victory, without the army's being obliged to wait three or four days for it.

The general should be well assured of the day on which the enemy's army sets out; of the country through which it is to march; whether it is an open, mountainous, or woody country; if it is divided by rivers; whether there are many bridges to pass; and in how many columns it marches: he should also get all possible information of the disposition of it. In the third section of the first part, relative to the march of an army in an open country, the disposition which it ought to make, in case it presents its front or flank to the enemy, hath been laid down. The general designing to attack ought to regulate his dispositions by those which the enemy hath taken, and which he can only know from his spies; but if the general cannot receive any information concerning them, the best rule for him is to suppose them good, and to form his own accordingly; it would be very imprudent of a general to suppose his enemy's dispositions are bad, when there is no danger in supposing them to be good, and acting in consequence of that supposition.

A general may march his army in six, eight, or ten columns, as the nature of the country will allow; they should arrive at the place appointed at the same time. The nearer the army is to the enemy, the brisker the attack should be; because the columns having less way to go, the enemy will have less time to make his dispositions.

As in the case of a surprise there cannot be signals given, without running the risk of the enemy's discovering that he is going to be attacked; it is therefore necessary, that every general officer leading columns should have a watch, regulated by the general's, so as to march all at the same time, at the hour agreed on and ordered. The ancients, destitute of watches, regulated their motions by the course of the stars; and it is, without doubt, on that account that Polybius, Ono-zander, Elian, and many others, exhorted military men to the study of astronomy: but as it is not often that an army marches by night, this knowledge would be very useless for an attack in the day-time; besides, the sun, by which they were also regulated, could be no way serviceable to them, should the sky be overcast.

If the general's intention is to attack the enemy's army in front, he must detach all his light troops, sustained by a large body of cavalry and some battalions, with orders to harass the flanks, in order to perplex the enemy with regard to the real attack. It is impossible to give the enemy too many false alarms with regard to what is really designed: the hussars, from their readiness in retreating, and their quickness in passing from one spot to another, are the fittest troops for these sort of expeditions. The same rule ought to be observed if the real attack is designed to be upon the flank; then the false attacks should be upon the front.

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fronte. In Santa Cruz may be seen the dispositions which he has made to attack an army on its march.

Stratagem, and the means of surprising an army, are allowable in war, provided treachery is avoided. Whilst the law of nations is not infringed, successful stratagems add lustre to the genius of the general: however irreproachable the conduct of Scipio Africanus might be, the means made use of by him to surprise the army of Syphax are by no means to be approved of.

The Roman general amused the Numidian king with feigned propositions of peace, during which time he had his camp reconnoitred by officers, disguised like slaves, belonging to the train of the Roman ambassadors. There is no profession where a rectitude of mind is more necessary: a real soldier scorns to act by indirect methods; he abhors deceit, and considers treason as belonging only to mean spirits.

Attilius, after the battle of Cannæ, came to Fabius, and offered to deliver Arpi up to him, which he had formerly delivered up to Hannibal. Fabius having carried this proposal to the senate, they debated whether they should put Attilius to death as a runaway, who was neither a friend to the Romans nor an enemy to the Carthaginians, and whose fidelity fluctuated according to the changes of fortune. Hannibal afterwards put the wife and children of this traitor to death.

Orozander observes, that promise and faith should be kept even with traitors: a man may keep his word with them, and have nothing to fear, provided he knows how to mistrust them. The difference between stratagem and treason is very great; the one a man may guard against, but no degree of human prudence is sufficient to shield him from the other. When, as related by Virgil, by the contrivance of Sinon, the Trojans themselves introduced the enemy within their walls, they could cast the blame only upon their own imprudence and credulity; but when, in the Iliad, Minerva is seen, in contempt of a sworn alliance, persuading Pandarus to shoot an arrow at Menelaus, one is apt to wonder how Homer dared to intitle Minerva, The Goddess of Wisdom.

In order to carry on a surprise by stratagem, one of the most certain methods is, to calculate what time is necessary for the army to arrive at day-break near the road by which the enemy is to pass, so as to be able to examine the country, and make the necessary dispositions for the attack: in an open country the army may be concealed behind corn, or behind a rising ground.

Prince Eugene, in 1702, after the battle of Crostolo, having gained some days march of the king of Spain, posted himself between the Zero and the Po. He so well concealed his army behind the bank of the Zero, that the combined army of France and Spain, which was on its march, and ready to enter into its camp, was obliged to range itself in order of battle, and to fight, without having scarcely time to make any disposition; and had it not been for those, which had been wisely foreseen by the king of Spain and M. de Vendôme, it is probable the combined army had been beaten.

A woody country offers more expedients for the concealing of troops: but as it is to be supposed the enemy's advanced guard will be advanced at least half

or three quarters of a league, to scover the country; therefore, if the general's design is to attack the enemy's flank, he must present some cavalry and hussars in the front of the enemy's army, so as to engage his attention. Some infantry should be placed in the woods, in the rear of these troops, in order to sustain them: this cavalry and the hussars should retire in proportion as the advanced guard advances, in order to induce the enemy to believe they are not sufficiently strong, and that the reason of their advancing was only to examine the march of the army. As soon as the enemy shall have reached the place agreed on by the generals leading columns that are to attack, the body of infantry that is in ambuscade in the wood, the number of whose columns should be regulated according to the situation of the country, will march silently, and near enough to the enemy, and will charge him with bayonets, without giving him time to recover himself: during this attack the cavalry, dragoons, and hussars, who keep the enemy's front in awe, will charge the troops who have passed the wood and spread themselves over the plain. These troops of cavalry must be sustained by the infantry which was in their rear in the wood, and which should be furnished with cannon. These two attacks, made one after the other, but at some small distance of time, will render the enemy doubtful with regard to the dispositions he is to make; he will be undetermined where to send assistance, as the cannon which he will hear at the head will induce him to believe that attack the real one: he will fly to that part, and will consequently weaken the flank, which is designed to be attacked by all the infantry. By this diversion the flank will with greater ease be broken through, and the enemy taken in rear: the enemy thus surrounded, and finding himself between two fires, cannot avoid being beaten.

It is more difficult to form ambuscades in an open country, particularly for a whole army, unless it should find a bank like that at Zero; then the general should consider whether or not the attack of the army on its march is practicable. If the general by his superiority can, without weakening himself, divide his army, and find means to conceal it, he will attempt the attack, provided that each detached body is posted before the enemy has begun his march, and that they can all join on the first order, without a possibility of being cut off or finding any obstacle to prevent their marching up to the enemy: but, in order for a greater certainty of success, these first dispositions being made, great exactness in giving, and diligence in the execution of the orders, is necessary; each separate body should charge at the same time, and at different parts. But as it may happen the attack may prove unsuccessful, whether owing to the good disposition of the enemy, or whether because the attacks were not made together or executed with equal vivacity, it is necessary that the general should have provided for a retreat, and that the officers commanding different bodies should know after what manner and from what part it is to begin. For the greater security, the general officers ought to communicate their instructions to the commanding officer of each body composing that which they command, so that at the time of the attack or of the retreat, they may instantly comprehend the meaning of whatever they are ordered to perform.

If the army intending to attack the enemy on his march is weaker, or equal, either in number or in the nature of the troops, it is then only the situation of the country, and the facility with which the enemy may be surpris'd, that should determine the attempt of this grand enterprize: the prudence of the general, his experience; that of the generals who are under his command; the quality of his troops; whether they are well disciplined or not; whether they are composed of one or of many nations; the quality of the troops to be attacked; and, in short, the genius of their general, are circumstances by which the attacking or not attacking should be decided. It is impossible to be decisive upon these circumstances, which depend entirely upon the ground, upon the vigilance of the enemy's general, upon the order which he causes his troops to observe in their march, and in short upon the troops under his command. A general, at the head of a well-disciplined army, composed of veterans and good general officers, will undertake and execute designs which he would not even dare think of with a new-raised army, however numerous: it is also very difficult to surpris'e a vigilant general, who is besides a good soldier, and who is also assisted by the counsels of able and intelligent officers.

A general should also be guided, in attacking the enemy on a march, by the country and the nature of the troops of which his army is composed. If the enemy marches through an open country, and the general is equal to him in infantry but superior in cavalry, he should make no hesitation in attacking him; but if the country is woody or mountainous, and the enemy's army is more numerous in cavalry than infantry, the general has still the same advantage with a superiority of infantry; because the enemy's cavalry, in those kind of countries, is unable to act against infantry; and the infantry also which the enemy may have will never be sufficiently strong to maintain itself upon the heights against forces so superior: and if the heights are forced, there can be no doubt of the enemy's being beaten, of his cavalry being ruined and crushed to pieces, or that his retreat will be attended with great difficulty, and that he will lose the greater part, if not the whole, of his army.

It is true, that an army so weak in infantry and strong in cavalry rarely engages itself in a woody or mountainous country; but it may happen that the enemy is obliged to pass through these countries in order to transport the feat of war to a spot more favourable for the cavalry. On this occasion the general must endeavour to concert his measures after such a manner as to render it impossible for the enemy to molest him, to dispute any pass with him, or to attack him on his march; if a general on any occasion engages himself rashly, it is a mark both of imprudence and want of capacity. If Amilcar Barca had engaged himself in the streight of Hache with a greater number of cavalry than infantry, he would never have been able to overcome the African rebels, whose chief strength consisted in infantry. Hannibal would not have engaged himself in the Alps without being much more numerous in infantry than cavalry; and yet the difficulty which he found in that passage was more owing to the trouble caused by the cavalry and baggage, than by the mountaineers, by whom he was conti-

nually harassed.

In a word, the attack of an army on its march should be foreseen beforehand. This operation requires the agreement of many circumstances, an inviolable secrecy and an exact knowledge of the country: a plan should be laid relative to the precautions the enemy may be supposed to take in his march, as well as those necessary to be taken to steal marches of the enemy, to approach him in order, and for observing strict silence in the march. The general should also endeavour by all means to gain the inhabitants of the country over to him, to choose a spot where he can march under cover, without which he can march only by night; in which case it will be difficult to prevent some of the columns from straggling, which will be sufficient to cause the miscarriage of the enterprize. The general should have safe and intelligent guides, be certain of his troops, and have nothing to apprehend from deserters; one of which is enough to baffle the best-concerted measures. In 1693, prince Eugene, on receiving intelligence that the Turks had prepared a large convoy for the garrison of Temeswar, formed the design of carrying it off: he therefore put himself at the head of the detachment destined for the execution of this design; but a soldier who deserted to the enemy prevented the Turks from marching, and the prince was therefore obliged to return without accomplishing his design.

SECT. V. Of the Attack of entrenched Camps.

THE principles of war among all nations and in all times have been still the same; but the little experience of the early ages of the world would not permit those principles to unfold themselves, as they have since done, and to which it is owing that new expedients both for attack and defence have been discovered.

In the fabulous times of Greece, the first conquerors were esteemed as gods, because they, by their genius and valour supplying the want of art, were regarded as beings superior to humanity, as mortals born for its destruction; but now, as arts of all kinds, and particularly the art of war, have soared to a pitch of almost perfection, these gods of antiquity are no longer considered in any other light than as great men who made themselves superior to the rest of their contemporaries. In proportion as posterity hath become more enlightened, it hath also become more just; it hath preferred the title of hero for those who have not made an ill use of their superior talents and strength; but hath given the detestable name of tyrants to those whose desire of revenge and rage have outlived their success.

The first epocha wherein the military talent became conspicuous, is the siege of Troy, although there were even wars prior to that. Homer, when describing the shield of Achilles, mentions wars raised for the carrying off cattle. Horace confirms this; and in his Satires also mentions a war anterior to that of Troy, the occasion of which was the same, and without mixing sacred authority with these profane ones: and those who know the passions can want no arguments to convince them that men have been in a state of warfare from the time they have been actuated by them, or, to use a better expression, as soon as mankind was formed into society. Even before the siege of Troy, Hercules

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and Thefeus had already astonished the Greeks by their conquests; but although these two heroes have purged the world of many flagitious men, their victories are rather a proof of their strength and cunning, than of their knowledge in the military science. In proportion as Greece became polished by the laws of Lycurgus, the people, more enlightened, discovered, in the necessity of self-defence, the principles of attack. The Grecians gave birth to that science which the Romans extended, which succeeding ages improved, and which we have almost brought to perfection.

What a sensible difference is there in the military art, such as it at present is, compared with that of which the rules are handed down to us by Onozander, Vegetius, the emperor Leo, Frontinus, Ælian, and many others? The towns, in their times, had no other defence than walls, raised at a great charge, flanked at little distances with towers, and a large ditch in front: it is true that the little force of their weapons contributed much to the advantages of their fortifications. Their entrenched camps had only a large ditch with some waggons placed behind it; and whenever the ancients were willing to practise all the art at that time known in war, they surrounded the camp with walls, in the same manner as they did their towns, with towers at little distances. Of this kind was Pompey's camp at Dyrachium in Epirus, the plan of which is given in the *marſhal de Puſſépur's Art of War*: the wall by which it was surrounded was 15,000 paces in extent.

The emperor Leo was unacquainted with any other method of entrenching a camp, than by heaping fascines together, putting trees upon one another, and posting advanced guards.

The experience which hath been since acquired, hath, without abridging the labour, rendered the works of places stronger, and easier to be defended: the labour of the entrenchments for camps hath been shortened; they have taken a new form; and being constructed upon the same principles as the fortifications of towns, they are become more difficult to be forced. By this same experience the means of attacking them hath been discovered; and in proportion as offensive weapons have changed, and are become more powerful, the system of fortification has been new-modelled.

The power and force of arms being become more considerable, it has been thought necessary to oppose them by such fortifications as were capable of resisting them; and necessity has done that which genius was till then unable to effect. It is for this reason that in the latter wars, and in those of the present time, generals have not been contented with making ditches in the front of their camps in order to entrench them, after the manner of the Romans, but have to them added lines, angles, and redoubts, at proper distances. Art hath been carried yet farther, by the addition of walls in front of the ditch: in short, M. Saxe, in the last war, instead of making use of lines to entrench his camp before Maaſtricht, only caused redoubts to be erected at proper distances, each of which had a covered way which was palſiſaded, and the redoubt fraized; and he also caused large and deep wells to be sunk in the ditch. Our posterity may perhaps discover something to add to the strength of these entrenchments; the

knowledge of a succeeding age being always increased by that of the preceding.

A general should be determined upon the attack, and the manner of it, by the nature of the entrenchments and the situation of the country. Such entrenchments as those of M. Saxe at Maaſtricht, are very difficult to be forced; nor can the design of it be formed without great superiority of force: even then the success is uncertain. The strength of these entrenchments hath been seen in the sixth section of the first part.

But a camp entrenched with lines may be attacked; although, at the siege of Philippsburg, Prince Eugene at the head of 80,000 men, did not dare attack those which were erected by the duke of Berwick: but this example should not serve as a rule. Two great men naturally fear and respect each other: Prince Eugene being thoroughly acquainted with the duke of Berwick's ability, was therefore convinced that his rival had taken all those precautions which he himself would have done in the same situation: the duke of Berwick, doing the same justice which all Europe did to Prince Eugene's talents, had to the prudence of his dispositions added all the assistance of art. The prince having examined the lines, and finding them strong in every part, acted the part of a wise and experienced man; the lines were not attacked, and Philippsburg was taken.

Camps entrenched with lines are not always equally strong in every part; they are neither always commanded, nor even to be attacked, by generals equal in talents, capacity, and experience: and when they are, there are some occasions where force and resolution must be joined to the prudence of the dispositions.

Let an army be supposed entrenched behind lines where art and nature are both joined; whose flanks are sustained and secured, furnished with troops and artillery along the whole front, with more troops behind to sustain those which line the lines. The general who would attack, ought first to survey the situation of the lines himself, and as much as possible the enemy's disposition; he will examine the construction of the lines, how they are supported, their extent, and whether the soil is firm or light. As soon as he shall be perfectly acquainted with these circumstances, he may form his plan of attack, and cause his army to march in as many columns as there are attacks to be made; but he should endeavour as much as possible to occupy the whole front of the enemy, whether for the strength, or whether to prevent the enemy from sending assistance to those places where the attack will be briskest. The head of each column should be well furnished with artillery; and as soon as it shall be within distance of cannonading the lines with effect, it should keep up a brisk and continual fire for the space of an hour at least, so as to beat down the earth of the parapet, and tumble it into the ditch, which will in some measure render the passage of it less difficult for the troops. The time of the attack should be an hour before day, so that the cannon may have fired before the enemy shall know where to direct his artillery: after every discharge, the situation of the cannon should be changed either to the right or the left, in order to deceive the enemy's gunners, and prevent their knowing where to direct their pieces. If there should be

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any height within proper distance, the cannon should be planted upon it: if the cannon can be brought to cross each other upon the lines, the artillery will then have a very great effect.

The infantry should follow the artillery, furnished with hurdles, planks, fascines, pick-axes, and shovels; the fascines will serve to fill up the wells, if there are any, before the ditch; or if there are no wells, they will fill up the ditch, and the hurdles will be thrown over them. The cavalry should be formed in two lines in the rear of the infantry, in order to sustain it. The general should endeavour to find some ridges, to conceal the cavalry from the enemy; but should there be none, it must be placed at such a distance, as not to be exposed to the cannon of the lines; for should it be placed too near, it will very soon be destroyed, without having it in its power to be of any service; the great fire which it will sustain, may strike it with terror, which may cause it to give back, and discourage the infantry, or at least deprive it of that resolution and vivacity which it had, knowing itself to be sustained; besides, it is great inhumanity in a general to expose troops which he can place in security. The enemy appears less formidable when force can be opposed by force; but the bravest soldier will be often disheartened when he sees himself exposed to blows which he has not in his power to return. Besides, as in the beginning of an attack of lines, the cavalry cannot be of any assistance, and cannot act till the infantry hath penetrated in some part, it would be useless to cause it to advance too near, provided it is within reach of marching readily when the infantry has passed, and hath made a passage large enough for it, by beating down the lines and filling up the ditch; the cavalry then will have no more to fear from the cannon of the lines, because the enemy's attention will be more engaged with endeavouring to repulse the infantry, than with firing upon the cavalry. As soon as the lines have been sufficiently cannonaded to beat them down, and throw the enemy into confusion, the infantry should march resolutely and together; and should take care to leave room for the artillery, so that it may advance at the same time, and continue its fire. The attack should be made by the grenadiers, sustained by the piquets: they will protect the soldiers who fill up the wells and the ditch; and as soon as they find an opportunity of passing, they will endeavour to get over the entrenchments, sustained by the whole infantry of the column, which will then be disencumbered of the fascines, hurdles, &c. in order to drive the enemy from his lines. As soon as there are soldiers enough upon the lines to bear the resistance of the enemy, the soldiers who have the shovels and pick-axes, and who ought to be last, will finish the filling up of the ditch by beating down the parapet of the lines, and making an opening sufficient for the passage of a squadron in order of battle. Then the whole infantry of the column that has broke through, will pass and divide into two parts, to let the cavalry pass, which will form under the cover of the fire of the infantry, and will not attack the enemy's cavalry till it shall have collected its whole force together.

If one of the attacks succeeds, on the first news, which will soon be spread throughout the army, all the troops at that time ought briskly to attack the whole

front of the line, in order to employ the enemy, and prevent his sending assistance to that part that is forced. The reserve, which is composed of infantry and cavalry, ought to join the troops that have broke thro' the lines, to sustain the cavalry charging that of the enemy, and cannot be sustained by the infantry who passed the first, because it is employed in taking the enemy in flank to the right and left. In this situation, when the reserve and all the cavalry which followed the column that hath passed, and to which others may yet be joined shall have passed, it should attack the enemy; if it is repulsed, it can never be to any great distance, because it has infantry behind it, to sustain it, and by its fire to stop the enemy. If the lines are forced by many columns, the success and also the defeat of the enemy will be thereby rendered more certain.

This disposition appears to be good, because the lines having been partly destroyed by the cannon, because the enemy cannot but have lost a great number of men, and because part of his artillery has been dismounted, without the army that attacks having sustained much loss. The prince of Orange in 1639, being posted upon the Ghete, at Nérvinde, entrenched his army after such a manner that it could not be surrounded; his right was supported by a river, and his left by the village of Romdorff, bordering upon the rivulet of Landen. M. de Luxembourg, being willing to attack him, could only get up with his cavalry in the evening, his infantry and cannon not being able to come up till night: that general during this time formed his disposition, and between five and six in the morning he put his army in motion, which formed in order of battle as it marched along, the infantry and cannon in front, and the cavalry in the rear.

When the duke of Savoy and prince Eugene, still encamped between the town of Pianezza and la Venerie, in 1706, marched to attack the lines of the French army that besieged Turin, they caused their armies to march in eight columns; the infantry formed the advanced guard, the artillery, distributed by brigades, marched at the head between the columns, the cavalry was behind in six, and out of reach of cannon-shot.

The disposition of marshal de Coigny in 1744, in order to attack the lines of Wissembourg, of which the enemy were in possession, was like it, except that the whole of his army had not time to get up; but as the moments were precious, he did not wait for it. The army which came from Landau divided itself into four, which formed the four attacks; one of which was at Wissembourg, the other at the mill between that town and the village of Picards, the third at the village of Picards, and the last was made above that village, which was entrusted to the Hessian troops. His cavalry, which was behind, passed after the infantry had broke through the lines; but the enemy were then almost either killed or taken, and those who could save themselves, retired to Lautrebourg, where their army had assembled after having passed the Rhine. It is difficult to determine which is most to be admired, whether the general's disposition, the quickness and exactness of his eye, and his coolness in a circumstance so delicate, or the courage of the French troops, who forced these lines in less than two hours.

As soon as the enemy is beat and abandons his lines, he must be pursued, but with precaution. The vivacity
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with which he should be pursued, depends upon the order with which he retires: if it is an open country, the general may follow him so long as he sees all clear before him; but if the country is divided with defiles and woods, it would by no means be prudent for him to engage himself in them, for fear of any ambuscades being placed there by the enemy, in order to secure his retreat: nevertheless, the general should endeavour to make the most of his victory, and should never be content to win a battle by halves; at least it should be carried so far, as to make the enemy sensible of his loss, and of rendering him incapable of continuing openly in the field.

But if the army that attacks the lines should be unable to force them, after many repeated attacks, and if the general perceives his troops are discouraged, he should immediately retire. If the retreat is made over an open country, he should begin it by marching off the cannon, the infantry next, and the cavalry will form the rear-guard in two or three lines; the buffs and dragoons will be upon the flanks of the cavalry: if there are any defiles or woods to pass through, the general should leave some infantry at the entrance of them, to sustain and protect the cavalry, which will retreat by files. If the enemy is in full strength, the general should leave some field-pieces with the infantry that is posted at the entrance of the woods and defiles, which will certainly stop the enemy's impetuosity: if, on the contrary, the enemy pursues the army with only a few troops, it will be proper to charge him if he approaches too near. In this disposition an army may retreat easily, provided that order is observed, and the movements not made with too much precipitation.

SECT. VI. *Of the Attack of a Convoy.*

The same motive that ought to oblige a general to practise every resource of art, in order to conduct the effort of a convoy in safety, should also induce him to use the same expedients to carry off the enemy's subsistence, to oblige him to retire, if advanced into the country, into the neighbourhood of some one of his own towns, in order to find subsistence: to carry off the enemy's convoys, and deprive him of the means of subsisting, is, in reality, to overcome him without fighting. Vigilance, so necessary for all kinds of operations, becomes more particularly so for those which may decide the fate of a campaign. Whatever may be the nature of the convoys, a general should never neglect an opportunity of attacking them: if they consist of provision, the most numerous army in want of that becomes its own destruction; if of forage, the taking of that causes the ruin of the horses, and renders the cavalry useless: the ammunition necessary for carrying on war cannot be transported to the army, nor the artillery conducted to it. Without ammunition the wisest and bravest general cannot have any resource; and if destitute of money, the soldier is disheartened, and those very men whom pay renders heroes, are converted into so many deserters: the bravest man who, without fear, exposes himself, isensible to the greatest terrors of war, cannot support even the appearances of famine.

If the effort of a convoy marches in a mountainous country, the officer who commands it should have a body of infantry at his advanced guard, another at the

rear-guard, and a third in the centre; for it may happen that he may be attacked in flank, particularly if the enemy, discovering an opening, presents himself in the road that the convoy keeps; and there should be also troops in all parts to oppose any attack that may be made.

An advantageous method for attacking a convoy is, by forming three attacks, one real and two false. Those attacks are called *real* which the troops make with vigour and in full strength, and when their charging is provided for and determined; the *false* ones are when the general's intention is only to keep back the enemy, and prevent his sending assistance to the troops that are really attacked.

These attacks, true or false, are determined by the situation of the country, and in proportion to the degree of ease with which the convoy may be turned from the road it is in; that is, if the general should meet with an avenue near the advanced guard, which will draw the enemy some distance from his main body, and which also leads to that of the troops which attack, it is at that part the real attack should be made: if this avenue is found at the rear-guard, the two false attacks should be made at the advanced guard and at the centre, supposing there is an opportunity of attacking the centre. These false attacks ought to be sufficiently numerous in troops, to be able to employ the enemy, without running a hazard of being beaten, and to prevent his sending assistance to other parts.

If the troops designed to attack the convoy are sufficiently numerous, although divided into three bodies, to attack every part at the same time with equal vigour, the success will thereby become more certain. The effort of a convoy is often more numerous than the troops which attack it; but it being certainly weakened by the division it is obliged to make in order to guard the whole length of the convoy, the troops which attack have greatly the advantage, although inferior in number, because those which they attack cannot send assistance to the parts attacked, especially if attacked on all sides.

If the road is wide enough, and there is room for a waggon to turn, the general should rather choose to attack the advanced and rear guards than the centre, to prevent the enemy's saving any of the waggons belonging to the rear-guard, which will undoubtedly be the case, if only the advanced guard and centre are attacked. If the road is so narrow that the waggons cannot turn about in order to go back, the general should attack the advanced guard, and employ the centre and rear-guard as much as possible.

A convoy may also be attacked at the opening of a defile into a small plain; then it is again the advanced guard that the general should attack, who should also contrive to have the rear-guard attacked at the same time. The troops in the centre will be confused, and not know where to send assistance, because they will hear firing both in front and rear; nevertheless, the general should defer charging till part of the waggons are passed, and the troops of the centre are still on this side the defile. An attack, when unforeseen, brisk, and sustained, can never fail succeeding, particularly when the troops attacked are so divided as not to have it in their power to assist each other; and if the whole convoy is not taken, there is almost a certainty of taking

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king a great part of it, or at least depriving the enemy of it, by setting it on fire, and by hamstringing the horses, if there is not time to carry them off.

The success of these attacks partly depends upon the choice of those places where the troops which are to fall upon the convoy are placed in ambuscade; the most secure are those which are least liable to the inspection of the enemy's parties. It is sufficient to have sentries upon the tops of the hills, so that they may see into the roads, and give notice when the convoy is near the place appointed for the attack: then the troops charged with the attack of the rear-guard, having nothing more to apprehend from being discovered by the enemy's parties, may draw near the entrances of the avenues.

If the ambuscade is discovered, the conduct which ought to be observed by the troops composing it depends entirely upon their force and that of the escort; nevertheless, even when they are weakest, the attack should be attempted, which, if unsuccessful, will at least have retarded the march of a convoy, for want of which the enemy may be greatly distressed. A general never risks much in attacking a convoy; the object of the officer commanding the escort being to conduct it in safety, and to avoid fighting: it is the same with the escort of a convoy, as with a chain of forage, the end of which is only to complete it; and consequently the troops charged with them will rather be attentive to execute the orders which have been given them, than to pursue the enemy, although beaten and drove back. The conducting of a convoy, and the dispositions which relate to foraging, are very different from those of a detachment only: foraging and convoys have a fixed destination, and a point where they are to terminate; whereas a detachment has no other view, than to seek the enemy and fight him, unless it is ordered to carry assistance, or to get possession of some post. Then the commanding officer should act in the same manner as if he was charged with the conduct of a convoy or a forage; that is, he should endeavour to execute his orders without fighting: but if the intention is only to seek the enemy, the troops in ambuscade, finding themselves too weak for him, should retire; but if they are superior, or even equal in number, they should attack him, and the vigour of their charge should determine the success of it.

In a woody country the situation of it should be considered, in order to regulate the manner of the attack: if the wood is thick, infantry only can act in it; if it is not thick, some hussars or dragoons may be added to it. If the road through which the convoy passes is large, the advanced and rear guards should be attacked; the troops in the centre will be easily kept employed by a few troops: if the road should be so narrow, that the waggons can neither turn back or double up, the head should be attacked, and the false attacks made at the rear-guard and the whole length of the convoy.

When a convoy marches through an open country, there should be many ambuscades formed: an enemy is less apprehensive in an open country, because, seeing all before him, his searches become the less exact, in proportion as the country is unfavourable for troops to form ambuscades; nevertheless, a general may always find some hollows, heights, or places of the same

nature, where troops may be concealed. As soon as the convoy shall be arrived at the place fixed on for the attack, the general should fall upon the advanced and rear guards, in order to take in the whole, and to induce, if possible, the troops in the centre to divide themselves, to run to their assistance; then the third ambuscade must show itself, and attack the centre, and endeavour to divide the convoy, before the command of the escort has had time either to park it or double it up. If the general succeeds in dividing the convoy, and if the troops in the centre of the escort are beaten and broke, he should detach some infantry, cavalry, and hussars, in pursuit of them: the remainder must be divided in two parts, in order to attack the troops lining the convoy; after which they must join those who attack the advanced and rear-guards. The troops, when re-united, ought to make this attack with vigour, and entirely determine the defeat of the escort, and consequently the taking of the convoy.

A convoy that is divided is half taken, as soon as the detachment of the centre is beaten; because the victorious troops can be divided, and part sent in pursuit of the body that is beaten, and the other part employed to reinforce those who still meet with resistance; whereas, if only one part is attacked, that which is not attacked can readily send assistance, especially in an open country, where there is nothing to prevent either cavalry or infantry from acting, and being a mutual assistance to each other.

A general who would attack a convoy never runs any hazard by dividing his troops, in order to divide those of the enemy: the more the troops of an escort are divided, with the greater ease will they be beaten. An officer who would attack, should know the strength of the escort, in order to regulate the number of his troops by the enemy's, and to be proportionably stronger. He who is attacked, being ignorant of his enemy's force, and being charged on all sides, is at a loss where to send assistance, and how to take care of every part: he who attacks by the knowledge he should have of the country, is enabled to post his troops after such a manner, as to employ all those belonging to the enemy, without weakening himself. The troops which attack have certainly great advantages, because, in dividing them, they are still stronger than the body attacked; and then they can choose the place most favourable for the attack: whatever may be the precautions taken by the officer commanding the escort, whatever may be his vigilance, it will be very difficult for him, considering these different attacks and the number of the enemy's troops, to dispose his own with sufficient quickness to place the convoy in security, especially if the attack is made with great quickness and vigour.

The attack and the defence should always be provided against, and the most certain means for succeeding should be taken beforehand. Upon this principle he who would attack a convoy ought to be informed of the day it is to set out, and the number of troops with which it is to be escorted. From the knowledge which he ought to have of the country, he will place his ambuscade out of the sight and searches of the enemy's advanced detachments; he will choose such places for the attack as are most favourable for him, and most disadvantageous for the enemy; and should the

convoy

convey have a bridge to pass, that will be the most favourable place for the attack.

On this occasion the commanding officer should divide his troops, which ought to attack, into three bodies: two must be placed in ambuscade on the opposite side of the bridge, and the third remain on its own side. As soon as the officer of the troops in ambuscade shall see the head of the convoy, he will permit the advanced guard, the body at the centre, and some waggons, to pass; then the two bodies in ambuscade on the opposite side of the bridge will show themselves, and charge the troops; one those of the advanced guard, and the other those of the centre: he will also permit some waggons to follow the troops of the centre, so that the passage of the bridge may be embarrassed; the third body, which is on its own side, ought to march in order to attack the rear-guard, which cannot have any communication with the advanced guard and the troops of the centre, the passage of the bridge being stopped up with the waggons with which it is covered; and because also the advanced and rear guards are attacked. It is to be presumed that these three attacks, made at the same time by superior force, will have the whole advantage of the action; and the more so as the troops of the escort being every where employed, cannot send assistance to any particular part. If the two bodies which attacked the advance guard and the centre should break them and put them to flight, there should be troops enough left in pursuit of them to finish their entire defeat, without any fear of being repulsed; the remainder ought to march to the bridge, and cause the waggons that are upon it to be ranged in order, and march to the rear-guard, in order to finish its defeat, if it still continues to make resistance.

It is necessary to observe, that some troops ought to be left at the head and along the convoy, in order to take care that the horses are not taken off from the waggons, and that none of the soldiers or drivers make use of that method to escape.

If the general has not troops sufficient to be divided into three bodies, the ambuscade on this side the river can no longer take place, but the advanced guard and the centre must be vigorously attacked. The general must observe not to attack till the troops of the centre shall have passed: this attack should always be executed by the infantry with the bayonets fixed, and without firing, and by the cavalry, hussars, and dragoons, sword in hand. The general should not then stay to make prisoners; but should put to death all those whom he finds armed. If the two first detachments are beaten, the general should march with the remainder to the rear-guard, which, not being strong enough to resist a body of troops much more numerous, will undoubtedly betake itself to a retreat. As it is the convoy, and not the troops of the escort, that is the principal object, the general should leave only some troops of hussars to pursue the rear-guard; he should make the waggons file off as fast as possible, and conduct them the nearest way to the camp or the neighbouring town.

If the action has happened at too great a distance from the army, and waggons cannot be conducted without running the hazard of being attacked, the traces must be cut, the horses carried away, and the

waggons set on fire. The hussars and the dragoons which have been left in pursuit of the advanced and rear guards and the centre, should not follow them more than half a league, and then ought to return, in order to form, together, the rear-guard of the convoy that is taken: to which some infantry should be added, especially if it is to pass through a woody country; if it is in a mountainous country, the pursuit of the enemy, as well as the rear-guard, on the return, ought to be entrusted to the infantry.

SECT. VI. *Of the Attack of green and dry Forages.*

NEXT to the convoys, the forages become most necessary for the subsistence of an army, as it is by them the cavalry is supported; and if a general can contrive to deprive the enemy of them, or to molest him in the making of them, his cavalry will soon be without resource, his infantry without baggage, and his artillery without the means of being conveyed. An army, however numerous, reduced to this extremity, is necessarily obliged to keep upon the defensive, however inferior in number or troops the army opposed to it may be, its movements will tend only to find subsistence, and all its designs will be by that means destroyed. A general who is so vigilant as to seize on such like opportunities, will fight more securely, and, instead of continuing upon the defensive, he will find himself in a capacity of acting offensively.

With regard to green forage, it is necessary the general should be informed of the time and place where it is to be made, and, if possible, of the number of troops which are to forage. In consequence of this knowledge, he will calculate the extent of ground they will take up, and also the number of troops necessary for forming the chain: from this judgment, and upon this examination, he must make a detachment sufficiently strong to attack the chain in many parts; and should also be sure, by the number of attacks made in different parts, of penetrating on one side or another.

A general should, on this occasion, make use of ambuscades; it is a very useful and also secure method of acting, when well performed. War, in the field, is almost entirely founded upon ambuscades; the great point consists in knowing how to place them advantageously: but it is unnecessary to enlarge upon this subject here, there having been a sufficient detail given of it in the second section of this part.

If the forage is made in an open country, the detachment destined to attack it, should be composed of infantry, cavalry, and hussars: the infantry should not appear, but ought to remain in ambuscade in some hollows, behind some hedges, and other favourable places; and it should be careful not to show its arms; because, by the glittering of the steel, they may be discovered: the cavalry should be divided into two bodies, three quarters of a league one from the other, taking care to be able to join in case of necessity. As for the hussars, they should be distributed about in many small detachments to the right and left, and in the centre of the two bodies of cavalry; upon one of the flanks, there should be a more numerous body of hussars placed in ambush, at a greater distance than the small detachments. Every one of those small troops should have a number of trumpets with them;

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and when the chain is formed, and the foragers spread over the plain, a part of these detachments should leave the ambuscades, making a great noise, and attack those belonging to the enemy which are advanced: and these detachments will charge them with so much the more vigour, as they will be sustained by the large body of hussars in ambuscade behind them, and which should march to sustain them, and attract the attention of the officer commanding the effort. It may happen that this first attack, made on one side only, may induce the enemy to unfurnish the chain in some place, by which it will consequently be weakened; that is the time for the other detachments of hussars to advance, followed by one of the bodies of cavalry, in order to attack the part that has been unfurnished. If the enemy, more prudent, does not weaken the chain in any particular part, which is every where strong, but contents himself with making the reserve march to the assistance of the troops which have been attacked, the second attack ought always to take place; but in order to employ the enemy every where, the second body of cavalry should march and attack the centre. This attack ought to be made with great briskness sword in hand, whether the enterprise succeeds or not: if it succeeds, a great advantage may be drawn from the rout of the chain; and, by pursuing the troops of the chain with the cavalry and part of the hussars, the other part should fall upon the foragers, where they will without doubt find but little resistance: if the attack does not succeed, and that, by the good disposition of the troops of the chain, the detachment has not been able to force it, it should retire to the infantry that has remained behind in ambuscade; this infantry will facilitate the retreat of the cavalry and hussars. But suppose, that the enemy, too eager, is carried away by this first success, a great advantage may be derived from his imprudence, by attacking him resolutely. The whole strength, and each body being united, it is to be imagined and even hoped, that the advantage will turn on the side of those troops which were repulsed but a moment before; and the more so, as the general commanding the chain can have pursued only with his cavalry, his hussars, and dragoons, because his infantry will have remained in the posts which it occupied, either to guard them or to sustain the horse, supposing they should be repulsed.

If the forage is made in a mountainous country, the infantry must act alone, the cavalry being only necessary in case it can have any ground on which to act, and sustain the infantry in case it is repulsed; the infantry should attack the avenues and the heights, and possess itself, as much as possible, of those which have the greatest command, and make the attack in many places, as in an open country. These different attacks render the enemy undetermined with regard to his dispositions; he does not know where to send assistance: the uncertainty of the general becomes visible to every officer, and soon communicates itself to all the troops; from thence proceeds their confusion, and consequently their defeat.

When the enemy is beaten and driven off, the detachment should pursue him far enough to prevent his returning to finish the forage; taking care not to go too near his camp, from whence there may come assistance, because the alarm will have been undoubtedly

ly carried there by the foragers who may have escaped.

The prisoners and horses that have been taken should be sent off first with an escort; the rest of the troops will retire immediately after by the shortest road. It is cruelty to abandon the wounded, whether friends or enemies; and as the detachment has undoubtedly found, within the circumference of the chain, some waggons with horses to them, they should be made use of to carry off the wounded, who should also be sent on before: if there are no waggons, the detachment must take them from the neighbouring towns.

The attack of a dry forage is conducted nearly in the same manner as that of a green one; but it is often necessary to employ a greater number of troops; because, as the forage is made in the villages, it is almost a certainty they will all be guarded by infantry sustained by cavalry; whereas the chain of green forage is formed with a much greater number of cavalry than infantry, unless it should be in a country where cavalry cannot act. It is difficult to force the villages where infantry is sustained by cavalry; whereas it is easier for cavalry to attack each other in a plain, where the affair is immediately determined; but it is not so soon decided when entrenched infantry is attacked by infantry: but whatever resistance a commander may find, he should always attempt to force it. As the principal object is to prevent the forage, it is obtained by attacking the chain briskly and in all parts; because it is certain that the general commanding the forage will cause the foragers to assemble; or else, seeing the chain attacked, without waiting for an order, they will of their own accord disperse, and fly toward the camp: but whether they assemble, whether they retire in order, or shift for themselves, the end is answered, and the forage is left unperformed. If by their flight the commander cannot hope to make any prisoners, he must keep the troops of the chain at bay such a length of time, as to make it impossible to continue the forage for that day: he should even, if possible, endeavour to force them to retire; which if they do, he should pursue them long enough to be certain of their retreat, and then collect all the waggons from the neighbouring villages, cause them to be loaded with the forage intended for the enemy's army, and conducted to the camp: if they do not retire, the commander must remain in sight of them during the night, and send to the camp to demand a reinforcement of troops, in order to oblige the enemy to retire. For the same reason that a forage should not be abandoned till the last extremity, the troops that would prevent the enemy from making it, should be absolutely bent upon it, at the same time without exposing themselves to the danger of being beat by any assistance that may come from the camp to the troops belonging to the chain.

SECT. XI. *Of the Passage of Rivers.*

THE subject of this chapter is perhaps the most interesting of all hitherto treated of. This subject, which has never been thoroughly understood by the ancients, and upon which the greatest part of modern authors have but lightly touched, hath been placed in a new light by the chevalier Folard, in his commentaries upon Polybius.

Before an army attempts the passage of a river, it should

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should be furnished with every thing necessary for it. Rivers are passed by swimming, fording, or upon bridges.

It is only small bodies that can pass a river by swimming; yet it will be very difficult to pass a river in this manner, particularly if the enemy makes the least effort of opposition. Antiquity furnished but few examples where whole armies have passed rivers by swimming. This trial was reserved for the French, encouraged by the example of their king, when they crossed the Rhine at Tolhuiz. It is an action, says M. de Feuquieres, the success of which was owing to its rashness, and which should never be cited as an example worthy imitation.

When a ford is discovered, it should be founded in every part, the goodness of the bottom examined, and whether the opposite bank is of difficult or easy access.

There are fords which become impracticable as soon as some troops have passed it, because the bottom has not been sufficiently firm.

If there is reason to apprehend that the enemy has armed the bottom with pointed iron, with stones chained together, or any other kind of thing, some soldiers should be sent with rakes to clear away every thing that may retard the passage; they ought also to take pick-axes and shovels with them, and indeed every instrument proper for removing of earth, because if the bank opposite to the ford is too steep, they will slope it properly.

If the river is not fordable, bridges made with boats or pontoons must be made use of; and if there is neither, then rafts. The reader may see what M. de Folard says upon this subject.

When a river is not sufficiently large to oblige an army to make use of boats or pontoons for the building of bridges, they are made upon piles, or upon wooden horses; then they are either fixed or flying. If they are supported upon piles, they are fixed; if upon wooden horses, they are flying. The method of constructing bridges with beams, or thick planks strongly fastened to each other, has been given in a former section; if the river is so wide that the beams or planks cannot reach from one side to the other, piles driven into the gravel must be made use of, that they may serve as props to the ends of the beams, in order to be able to establish the bridge; if the army is furnished with boats or pontoons, they had better be made use of, because the bridge will be the sooner completed.

The head of the bridge is secured by entrenchments of earth, that is, by sinking a ditch, and raising a parapet formed of the earth taken out of the ditch. These entrenchments are proportionably large, according to the use to be made of them, or the advantage intended to be derived from them. Sometimes an horn-work is erected, with an half-moon before it, the whole well fraised: a covered way palisaded is also sometimes added; but it is generally thought sufficient to cover the head of the bridge with an half-moon only; but that depends upon the importance of the post. Intrenchments are again made with waggons, where Turkish wells are made in the front; that is, deep holes, placed chequer-wise, at certain distances.

The passage of a river upon rafts is less dangerous than upon boats; but a very rapid river cannot be passed in this manner, because the rafts are secured only by ropes, which are liable to break: besides, this man-

ner of passing is very tedious, unless there is a very great quantity of rafts; and during the time they take up in constructing, three bridges may be built: this expedient should never be used except when there are no boats, and it would take up too much time to send for them. Rafts are joists of deal fastened together. In the chevalier de Folard, the reader may see those which he has invented: his contrivance for making the cavalry swim over is more ingenious than practicable.

The ancients had still many other methods for passing navigable rivers; they passed them, according to Vegetius, by means of wooden horses, which they sunk in the water; or else made use of empty tubs, which they tied together in a hurry, and floored; but, adds he, nothing was found more commodious than small boats, made of a single tree, very light by the quality of the wood, and which followed the army upon waggons.

Before a general engages in an enterprise so considerable as passing a river in presence of the enemy, he should, according to the chevalier de Folard, consider opportunity; the condition of the enemy's forces; by what circumstances the attack and the defence may be prevented or facilitated, and compare them together: he should examine the nature and the course of the river; remark the places where the fords are, the size and depth of them, their distances from one another, the nature of the bottom, whether it is firm or boggy; if there are marshes either on one side or the other, whether these marshes are practicable; whether the passage will become difficult in proportion to the numbers which pass; whether the banks are steep, and at what part they are most so; whether the ground on the opposite side is more favourable for infantry than cavalry; the heights on this side to place cannon on them; those which are on the other, where they may be carried; the nature of the river, whether it is apt to swell on a sudden by the rains, or the melting of the snow.

Whenever a general attempts the passage of a river in strength, as the whole advantage will be on the side of the opposing party, he should suppose the enemy vigilant, resolute, capable of profiting from circumstances, steady in his resolutions, and ready to try all possible means of opposing the passage.

A general should be particularly acquainted with the nature of the banks of the river, as well those of the opposite side as of that where he is, in order to be strong in every part, and that all the attacks may be equally made, and that with every advantage the ground will allow. In short, it is very essential for a general to be acquainted, not only with every thing relative to the rivers he has to pass, but also with all concerning rivers in general.

These principles established, this section will be divided into four articles; in the first, an army shall be supposed to meet a river in its march, which it is obliged to pass.

In the second article, the defence necessary to be made for opposing the enemy, and preventing his passage, shall be treated of.

Thirdly, shall be particularized the means which a general should employ in order to facilitate the passage, notwithstanding the enemy's opposition.

Fourthly, the secret method of retreating shall be demonstrated by facts.

ART. I. It is easy for an army to effect the passage of a river when the enemy is at too great a distance to oppose it. A general may choose his own time and place, and make what disposition he thinks proper: he may either pass it upon bridges, rafts, or at a ford; if he finds a ford, he may let the cavalry pass there, provided the bottom is good; it is much better to throw over a bridge for the infantry, than to expose them to the wet, and unnecessary fatigue.

"Infantry," according to M. de Montécuculi, "is the basis and the support of an army, whether for battles or sieges; and it is with that the Romans and the Swifs have performed such surprising exploits." A general should therefore be very careful of it, and not expose it to the danger of diseases, by making it ford over rivers, when it is as easy to cause it to pass over upon bridges. The artillery and baggage should likewise pass over upon bridges: thus, instead of causing two or three bridges to be made, one or two only will be sufficient, according to the number of troops composing the army, upon which the infantry, artillery, and baggage will pass, while the cavalry ford it over; if there is no ford, the general should order many bridges to be built, in order to expedite the passage.

The method of turning the course of rivers, laid down by Santa-Cruz, by choosing a spot lower than its channel, making of trenches, and by forcing it to take a new course, by the great quantity of stones which are thrown into the channel, is an enterprise to be executed only upon small streams, or by armies such as those of Xerxes, whose thirst, according to Juvenal, could dry up a river in a day.

As to the manner by which a general may open himself a passage across the waves, it would be easier, in case of a deficiency of boats, and if time and the enemy's distance would allow of it, to make a causeway by the means of piles and stones, and by raising up the ground. The only inconvenience to be apprehended, is, that the waves coming in front, and their body being augmented by this impediment, the force of the water will probably break the bank; therefore, in order to render it more substantial, it should be made with an angle in the centre, and each side of it should be sloped like a glacis. But these operations require a length of time too considerable, and labours which would be too tedious and fatiguing.

The ropes which are sometimes thrown across rivers, and which serve as a support for the infantry, when the ford becomes too deep, may prove of some use; but it is to be feared, that the soldiers, by hanging to it, will only embarrass each other, and that those in the front will be a hindrance to those who follow.

Santa-Cruz proposes that some squadrons of horse should be placed at the head of the fords, who should keep themselves firm and close together, in order to break the force of the current, while the infantry shall pass lower down, and that they shall open from time to time, in order to let the waters they have retained run out.

He would also have some squadrons at a greater distance, in order that any soldiers which may have been carried away may be stopped there; but this contrivance can be of no use against the depth of a river, it can only be serviceable in stopping the rapidity of it: Vegetius also never practised this method but on an occasion of this sort.

But after whatever manner the fording of a river is attempted, the troops should form as large a front as possible, as they will by that means be better able to resist the violence of the current, and will find themselves in order of battle after the passage is effected.

As to the passage of a river upon rafts, the infantry who pass first can take the end of a rope with them, the other end of which will be tied to the extremity of the raft; and as soon as they shall be landed, they will draw these rafts to shore. As soon as the cavalry on them shall have debarked, those on the other side will draw the raft back, with another rope that shall be fastened to it, and by degrees the whole cavalry will pass: in order to shorten this passage, many rafts should be made use of.

It is again more secure, when practicable, to cause the infantry to pass, mounted behind the cavalry: but then it is also dangerous; because if the enemy presents himself on the other side, both trooper and foot soldier will be confused, and it will be with great difficulty that either the one or the other will be capable of defending themselves, as they cannot dismount readily enough without embarrassment. The least impediment on this occasion throws the troops into disorder, and exposes them to the danger of being drowned, or to retire disorderly by swimming, which cannot be done without considerable loss: this method cannot be put in practice, but when there is a certainty of the enemy's being at a distance.

It sometimes happens that an army crosses a river, which swells all on a sudden by the melting of the snow. In which case a general should be cautious, as Santa-Cruz remarks, not to undertake the passage, but in proportion as he shall be certain, that the whole army, artillery, ammunition, provisions and baggage, shall have passed before the flood is at its height. In the same place he points out the precautions which ought to be taken to prevent confusion among the troops during their passage.

ART. II. It would be impossible to run through every precaution that can be taken to dispute the passage of a river; we shall therefore confine ourselves to the principal ones, by a succinct relation of the different systems of the authors who have treated on that subject.

In the passage of rivers, the whole advantage is on the side of the army on the defensive. Nevertheless, the chevalier de Folard observes, that it is very seldom that a general attempting the passage of a river fails in his undertaking; for which he assigns two reasons: 1. Because the general who would pass, by false attacks, obliges the general on the defensive to divide his army into so many different bodies, that he becomes weakened in every part. 2. Because he cannot have any information of what is doing in the enemy's army, and is ignorant of all the enemy's designs, till such time as they are put into execution. There is still a third, which results from the first, and which seems very plausible: It is, says M. de Fenquieres, impossible to cover the banks of a river, when the ground to be protected is of a great extent, because the assailant who seems to make his effort in many parts, at length determines upon that where he finds the least resistance; but if he who is on the defensive knows the river, and is as well acquainted with the fords as he who attacks, why is he

PLAN of the Position of an ARMY for the defence of a RIVER.
Fig. 1.



Scale of 1/2 League.

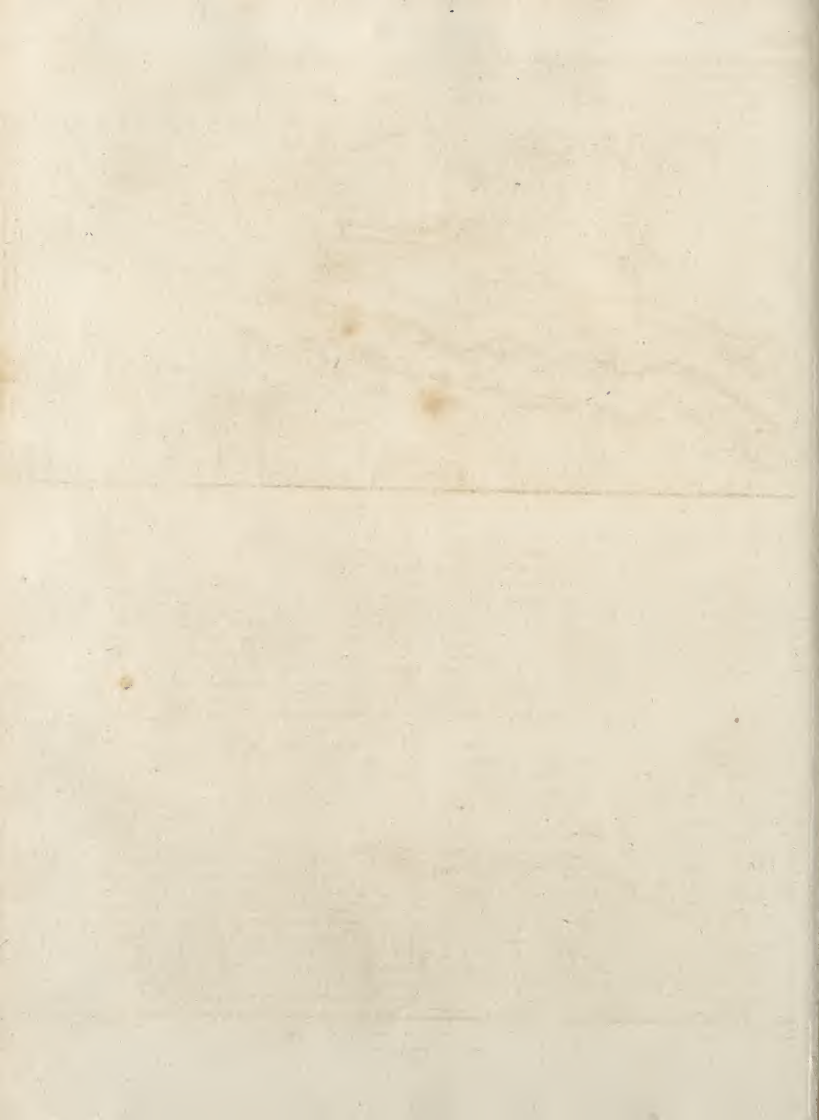
PLAN of the Passage of a RIVER.

Fig. 2.



Scale of 1/2 League.

of the bridge.



not as well able to oppose the enemy, stratagem by stratagem? According to M. Feuquieres, the most certain method on this occasion, is to keep together, within a reasonable distance of those places where the enemy can attempt the passage, and to have persons whose vigilance may be depended on, upon the bank of the river, so as to receive information in such a manner as to have time sufficient to fall upon the enemy, with the whole army, either before he shall have entirely passed, or before he shall have been able to form himself in order of battle.

The first precaution to be taken, according to the chevalier de Folard, is, to draw off all the boats which are upon the river; to observe whether any other river has a communication with it; to examine the course, the windings, and the most accessible parts of it; to raise good redoubts near the banks; to ascertain the bottom by means of sacks and baskets filled with stones, large trees with their branches, and by stopping them with stakes.

To this precaution may be also added another, which, executed with exactness, may produce great effects; that is, to throw whole trees with their branches into the river, not so heavy as to sink to the bottom, but whose size and quantity shall be so considerable as not to be easily stopped; their branches should also be interwoven, and formed like a chain from one bank to the other; they should be held fast, till the enemy's army is engaged in the fords or upon the bridges, at which time they should be let into the current, the quickness of which will increase the force of this kind of moving bank, which will overturn every thing it meets with, soldiers, baggage, horses, bridges, and boats: in short, nothing will be capable of withstanding it if there is any degree of rapidity in the torrent. This method is pointed out in M. de Puysegur as levelled against bridges only. To avoid also giving any suspicion to the enemy, this chain of trees can be placed upon the bank of the river, of which some engineer must have been careful to take the dimensions beforehand; and when it shall be nearly the same size of the river, and the enemy is passing, it must be held at one end, whilst it is shoved off by the other: the whole of it will be taken by the current, which, without any other assistance will direct it against the enemy.

In regard to the troops designed for the defence, the best method, according to M. Folard, is to form small camps of 2000 or 3000 men, a league distant one from another, with guards and signals from one to another; to have canoes, in order that the river may be crossed silently in the night by soldiers, who will endeavour to make some prisoners, and who will also listen in order to discover whether the enemy is preparing to march. A general should particularly endeavour to possess himself of the islands, if any, under cover of which the enemy may attempt the passage; and if the general can be certain that the enemy's intention is to throw over a bridge where they are, in order to set out from thence, to save so much of the way, the general will by this means assure himself of the place where the enemy will attempt the passage, and which circumstance will be almost sufficient to prevent him.

But in case the general can get possession of these

islands, and plant cannon upon them, the passage in that part would then become impracticable for the enemy; for besides the fire of the cannon driving him from the shore opposite the island, it would also greatly annoy him on the right and left, to a considerable distance.

But, in order for the better explaining of the manner in which a river should be defended, let two armies be supposed, one of which, consisting of 40,000 men, defends the passage against another of 60,000. This last is divided into three bodies; that of the centre consists of 40,000 men, and the two others of 10,000 each: the centre-body is encamped nearly opposite to the place where the passage is intended to be effected, of the two bodies which are upon the flanks of the centre, one will serve to keep the enemy in suspense, with relation to the true place where the passage is designed. They ought to be continually moving, sometimes at a distance from the main body of the army, and pretend to throw bridges higher up, or lower down, in order to induce the enemy to divide and separate the different bodies of his army in such a manner, that they can no longer be of assistance to each other, or be in a condition of opposing a superior body of troops that may attempt the passage.

The army defending the passage is divided into many bodies; three of 10,000 men each, at a league distance from one another, and two others of 5000 men each, composed of the light troops, both horse and foot, and dragoons, encamped at half a league upon the two flanks of the army. The communications should be preserved between each separate body, and constant patrols kept upon the side of the river, which ought continually to cross each other; and detachments of hussars upon the right and the left, both up and down the river: the general is also supposed to have planted batteries of cannon, in different parts upon the shore; and to be possessed of two islands which he has fortified, and in which he has also placed troops and cannon: in short, he is supposed to have taken every advantage of ground, for rendering the passage difficult to the enemy, and to oppose troops to him in every part where he may attempt it. It is impossible to be certain, that the enemy, notwithstanding all these obstacles, will not effect his passage; the means of hindering him, and rendering the passage very difficult and bloody to him, can only be laid down. By the most prudent precautions, the probability, but not the certainty, of success may be determined. See Plate CCXCIII. fig. 1.

If, notwithstanding all these obstacles, the enemy attempts the passage, he should be attacked as he debarks: it is that reason therefore which makes it essential not to divide the troops into too small bodies, which, too weak to resist a superior number, will be easily routed. In attacking the enemy's troops, there is no danger to be feared from their cannon, which they cannot make use of without annoying their own troops; whereas the cannon planted upon the side of the river, to defend the passage, can always fire upon the troops which follow, in order to sustain those who attempt the passage: there should also be infantry placed near these batteries, to defend them, and to flank such of the enemy as have already passed.

There yet remains many stratagems to be praised

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on these occasions: a general may make use of those mentioned in the section which treats of ambuscades; and they should be particularly directed against those places which are supposed to be most favourable for the enemy. The history of prince Eugene, whom the chevalier Folard styles a great traverser of rivers, furnishes many examples.

The general should be particularly attentive in disturbing the enemy when constructing his bridges; which appears the more practicable, as the bridge is never properly established, if not guarded at each end: besides, by the assistance of artillery, the enemy may be easily prevented from going on with his work. M. Feuquieres, in the passage already cited, relates examples where the enemy hath not been able to prevent the bridges being built under their very noses; but besides the rarity of these examples, the precautions he used are a very convincing proof of the difficulty attending such undertakings.

A prudent general, and one who is himself acquainted with the river, of which the enemy would attempt the passage, is guided by its depth, by the difficulty of gaining its banks, and in proportion to its rapidity: he often pretends to be inactive, permits the enemy to throw his bridges over it, and waits till he is in the middle of his passage; at which time he makes a furious fire upon him, spreads disorder amongst his troops, and overthrows his ranks; and the enemy, besides losing a great number of men, also fails in the success of his enterprise.

A general may turn a town on the other side of the river, either of his own or one in alliance with him, to great advantage: in this situation he should cause a body of troops to form a camp on the other side, reaching from the river to the town, in order to be a check upon the enemy, who will always be apprehensive of being taken in flank by this body if he attempts the passage. The rest of the army will be encamped on the side opposite to it, divided into many bodies, to guard a larger extent of country, that the army may be disposed in such a manner as to guard every part of the river.

In 1744, M. de Seckendorff took this position near Philipbourg, an imperial city, and garrisoned by the emperor's troops, then in alliance with France: if he had remained there, if he had repassed the Rhine, and joined the right of the army commanded by the marshal de Coigny, prince Charles would never dared to have attempted the passage, at least at the place where he effected it.

ART. III. As to the distribution of troops, for the passage of a river, a general should always, according to the chevalier Folard, regulate the order of his march, and the distribution of the columns of infantry and cavalry, according to the probability of coming to action. His dispositions, as well those relative to the passage, as the order to be observed upon coming to shore, deserve perusal. His reflections upon the passage of the Granicus are very just, and the reader is referred to them, as they would be too long to be related here.

When a general has discovered two or more fords upon a river, it is sometimes proper to attempt the passage at each of these fords, or at least to make the enemy imagine so, that, by having them all guarded,

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he may weaken himself. Among the reflections of the same author upon this subject, will be found the stratagem made use of by Xenophon upon a like occasion. A general can also make as many false attempts as there are fords; not at the places where the fords are, that would be the means of discovering them to the enemy; but either a little above or below them, in order to keep the enemy's troops divided; because, without that, an army not being able to pass all at the same time, would run the danger of being beaten, by degrees, during the passage.

A general who attempts a passage in presence of an enemy, should be very certain of his troops; he ought to place the most intrepid in the front, in order to encourage those who follow them: on those occasions every thing is to be apprehended from ill-disciplined troops, because that, as soon as they are engaged in the river or upon the bridges, having no longer any place of refuge to fly to, they will be discouraged, and spread the panic throughout the whole army.

The emperor Leo relates, that his father, at the passage of a river, kept himself in the middle of the waves; that he gave assistance to some, reached out his hand to others, and that he rescued many from the danger of drowning: it is thus a general ought to animate his troops. If, by his rank, he is exempted from exposing himself to the greatest dangers, he at least ought to encourage his troops, as much as he can, by his discourse and his example; he should even share the most painful labours with them, and alleviate them as much as possible.

If the army passes upon two bridges, it is impossible to take too much care for their security: history is filled with fatal examples of bridges falling under the weight of troops. One of the greatest dangers ever experienced by Charles XII. was when, having caused a bridge to be thrown across the Vitula, the wood which had been made use of being too weak, and the timber-work ill secured, the bridge broke down whilst the king was passing. Charles, the prince of Wirtemberg, and many others, fell into the water: the king, having caught hold of a piece of the timber that was floating, was carried away by the current. The troops which had already passed found themselves at the enemy's mercy, who might have destroyed them; but they did nothing, says the historian Nordberg, because of the heights of which the Swedes were in possession, and from whence they kept a fire upon the Saxons. Was it not rather an instance of the good fortune which usually attended that intrepid prince?

It is probable, when a river is passed upon bridges in presence of the enemy, that they have been built before his arrival, and consequently there has been time to entrench them at each end, but particularly on that side next the enemy. These entrenchments should be made in such a manner, as to prevent the bridges from being flanked by the enemy's cannon; therefore, instead of the entrenchments usual at the heads of the bridge, such as a horn-work, a crown-work, or a half-moon, the general should cause redoubts to be thrown up, the farthest of which should be 400 yards distance, and opposite to the bridge; and the others should be thrown up nearer to the banks of the river, forming a semicircle; in order for
their

their better defence, the general should follow the same dispositions which have been laid down in the preceding part. If there are many bridges, they should be constructed as near each other as possible, that the same redoubts may equally serve to cover them: the reason of these redoubts being placed at a distance from the bridges is, because that, as the troops pass, they will have room to form and sustain those occupying the redoubts. These redoubts undoubtedly require a greater degree of labour than is requisite for the construction of a half-moon, or even a crown-work; but it seems impossible to pass a river upon bridges in presence of an enemy, however strongly they may be entrenched, if there is not space enough left between the entrenchments and the bridges, to contain a number of troops sufficient to oppose the enemy, and to give time for the remainder of the army to pass. Labour should never be considered, when an enterprise is successful; a general, therefore, should never spare any pains for the attainment of his ends, but should take every precaution necessary for success, without troubling himself about the time and the labour it will cost: the glory of having forced the enemy to leave the passage open to him, makes sufficient amends for the trouble he has given himself in order to attain it.

A general who would hinder his enemy from passing a river, should be beforehand with him in all his designs, and be himself in a condition of attempting it. It is necessary that a particular account should be given of the methods of passing a river, by attacking the enemy, and facilitating the passage of the troops, against the enemy's efforts to the contrary. Mr Folard has laid down many different methods, which may be seen in his works.

Suppose an army of 60,000 men would pass a river, guarded by an army of 40,000. Let it also be supposed, that the army intending to pass has got the start of the enemy, either because he was not yet arrived, or because he has been amused with marches and counter-marches; that the general has also had time to construct three bridges, and to entrench them in the manner above-mentioned: he must begin the passage by causing these redoubts to be occupied by a battalion or half a battalion, according to their size; and he must plant cannon between those redoubts, with infantry to guard them. These dispositions being made, the army must march in three columns; the centre column must be entirely infantry, and the other two composed of infantry and cavalry. As the infantry passes the bridges, it must divide, and form columns, consisting of four battalions each, which must pass between the redoubts, having cannon upon their flanks: the cavalry must pass to the right and the left through the interval of the two redoubts nearest the river, and form in order of battle upon the flanks of the columns; the right wing with its right towards the river, and the left with its left. When all these columns shall be formed, and ready to march towards the enemy, the right and left of the two lines of cavalry must sustain it; and the right of those of the right, as well as the left of those of the left, will march to put themselves in a line in presence of the enemy: in this position the army must march towards the enemy and attack him, if he is so rash as to hazard an action; and if he should

retire before the army is entirely passed, the passage will be the more easily effected. See Plate CCXCIII. fig. 2.

From this disposition it appears, that the army which attempts the passage is almost certain of succeeding; it is sheltered behind the redoubts during the passage of the bridges; it has ground to form itself upon, and to show itself in full strength. If the enemy would attack the redoubts, he cannot so quickly carry them, but that assistance may be sent to them: besides, the cannon planted between each redoubt will prevent the enemy approaching it; or if he should, it will not be without losing a great number of men, a loss which will dishearten the soldiers, abate their eagerness, and give time for a part of the infantry to pass, to form itself in many columns, and attack with vivacity.

But it is seldom a general has time to build the bridges and entrench them after this manner, when the enemy is on the opposite side with an intention of disputing the passage: so circumstanced, he must endeavour to find some fords, and, under shelter of one or more islands, construct a number of rafts behind them; he must endeavour to keep the enemy at a distance from those places, by marches and counter-marches; and when that is done, he must cause the cavalry to ford over with grenadiers and labourers behind them; these labourers must throw up entrenchments as fast as they can, whilst fresh infantry is caused to pass over upon rafts. Provided these entrenchments can stop the enemy for some time, and contain infantry enough to resist him, the remainder of the army will be very soon passed: the cavalry will at the same time pass at the fords which have been discovered, in order to cover the flanks of the infantry; when it will spread over the plain, being itself protected by the infantry, as it leaves the entrenchments in columns.

The passage of a river cannot be safely attempted, if the general does not provide for a defence, and take infinite precautions to protect the army in its passage.

All that authors have said upon this subject, arises from this principle of Vegetius, which they seem to have commented upon, and to which they have applied different examples. "As the enemy (says he) are accustomed to form ambuscades, or to attack openly at the passage of rivers, the general should post himself beforehand of a good post on the opposite side, and entrench himself even on that on which he already is, to hinder the enemy from attacking his troops, separated by the channel of the river; and still, in order for greater security, the general should cause the two posts to be entrenched and well palisaded, that in case of an attack, he may be able to sustain the efforts of the enemy without great loss."

It may not be improper, in this place, to relate a disposition of M. de Valere's, formed upon this principle.

He says, "After the cannon are planted, a parapet should be raised upon the banks of the river, 200 yards in length or thereabouts, behind which some infantry should be immediately landed from the centre of the parapet, and some soldiers with labourers sent over, who must immediately erect a small half-moon: as soon as that is done, more soldiers should be sent in order to defend it in case it should be attacked; more labour-

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ers should also be sent to erect another half-moon, both upon the right and the left.

"If the labourers are not annoyed by the enemy, they should at the same time erect a horn-work, whose wings should be flanked by the first parapet, and the cannon planted in it: if the river is so large, that the wing of the horn-work cannot be defended by musquetry, it must be defended from the half-moon, made from thence to the water."

In the mean time, the general should cause the bridge to be continually worked at; and, as soon as it is finished, make the troops pass over it, if the enemy is not in sight; but if he is, the horn-work must be completed, to prevent the enemy from falling upon the troops as they pass. The horn-work being made as strong as is judged necessary, as much infantry as it will hold should be lodged in it, with some field-pieces; and as the cannon upon the rising will keep the enemy at a distance, the general may order the cavalry to pass: but still all this cannot be effected but before an army very inferior. If the enemy's army is of superior force, the safest method is to try a passage at some farther distance, still keeping the army in sight as long as possible, and concealing from the enemy that any troops have been detached.

It is impossible to foresee every stratagem that may be employed, as they depend upon many circumstances; but it is always right to send, if possible, some trusty spy to discover the enemy's position on the other side of the river, what obstacles he can place in the passage, what methods are to be used to avoid them, and what parts of the bank are most accessible or best guarded.

A general should make many false attempts, particularly at those parts where he least intends passing; they should be made as secretly as possible; and also, in order to deceive the enemy, the general may throw over two or three bridges at hazard, in sight of the enemy, at those very places where he has resolved not to pass: the enemy's whole attention will be directed to that side; and a constant fire should be made on him from the other side, so that he may not be mistrustful of the stratagem. There is no doubt of these bridges being taken, which is of no consequence, provided the enemy is amused, and the general has time to throw over another bridge at a distance from that place, by which he can pass.

Cæsar's method may also be practised, which he made use of in order to pass the Segre, whose opposite shore was guarded by Afranius. (*De Bell. Civ. l. i.*)

By uniting these two methods, a general can, whilst he amuses the enemy by a feigned passage, or by the bridges which he has thrown over at hazard, make use of the portable boats, and effect a passage at those places which the enemy have abandoned in order to oppose himself to the bridges.

Whenever two armies are on either side of a river, a general may pretend to have abandoned all design of passing it, and seem to proceed on his march as if he would attempt a passage elsewhere.

If the enemy should follow the army on the opposite shore, the general may leave a brigade of infantry, pontoons, and cannon, in a wood, or behind a hill, to wait till the enemy abandons his post, in order to follow the army that is marching lower down; then those who have remained behind will throw a bridge over the

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river, which they will pass, and entrench the head of the bridge. That being done, the general will detach some brigades of infantry and artillery to reinforce the troops which have already passed; so that being joined, they will be sufficiently strong to give the rest of the army time to arrive and effect the passage.

It would be impossible to recapitulate every stratagem which a general may practise: in the histories of prince Eugene and Charles XII. the reader may see the different methods which they made use of; it will be sufficient here to relate the rules laid down by Montécuculi, with some modern examples, by which they seem to be corroborated.

1. The general must plant artillery upon the bank opposite to the post he intends taking; which will be attended with great advantage, if the river forms a re-entering angle, and if there is any ford near it.

2. In proportion as the construction of the bridge advances, he should post some infantry upon it, in order to keep a fire upon the opposite shore.

3. When the bridge is completed, he must cause a body of infantry, some cavalry, some field-pieces, and some pioneers to pass it, in order to fortify the head of the bridge on the other side.

4. The general must take great care that the enemy has not poited armed barks, or other machines, to break down the bridge when half the army shall be passed.

5. If the general would preserve the bridge, he must fortify it at both ends, and place sufficient guards in it.

In 1743, prince Charles intending to pass the Rhine, kept a continual fire upon all the French posts from 11 o'clock at night till three in the morning, in order to conceal his real design with regard to the passage.

Marshal de Coigny assembled his army in three large bodies; and lay all night upon his arms, the only prudent step he could take on that occasion.

By this disposition he found himself in a condition of transporting himself opposite to the isle of Raigance, of which the enemy was in possession; and it is well known, that they ended the campaign there, without being able to penetrate into Alsace.

The number of columns ought to be regulated by the breadth of the ford, or by the number of bridges that are established.

The third of June 1747, at day-break, the army commanded by M. de Belleisle passed the Var in five columns.

This passage was effected without any resistance on the part of the enemy, and M. Belleisle had 15 men drowned, although there was a chain formed of peasants, acquainted with the fords, to direct the march of the columns, and to assist the soldiers who were carried away by the rapidity of the current.

ART. IV. All passages of this nature, whether in a march, whether in defence, or for an attack, may be foreseen. A general may, at a distance, make all the preparations necessary for these operations; he may anticipate or foresee the dispositions of the enemy: in regard to a retreat it is otherwise; for although it may have been provided for, a general cannot be certain whether it can be effected after the manner he hath intended; besides, he must, in a retreat, unite all the different dispositions already mentioned: the least negligence becomes irreparable, and gives the enemy a very great

great advantage. A moment lost, a movement discovered, may also be the cause of a rout, and render the retreat impossible, or at least very bloody; therefore if a general, in these circumstances, has not a perfect knowledge of the river he has to pass, if he has not been careful to preserve the bridges, or to keep the materials and instruments proper for the throwing over of new ones, he will be unable to pass in sight of the enemy. Xenophon's retreat with the 10,000 Greeks, furnishes examples of the passages of rivers, which a general should always have present to his view. What prudence, what activity in founding the fords himself, whenever he met with any stream or river to be crossed! What orders to prevent confusion among his troops, and what stratagems to avoid being repulsed!

If a general is certain of returning by the same place, at which he has formerly passed, the best way would be, as Vegetius says, to have the bridges guarded, and to erect a fort with large ditches at the head of each, for their security, and to place troops in it to guard the bridges and the passage, as long as shall be thought necessary.

Thus circumstanced, a general should entrench the heads of the bridges in the manner directed in Art. 3. and that the troops may pass the bridges without confusion, according as one brigade of infantry shall enter the circle formed by the redoubts, another shall pass the bridge, and that which enters shall take possession of the posts which that which passes occupied; he must be careful to establish batteries of cannon to the right and the left, on the other side of the river, to flank the redoubts, and defend the approach to them; so that when the whole army shall have passed, the troops who occupy the redoubts may retire with ease. The cavalry will pass the bridges without stopping behind the redoubts.

In a retreat of this kind, the infantry should march in column, and the cavalry in order of battle, upon the flanks of the infantry. Before the march is begun, some troops must be sent to occupy the redoubts; as soon as they shall be in possession of them, the army will put itself in march, and proceed towards them. The cavalry of the right must pass over the bridge nearest to it, and that of the left will do the same. The columns of infantry must enter by the spaces which are between each redoubt; the grenadiers and the piquets must remain, in order to sustain the troops occupying the redoubts: some pieces of cannon should also be left to fire upon the enemy in case he should approach too near; the columns must pass over the three bridges; the grenadiers and the piquets must also draw near the head of the bridges at night-fall; the troops occupying the redoubts must quit them silently, and pass the bridges; they must be followed by the cannon that has been left during the day; the grenadiers must pass last of all; after they are passed, the bridges must be broke down. This may be easily executed, provided order and silence are preserved; but if the enemy entertains the least suspicion of the redoubts being abandoned, he will come in full strength to attack the troops still remaining on that side. These troops, too weak to resist a superior number, cannot avoid being beaten, slaughtered, or drowned, the cannon taken, and the bridges burnt.

For greater security, the grenadiers and the piquets

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may be furnished with chevaux de frise, which will make an entrenchment, till the troops which occupied the redoubts are retired. A retreat never merits the epithet of *fine*, except it is performed with order, and with the loss of as few brave men as possible, to save the rest of the army.

In every enterprise formed by a general in difficult places, he must, according to M. de la Valiere, provide for his retreat. In retreats of all kinds, adds the duke of Rohan, a general cannot be too attentive to render it safe, and to avoid disorder: when it is the effect of his own choice, it ought to be made so early, and so expeditiously, that he may not be under a necessity of fighting.

During the passage of a river, or even after a general has passed it, if he should be repulsed, the retreat becomes very difficult, and cannot be performed without great loss; it is for that reason that many generals, who have been mistrustful of the firmness of their troops, have burnt their ships in the port, in order to animate them to victory, from considering the impossibility of retreating.

The passages of the rivers now going to be mentioned, will serve both for examples and rules. The particulars which will be entered into, will leave nothing to be wished for by those who are desirous of instruction only.

In the campaign of 1742, the disposition of M. Saxe for passing the Danube, owed its whole success to secrecy, to the general's address in profiting by circumstances, and particularly to a very thick fog.

The two armies were encamped two leagues distant from each other, and the light troops skirmished together the whole day.

At seven o'clock at night, count Saxe sent for the general officers, furnished them with instructions, and caused the guards to be doubled.

At nine o'clock, the baggage filed off over two bridges; one of rafts and another of piles: after which the infantry passed, and the grenadiers, who formed the rear-guard, cut down and burnt the two bridges. The enemy advanced in order to charge his rear-guard; but 18 pieces of cannon that had been planted beforehand, very soon silenced the fire of their musketry, and he lost not a single man.

At day-break the army formed in order of battle, upon two lines, in order to give time for the Imperialists to retire from Pladling; and as soon as they had joined, the army put itself in march in four columns.

It is particularly necessary, either in passages or retreats, to be acquainted with the nature of places, and if they are fit to furnish the timber necessary for making rafts and bridges. In Germany, and countries where wood is very plenty, in order to pass with greater expedition, a general can make use of rafts or flying bridges. Two may be placed, one upon the right, the other on the left, of a bridge built upon piles; by which means three columns can pass at once. It should be observed, that the flying bridges are by no means secure against torrents.

In 1742, count Saxe having beforehand possessed himself of Thonau, caused two flying bridges of rafts, and a great work of redans, to be erected, in which he posted five battalions and some cannon.

On the ninth of September all the baggage passed

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the Danube: on the tenth the army put itself in order of battle in two lines, which retired successively toward the river.

The lines passed one after the other; that is, the cavalry at the ford, and the infantry upon the flying bridges.

Six thousand of the enemy's advanced guard were witnesses of this retreat without daring to molest it; so prudently were the orders given, and so exactly executed.

It is in retreats that bridges are most liable to break under the weight of the troops; it is at that time the precautions are neglected, because the danger becomes more pressing, and they are not sufficiently acquainted with the rivers over which the bridges are thrown.

If Cæsar, says M. de Puyfégur, had known there were always floods in Spain at the time of the year he was there, he would have been guarded against the accident which he describes: at the end of this reflection the reader may see the methods he proposes for remedying these inconveniences.

In the following account it may also be seen, that a passage cannot be unfortunate, when it is executed by resolute soldiers under the command of a prudent and intelligent general.

After the battle given the 16th of July 1746, under Placentia, the combined army of France and Spain, posted on the other side of the Po, subverted at the expense of the Milanese, and by means of the communications of Lody, drew provisions from the Venetian territory: the Austrians, to the number of 12,000 men, attempted the passage of the Po, foiled by the king of Sardinia with 30,000 men.

The combined army advanced upon the Ambro, to dispute the passage with them; for that reason a very vigorous defence was resolved on upon the lower part of the Ambro: by these dispositions they found themselves constrained to attempt the conquest of Lody, a place of no great consequence; nevertheless, as Lody was the only pass by which the combined army could draw provisions from the Venetian territory; and thro' the apprehension of being a second time shut up in Placentia, where there was no longer any provision remaining, M. de Maillebois proposed the repassing of the Po; and notwithstanding the objections which this proposal already had experienced, and still had to meet with on the part of his royal highness the Infant, it was carried in the affirmative.

It was therefore resolved to pass the Po upon three bridges, on this side of the mouth of the Tydon, the night of the eighth or ninth of August.

The viscount of Crussol was ordered to abandon Lody, which was greatly straitened by the enemy, the night of the seventh or eight. On the eight at night, the retreat having served by way of general, each body put itself in motion.

A body consisting of 8000 men, under the command of M. de Campofanero, was appointed to keep back the king of Sardinia's army, and to form the rear-guard.

The marquis de la Chetardie, major-general, with 30 companies of grenadiers, 6 battalions, 500 horse, and 6 pieces of cannon, formed the advanced guard: he was ordered to throw a bridge over, and to occupy

the Tydon, whilst the marquis de Monteynard, brigadier, with 4 companies of grenadiers, 3 battalions, 500 horse, and 2 pieces of cannon, landed on the right, to close up the interval between the Po and the Tydon, and oppose the detachments of Piedmontese and Austrians, distributed upon the right bank of the Po, as far as Parpenza.

On the eight, at night-fall, the body commanded by M. de la Chetardie came out from Corte St Andrea, and took post upon the left bank of the Ambro, where he was to embark part of his troops, whilst M. de Monteynard, who came out from Albaroni, embarked with his whole detachment upon the shore upon the right: the Croats were pontoned beforehand, and placed two and two in the mouth of that river.

These dispositions being made at midnight, M. de la Chetardie gave orders to march out half an hour after, in order that the remainder of the body which he conducted, and which had not been able to embark, might arrive at Buttaroni di Sotto, in the place where the bridge should end on the other side.

At one o'clock at midnight, the 68 boats which were to form the two first bridges, left the Ambro in two columns.

There were but 12 grenadiers, or volunteers, killed or wounded in the embarkation; the first bridge was completed at day-break, the second two hours after; and the third, which reached as far as Placentia, was finished at noon: the army, followed by its whole baggage, 4000 mules, 1000 waggons, and 60 pieces of cannon, passed that day and night.

M. de la Chetardie, with his advanced guard, occupied the Tydon from its mouth as far as Verati, after having caused the bridge which belonged to the enemy upon the lower part of the Tydon to be burnt; to which place M. de Nogent went.

The marquis de Pignatelli was ordered to occupy the Tydon from Verati to the Strada Romea; but not having a sufficient number of troops, he contented himself with occupying a casine, which was within musket-shot of the Romea. The marquis de Seneffere having joined him, and knowing the consequence of guarding the country up to the Romea, took the right of M. de Pignatelli, with the body under his command; but his body of troops, joined to that of M. de Pignatelli, not being considerable enough to occupy the ground necessary, he contented himself with reinforcing those troops which the Spanish general had sent into the casine.

M. de Monteynard drove the enemy from Perpenza, whilst a Spanish detachment advanced up to Castel St Giovany.

The order was given to march on the 10th at day-break: the enemy perceiving that the right of M. de Pignatelli did not reach to the Romea, began their attack in that part at eight o'clock in the morning.

M. de Pignatelli, pursuant to the orders of marshal de Maillebois, with his grenadiers, occupied a little rising, which was in a creek formed by the Tydon, and which commanded the opposite shore.

The fire of the grenadiers stopped the enemy for a moment, and gave time for M. de Seneffere to advance with the two brigades of Anjou, and the Lorrain guards, to cover the causeway of Castel St Giovany; upon which he caused the piquets of this last brigade,

to take post in the cassines on the right and the left. He caused messieurs de Larnage and de Saulx to pass to his left, with the brigade of Anjou behind a hedge, which favoured his fire.

The first effort of these two brigades forced the enemy to repass the Tydon in disorder, pushed on the left by the regiments de la Reine, the Saguntum Spanish dragoons, and by a squadron of Dauphiny.

The enemy being formed again, passed the river near the great causeway, came out in a column upon the cassines, which were occupied, and forced the piquets of the Spanish guards to give way: then M. de Senestre caused M. de Wigier to march with the brigade of Lorrain guards, commanded by the chevalier de Beauveau, which retook the cassines, and maintained itself there till the piquets, obliged to give way by the fire of the enemy's column, left our right and the cannon uncovered; then the Lorrain guards retired in good order into their former posts.

By a motion to the right, which half the brigade of Anjou made, it took the enemy's column in flank, which wanted to get before the brigade of Lorrain's guards, stopped it, and mixed itself with it.

Three squadrons of Spaniards caused it to fall back upon its cavalry; then the brigade of Lorrain guards returned to take its post; it received orders to march, to attack a battery of four pieces of cannon; but the Spanish cavalry which was to sustain it, not being able to bear the fire which it received, threw the brigades into confusion, who very soon regained their ground, and maintained it, till they were relieved by the Spanish guards, sustained by all the French cavalry under the command of M. d'Argouges: at last the enemy was obliged to retreat behind the hedges.

Whilst the prince de Beauveau occupied the castle of Verati on the left, M. de la Chetardie, who sustained that village, drew near to the left of M. de Pignatelli, who had been joined by the Waloon guards and the Provincial grenadiers. M. de la Chetardie wanted to charge the enemy with bayonets: M. de Pignatelli opposed it; but the French general kept up so continual and great a fire, that the enemy's grew less and less, and at a greater distance.

Things remained in this situation till two in the afternoon, when the retreat was ordered: M. de la Chetardie caused M. de Beauveau to advance with 30 companies of grenadiers and a regiment of dragoons, to guard the great causeway: his appearance stopped the enemy, and M. de la Chetardie continued his march without being molested.

The body which came out of Placentia, along with M. de Castellar, retook the ground where our troops had fought: the enemy repassed the Tydon, and M. de Castellar fell back upon M. de Beauveau with his grenadiers.

The passage of the Po, and the battle of Tydon, are two actions worthy of being handed down to posterity, from the readiness, resolution, and steadiness, with which they were executed.

The passage of the Po, by the assistance of three bridges, was executed in 24 hours, notwithstanding the great quantity of waggons which the Spaniards caused to pass by force. The action which followed this passage, is a lesson for every military man, upon the manner in which he must form after a passage. The

passage of the Po was effected betwixt two armies of the enemy, and under their eyes; the enemy were terrified at the steadiness of the troops, and the prudence of the generals.

The success of the day of Tydon is partly owing to the marquisses of Senestre and Pignatelli, under the orders of marshal Maillebois.

In a word, a general cannot take too many measures in the passage of a river, or sufficient precaution to prevent the enemy from passing, nor make use of too much contrivance or artifice in a retreat; and he should even employ cunning itself, when the enemy is superior in strength, particularly when he harrasses the troops.

It is impossible, says M. de Montequieu, to give a detail of every thing without tiring the reader; it has therefore been thought better to cite authors, whenever it has been imagined that the reader would find in their works solid instructions, which it would be useless to repeat here: but it has again been supposed, that it will convey pleasure to the military readers, in placing before their eyes examples, of the most part of which they have been witnesses; a method more conducive to instruction than all the rules that can be given.

SECT. XI. Of Battles.

Of all the operations of a campaign, the most important, and that which is most deserving of attention, is a battle, because it is generally decisive; every other operation is but preparatory to, or consequent of it. A general engagement, says Vegetius, is often decided in two or three hours; after which there scarcely remains any resource for the vanquished. Battles, says M. de Montecuculli, bestow and take away crowns; from their decisions princes cannot appeal; by them war is put an end to, and the name of the conqueror immortalized. A general should, therefore, think of, and try every thing, and should leave nothing unattempted, before he proceeds to this last extremity.

A general should by no means suffer himself to be forced to a battle; neither should he offer it but when there is a real necessity for it; and even when he gives battle, it should be rather with an intention of saving than shedding blood; more with a view of asserting the rights of his master, and the glory of his country, than of oppressing mankind.

However bloody a battle may be, it is always less so than a long war; which, by reiterated troubles, consumes the treasures of sovereigns, that finew of a state, and drains the blood of the subjects. Nevertheless, there are some occasions where it is not left to a general's choice, either to give or accept of battle. An army of observation, and an army acting on the defensive, neither can nor ought to be desirous of coming to action. Both the one and the other should have no other object in view, than that of posting itself in so advantageous a situation, that the enemy may neither entertain a thought of attacking it in its camp, or any hope of forcing it. The army of observation, whose only object is to protect, or to cover the troops forming a siege, should never seek to fight the enemy, unless attacked by him: the other, obliged by its want of strength to act upon the defensive, should only be desirous of occupying advantageous posts, to prevent the enemy's penetrating into the country, and attacking it in any position it shall have taken.

If the choice is left to the general, he ought to be particularly careful, before he comes to a resolution of giving battle, to examine whether he can gain greater advantage by winning it, than he will sustain damage by losing it.

It is therefore, neither caprice, nor a mistaken courage, or the desire of distinguishing himself at an improper time, that should determine a general to give battle. "The reasons which should induce a general to give battle, are," according to Mr de Feuquieres, "his superiority over the enemy, both in the number and quality of troops, the enemy's incapacity, his ill-chosen encampments and negligent marches, the necessity of securing a place, or the certainty of a reinforcement, by the junction of which the enemy will become superior, or circumstances which may change the original designs of the campaign." This was the reason which induced the viscount Turenne, in 1674, to give the battle of Einshelm, because the prince of Bourbonville waited the arrival of the elector of Brandenburg, who was coming to join him with a considerable reinforcement; and if he had not given battle before that junction, the enemy's army would have had a very great superiority over his. The reasons given by Montécuculli for avoiding a battle are, "when the loss of it will be more prejudicial than the gaining will be advantageous; when inferior to the enemy, or when success is expected; when the enemy has the advantage of the ground; when it is perceived the army is working its own ruin, either by the fault or division of the commanders, or through the disagreement of confederates." It may also be added, when the enemy's army labours under some disease; when it is in want of provisions and forage; and that, disheartened by these circumstances, his troops desert from him.

It is on a day of battle that it becomes particularly necessary for a general to be acquainted with his own ground, and also that which is occupied by the enemy; to know in what manner his wings are supported, the nature of the places where these supports are; whether he can be surrounded, and in what part he can be attacked with the greatest facility.

But however essential these branches of knowledge may be, it is not always the superiority of number, or quality of the troops, or advantage of ground, that will secure the best disposed army from being routed: it is the foresight of the general in the precautions he has taken before the battle; it is his genius, his activity, his coolness in the time of action, and the capacity of the general officers acting under him, that determine the success.

Ground, seemingly the most advantageous, often presents obstacles, which do not immediately strike a general, although an experienced one, and which may prove fatal in the course of a battle; how, therefore, will a general be able to correct these mistakes, if he considers them as only trivial? At the battle of Cerignoli, given on the 28th of April 1503, the enemy's front being more extended than at first it was supposed to be, in order to give a greater extent to that of the French army, it was necessary to continue the lines across vineyards and thickets; by which means, the neglecting to fill up a ditch caused the defeat of the

French, and the death of M. de Nemours their general.

A general should not always pursue his own opinion, it being impossible for one man to see every thing; he should, therefore, cause an exact account to be given to him of whatever he cannot have an opportunity of seeing personally; to inform himself by spies of the enemy's order of battle, and act in consequence of that knowledge; he should possess himself of all places capable of containing ambuscades, which he ought to have had examined some days before the battle. Santa-Cruz hath given a particular detail of all these preparations.

It is in these moments, which decide the fate of whole nations, that the genius and prudence of a general ought to be conspicuous; he should, at the same time, see what is doing among his own and the enemy's troops. Beside the precautions which ought to have preceded the day of battle, those which ought to be taken in the course of the action are so numerous, that it is impossible for them all to find a place here.

Some depend upon the general's ability, others upon circumstances, which it is almost as difficult to describe, as to mark out the necessary dispositions for them.

It depends upon the general's genius and foresight to make choice of intelligent, active, and prudent aides-camp, to assign to each particular body the properest to command it; not, for example, to place, at the head of infantry, one who has been long accustomed to the service of the cavalry; or, at the head of cavalry, one who is more used to the infantry, &c. to encourage the soldiers by the hope of rewards, and by motives which may spirit them up, and to threaten those who are so unmanly as to tremble at the sight of an enemy, or rash enough to run forwards without order.

The general should also be capable of forming new schemes, in order to render those of the enemy abortive; he should also take care, whatever may be the nature of the country, to dispose his army after such a manner, as to render it equally strong in every part, and that each body may protect and assist one another without confusion; that the intervals necessary for acting are well preserved, and that the reserve can easily march wherever it shall be ordered: in a word, the troops should be disposed after such a manner, that even before the action they may perceive in what manner they are to act.

It is the work of genius to take advantage of circumstances, and to submit to them; it is impossible to foresee the precautions dependant on them, as the very circumstances must be, themselves, unforeseen: it is by a general's address, in knowing how to profit by circumstances, that he sometimes make a motion, conducive to the whole success of the action, from the inequality of the ground, a sure means of beating him. M. de Montécuculli reduces all the advantages that can be gained over an enemy to four principal heads, which, in reality, are of themselves reduced to the knowledge of profiting by circumstances; such are the advantages of number, when the enemy is beaten in his posts, his convoys, and in his forages; when an ambuscade is surrounded, or when a whole army falls upon a small, weak, and separated body: the second head consists in the knowledge of the commander; the

third in the manner of fighting; and the fourth in the advantage of the ground. A general, who properly considers these heads, will dispose of a combined army after such a manner, that it may, at the same time, receive orders without mistake, and execute them without confusion; a very necessary precaution, and one which Hannó, general of the Carthaginians, neglected to take with regard to the strangers allied with them, which occasioned the troubles related by Polybius. He should have mixed the soldiers belonging to those countries, where bravery is in a manner natural to them, with those belonging to countries where it is more extraordinary.

Notwithstanding, Tacitus would endeavour to prove that it is much better to keep them together; because, says he, each different nation, striving to distinguish itself, will be animated by a desire of excelling each other: experience, however, has often proved the contrary:

Vigétius points out the precautions necessary to be taken by a general, to avoid having either the wind or the sun in his front. The wind, which raised the dust, and blew it into the eyes of the Romans, contributed to the loss of the battle of Cannæ: the sun, on the other hand, dazzles the soldiers, and lays open their dispositions and evolutions to the enemy: in a word, the general should not even neglect those precautions which may be in appearance useless, whether before the battle, or at the very time they may be put in execution after the action; as the rallying the troops, the refreshing of them, the retreating from before the enemy, or the pursuit of him, supposing the battle to be gained. A general should have beforehand formed the plans of the marches and the enterprises he would attempt, and be almost certain of the means of executing them; if, on the contrary, he fails, he should have determined the positions by which the army, fixed in a camp strong by situation, may prevent the enemy from reaping any great advantage from his victory: he should also have provided for the security of the prisoners, the hospitals, the plunder of the soldiers; in short, for all that is necessary for preserving order and discipline, and every thing contributing to the security of the troops: the distress of the enemy, and the glory of the sovereign, should be provided for without waiting for the event; for at that time confusion and disorder would prove more fatal than even the battle.

In the treatise written by Santa-Cruz, upon the dispositions before and after a battle, may be seen a long detail of the precautions depending upon genius, and of those which are regulated by circumstances.

The general's post during the action ought to be, according to Vigétius, on the right wing, between the cavalry and the infantry. Onozerand fixes it upon some height, and Santa-Cruz towards the centre, in the front of the second line. Titus Livius and Polybius have observed, that the posts of Scipio and Hannibal were always in those parts which were least exposed; because, as observed by Onozerand, a general who runs into danger is a rash man, fuller of presumption than courage: neither is daringnefs, adds his commentator after Plato, always a sign of courage; besides, a man who is really brave, is never daring but when it is absolutely necessary. Æneas, all valiant as Homer has painted him, did not judge it proper to

wait for Antiochus, who had joined Menelaus, with whom he was fighting.

A general should not always suppose that what particularly strikes him is right; he should reason calmly upon the probability of it, in order to come to a greater degree of certainty with regard to the practicability: he ought also, says Vigétius, to be acquainted with the nature of the enemy, and the characters of his generals, whether they are prudent or rash, daring or timid; whether they fight upon principles or at hazard: in effect, a general ought to be earlier or later in making an attack, in proportion to the rashness of the enemy. If, says M. de Montécuculli, any sign of fear or confusion is perceived among the enemy, which will be known when the ranks are disordered, when the troops mix together in the intervals, when the colours wave about, and the pikes shake all at the same time, then he should charge and pursue the enemy without giving him time for recollection: some dragoons, light cavalry, platoons, some loose troops, should be sent forward; who, whilst the army advances in order of battle, will go before to seize some posts into which the enemy must fall. A general also ought, says Vigétius, to sound the spirit of his soldiers, and observe whether they have a firmer countenance than the enemy. It is dangerous to lead an army on to action that is not thoroughly determined to do its duty. "Battles," says Vigétius elsewhere, "are generally won by a small number of men." The great mystery consists in the general's knowing how to choose them, to post them well, conformable to his plan, and the services required of them.

I cannot assign the reason, says he, why particular bodies fight better against other particular ones, or why those who have beat bodies stronger than themselves, have in their turn been often beaten by those that were weaker? It is undoubtedly owing to want of confidence; because the place of action has been different; or from other circumstances which cannot be laid hold of, but on the very instant. The situation of the mind is shown in the countenance of the soldiers; it is declared in their discourse, and by the most trifling of their actions. The general should consult them; he ought even to go farther; the best countenance is not always a sign of the firmest courage. Cowardice often conceals itself under the mask of intrepidity; but soon as the action begins, the veil falls off, and the coward shows himself, notwithstanding all his endeavours to the contrary. Neither at this time should a proper degree of fear be thought blameable; nature must be allowed to shrink in that awful and uncertain situation: the coward gives himself up to his fears; the bully seeks in vain to dissimble them; and the rash man, who can neither distinguish between danger and safety, is sensible of both; the real soldier is always modest, and contented with having done his duty. A good general turns every thing, even want of strength, to advantage. Hannibal, at the battle of Cannæ, posted his best troops upon the wings, that the centre, which was composed of those on whom he had the least dependence, might be the sooner broke, in order to give the wings an opportunity of surrounding the Romans.

It also requires a very strict examination in a general, in order to be thoroughly master of the circumstances on which he should regulate his dispositions; and

and he will also find it sometimes necessary to make some change in his original intentions. It is always proper that the corps of reserve should be composed of veterans, and even of part of the flower of the army; for should the army happen to be broke, this reserve alone may probably give a new face to the action: it was this method which Hannibal pursued at the battle of Zama; where Scipio, after having defeated the troops which presented themselves to him, was astonished to find he had a new army to fight with. At the battle of Fontenoy, the household troops placed in reserve, with some brigades of infantry, determined the success of that day. Nevertheless, on some occasions this disposition may prove disadvantageous; such, for instance, where it would be necessary to present a large front to the enemy, or where it is necessary to prevent his getting possession of a pass or a defile; where a general finds himself too inferior, and where there are also posts to be defended.

It would be unnecessary to repeat every thing mentioned by Vegetius, relative to the precautions necessary to be taken before a battle; time, and the difference of weapons, have greatly altered dispositions: firearms, which are now made use of instead of darts and slings; the bayonet, instead of the pike, have contracted the intervals which must necessarily be left between every soldier.

The emperor Leo carries his speculations still farther; he exhorts a general to continue the action with the enemy, according to circumstances of times, seasons, and constitutions: in effect, there is no degree of equality between an army fatigued by a long march, and an army which, although inferior, has been at rest. Soldiers transported from one climate to another, are no longer the same; the southern people, naturally weak, are much more so in a northern country; and the northern people sicken in a more temperate climate. This truth has been often confirmed by the experience of almost every nation; particularly by the French in many of their wars in Italy; and lastly, in their campaigns in Bohemia.

It is upon these circumstances, and upon many others also, which it would be too tedious to particularise, that a general should regulate the dispositions for a battle. Vegetius mentions only seven different methods, which may be nearly reduced to three: "The first method of ranging an army in order of battle is," according to him, "the long square; the second, by marching obliquely with the right to the enemy's left; the third, by beginning the action with the left against the enemy's right; the fourth, by pushing on the wings against those of the enemy, when the armies come near each other, leaving the centre by the way (which was Hannibal's disposition at Cannæ), and by trying immediately to break through the enemy's wings contrary to his expectation." The fifth is like the fourth, or rather the correction of it; because by means of it the centre is concealed, and covered by the archers and light-armed troops. "The sixth resembles the second; when the army in order of battle draws near to that of the enemy, and with the right attacks his left briskly, where the action is briskly maintained with the best troops, by keeping the rest of the army at a distance from the enemy's right, and disposed long-wise like a javelin that presents its point. The

seventh is, when the army can form with one wing to the sea, a river, a lake, a morass, or an hollow; and that the general reinforces with the best troops the wing that is not supported."

The chevalier de Folard and M. de Puyfégur have themselves also conceived particular dispositions; which, however suppositions, still show the greatness of their genius, and give great perspicuity to those principles they have established in their works; and although it may never happen that every circumstance which they have supposed should actually meet together, there are nevertheless cases where there may be found a very near resemblance of them, and where their imaginary dispositions may be put in execution. But even should these suppositions have no other advantage than that of exercising the genius of an officer, who takes pleasure in his business, to infuse into him that spirit of contrivance, so necessary for one who is placed at the head of an army, and the facility of readily applying rules to circumstances, and theory to practice, they well deserve the praises of posterity.

The order and disposition of troops for action depend entirely upon the general, who knows how to profit by circumstances; the just execution of them depends upon the capacity of the general officers. The general cannot be every where, or see every thing; he is obliged to rely upon the understanding of those who command under him for the just execution of his orders; the general officers should know how to vary them, in proportion as circumstances, and the situation of the enemy changes. They should have an exactness and quickness of eye, both to oppose and profit by them; and, as M. de Puyfégur observes, the disposition of the troops being once regulated by that of the enemy, by the situation of the country, and the general orders that have been delivered, the only part the general can have in the action, lies in those places where he is within reach of giving orders himself.

M. de Montécuculli with great reason observes, that there cannot be too many officers in an army on the day of battle, in order to supply the places of those who are killed: but can a man possessed of any degree of humanity approve of what he adds, that this number should be increased in time of war, and reduced in time of peace? What a prospect for a soldier, who, after having lavished his blood for the safety of his country, and the glory of his prince, sees himself exposed to the fate of Belshazzar! Whatever were the virtues of his master Justinian, can any one, without indignation, see this general, after having overcome the Persians, reunited Africa to the empire, punished the Vandals, driven the Goths out of Italy, ravaged Assyria, scattered at a distance from both empires that throng of barbarians by which they were over-run, and preserved the throne, and the life of the emperor; upon the bare suspicion, or rather under the pretence of a conspiracy, deprived of light, and reduced to beg alms of passers, in the streets of that city which he had so often saved?

It has been already seen, that the dispositions in a mountainous country change according to the situation of the ground. Vegetius repeats, speaking of a field of battle, what has been so often established in the foregoing sections, that an open country is always most advantageous for an army that is strongest in cavalry;

vairy; and that an enclosed spot, divided by ditches and marshes, covered with mountains and woods, is most convenient for infantry. In this last, the knowledge of the country, the art, the ability of the general, and the understanding of the general officers under his orders, sooner ascertain the success, than a superiority of troops in an open country, which presents little or no variety of ground, and which allows the greatest part, or indeed the whole, of the troops to act; the superiority in troops is attended with great advantage, provided also the disposition is good.

The different disposition for troops are so many, the circumstances differ so greatly, that were it even possible to connect in one body only, all the battles which have been fought since the time mankind resolved to regulate their properties by the law of the strongest, the number of contrivances which remained to be collected, would be greater in number than those which have been executed. It is impossible to give a detail of every thing; every particular spot, and the disposition proper for it, every country, and all the circumstances that may oblige these dispositions to vary, must be described. Those now going to be mentioned, are only with a view of giving the rules, and of more clearly demonstrating those precepts which lead to the knowledge of all others.

DISP. I. Let two armies of equal force be supposed, in an open country divided by a river, consisting of 57 battalions and 72 squadrons each, cavalry, hussars, and dragoons. The two armies are on the same side, the right of the one, and the left of the other, to the river. The left of the army whose right is to the river is unsupported; and that whose left is supported, has a wood on its right. By this disposition may be seen the necessity of covering the wing of the army A, that is exposed.

The army I, whose right and left are supported, is formed upon two lines, and presents the same front as the army A, with a reserve in the rear. The following is therefore thought to be nearly the disposition which should be made by the general commanding the army whose left is unsupported. It therefore seems, that in order for a safe disposition, the first line ought to consist of 20 battalions, with intervals of about three toises between each battalion; 12 squadrons on the right, with their proper intervals; four battalions on the right of the cavalry, 10 pieces of cannon, and a battalion in column close to the river; 12 squadrons on the left of the first line, with their proper intervals; 16 battalions in the second line, 300 paces distance from the first; 11 squadrons on its right, placed behind the intervals of those in the first line; and on their right, six squadrons of dragoons next the river, in order to sustain the infantry and cannon covering the right; 11 squadrons on the left, placed in the same manner as those on the right; 10 pieces of cannon, supported by a battalion in column, between the infantry and the cavalry of the right; 10 others, supported also by a battalion between the infantry and the cavalry of the left; four battalions in the rear of the second line on the left, with orders to transport itself obliquely, or sideways, as soon as the army moves to attack that which is drawn up against it; 12 squadrons of cavalry in the rear of the first line upon the left, to post themselves obliquely upon the

flank, at 100 paces distance from the first squadron on the left, next to the four battalions and the cannon; the reserve, consisting of 10 battalions and eight squadrons of dragoons, in the third line upon the left flank, so that it may fall into the first line as soon as the squadrons of cavalry, which were in the rear of those of the first line, shall be posted obliquely: in this position, the army will move forward, the right never quitting the banks of the river.

If the enemy's army should advance, the disposition of the army A will become still better, because the army I will quit the support it had on its right; but if, on the contrary, it remains in its post, in order to keep this support, then the 10 battalions of the reserve, followed by the eight squadron of dragoons, will join the four which support the flanks of the cavalry which is posted obliquely. When marching, this line posted sideways should proceed obliquely; and when the cannon shall be near enough to cannonade with effect, it should make several discharges, in order to break and beat down the entrenchments, or felled trees, which the enemy may have made, and also to destroy their disposition. As soon as the army A shall be near enough to cannonade the army I with success, it must halt, and amuse it with a continual fire of the cannon. The principal attack ought to be made at the wood by the 14 battalions: in order to give more strength and certainty to this attack, six other battalions, with 10 pieces of cannon, should be detached to it from the second line, always keeping up a fire from the front. If during this attack, it is perceived that the enemy weakens his line, in order to carry assistance to the wood that is attacked, then the centre and the right of the army should march up, and charge him briskly. The troops who cannonade the wood ought not to advance, but should only keep the troops posted in it at bay; because that part which the enemy has weakened will then become the principal attack: it is probable, that the enemy having weakened his front, will certainly be broke. If the enemy should not weaken his front, and the attack of the wood should succeed, as soon as the enemy is driven out of it, the troops which attacked it should take the enemy in flank; then the body of the army, by advancing, ought to determine an affair already half gained. If by the intelligence the general hath received, and the number which he knows the enemy's army to consist of, and which he sees before him, he judges the wood is filled with infantry, and that consequently the attack of it will be attended with difficulty, he must attack on the side of the river, by marching by degrees from the right, as if to sustain the left. In order for the greater certainty of succeeding in this attack, he should reinforce the five battalions upon the right with some others from the second line: the left should continue in the position already mentioned, to keep back the enemy. If it should happen that the enemy, seeing his left attacked, causes the troops to leave the wood in order to replace those of the centre, which he caused to march to the assistance of the left, the 14 battalions which are posted sideways, ought briskly to attack the wood sustained by dragoons. These last should post themselves upon the left flank of the infantry in order to cover it; and as soon as it shall be within 60 paces of
the

the enemy, it should march up to him with bayonets fixed; and the dragoons ought to attack him in flank, at the time the infantry does the same in head. The wood is all this while supposed to be practicable for the dragoons on horseback; but in case it should not be so, they must dismount, the infantry being sufficiently supported by the 12 squadrons of cavalry, which are placed sidewise.

The general may with ease, especially in an open country, attack the enemy's whole army together; but this may be attended with great danger, and if the whole front of the first line is broken, there will not be much difficulty in breaking the second: whereas, by attacking the enemy's army in one or two parts, if one of these attacks succeeds, the battle is won; because the troops who are victorious, take the enemy in flank, at the same time that he is attacked in head by the rest of the army. In case it should not succeed, the troops who made the attack can retreat, protected by the whole army, which hath not at all suffered.

The general should, as much as possible, conceal the motions he intends making from the enemy; consequently, the five battalions and 10 pieces of cannon which support the right of the army next the river, ought to march in the rear of the squadrons of the first line, the infantry with their arms secured, and not range themselves in the order of battle intended, till the two armies are ready to march to charge each other. It is the same with regard to the squadrons of cavalry, which should be posted behind those of the first line, to execute the design already laid down. See Plate CCXCIV.

DISP. II. If the two armies are not supported either on their right or their left, the same position should subsist that hath already been established for the cavalry, which is in the rear of that belonging to the first line, except that it should be distributed on the right and the left. If there is not cavalry sufficient, hussars must be substituted in its place; but if there should be cavalry enough, it must be used on this occasion; because cavalry being a greater body, its charge is heavier, and it also makes a greater impression upon other cavalry opposed to it, provided they execute their order with great quickness. This cavalry or hussars, which are posted sideways, should not quit their post, but wait the success of the attack. If the enemy is repulsed, they must then fall upon his flanks, and by a brisk and vigorous charge endeavour to involve the second line in the confusion of the first; they will be followed by part of the wing of cavalry that is victorious, in order to give a greater force to the attack of the second line, taking as much care as possible not to leave any body of cavalry upon the wing of infantry that is in a condition of protecting it. After these two lines of cavalry have been broken and pursued, half of the victorious line should remain in order of battle; and, by a motion to the right from the left, take the enemy's infantry in flank, at the same time that it is attacked in head by the infantry of the army. The second line should then move into the place of the first, in order to be near enough to assist it in case the enemy's infantry should stand its ground firmly; but it is probable, that being deprived of its cavalry, it will neither have the same firmness, nor the same spirit, as if it was support-

ed, especially when it is attacked on every side.

The cavalry and the hussars who pursue the beaten wing should not expose themselves too much, or break their order in the pursuit, for fear the enemy's hussars which are behind should fall upon and beat them by attacking them on all sides; which may very probably happen, if they do not take care to keep in order of battle; which should at least be attended to by the cavalry. After the hussars have pursued the enemy's cavalry so long as to entirely disorder them, they should return and take their former posts, in order to march from thence to whatever place they may be serviceable. Although it may appear something hard to make the hussars return, there is nothing so difficult but what may be accomplished, when order and discipline are firmly established, and when an officer has the art of making himself obeyed.

At the battle of Cannæ, the Carthaginian army, superior to that of the Romans, having broke through them, one part continued the pursuit, and the other fell upon the rear and the flanks of their infantry; at the same time the Carthaginian infantry charged that of the Romans in all parts, which decided the victory. Thus Hannibal owed his victory partly to his superiority in cavalry, and to his attack upon the flanks. The Numidians, who were upon the right wing of the Carthaginian army, and who fought nearly in the same manner as the hussars, performed on this occasion the same service as the hussars would certainly do in the disposition now before us; so true it is, that infantry, destitute of its cavalry, hath no longer the same firmness, nor the same spirit; and if it is also attacked in head by infantry, it cannot avoid being beat. The principal attention of a general, says M. de Montécuculli, ought to be to secure the flanks; experience having taught, that when the wings of cavalry are broke, the infantry is easily surrounded, and hath no longer the means, nor even the courage of defending itself. The reader may see the principles he lays down upon that subject. It is seen by the example of the battle of Cannæ, what use the cavalry ought to be put to, particularly in an open country where it can easily act. What advantage may not be expected from it, when an army of Romans, 80,000 strong in infantry, and 6000 horse, was overcome by the Carthaginians, weaker by the half in infantry, but which derived its principal strength from 10,000 cavalry, all veterans, and well disciplined.

It is the manner of drawing up troops, their order and discipline, and not numbers, by which battles are won; it is very rare that the whole can be employed. During the late wars on the continent, scarcely the half have been engaged in all the battles which were gained.

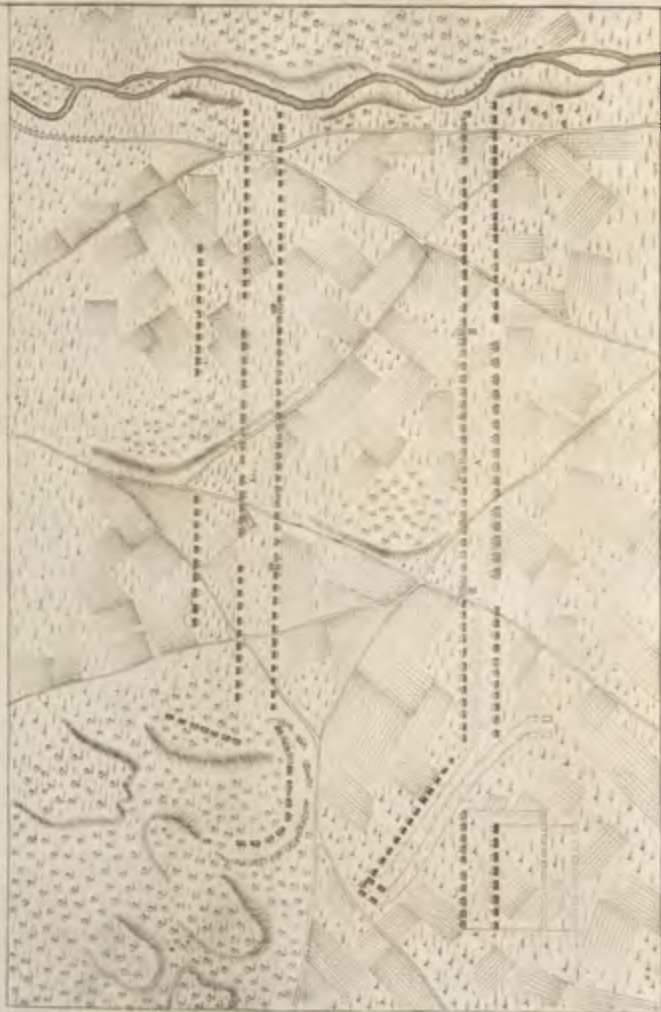
But if the wing of cavalry is beat, it ought to retreat with as much order as possible. The cavalry, or hussars, that are posted sidewise, should always continue in the same place; there is no reason to fear that the enemy will advance briskly to the pursuit; because he will be taken in flank by the body that is posted sidewise; a circumstance which ought not only to abate the eagerness of the conquerors, but also animate the conquered. By this manner of acting they gain time to pass through the intervals of the second line, and to rally in the rear of it, which they can perform with the

greater

WAR.

Plan of an Order of Battle 1st Division.

Plate CCXCIV.



Scale of 1/2 League.

1/2

1/4

1/8

1/16

1/32

1/64

1/128

1/256

1/512

1/1024

1/2048

1/4096

1/8192

1/16384

1/32768

1/65536

1/131072

1/262144

1/524288

1/1048576

1/2097152

1/4194304

1/8388608

1/16777216

1/33554432

1/67108864

1/134217728

1/268435456

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greater ease, as they are neither pursued or molested, at least but very lightly.

In order to prevent the inconveniences that may arise if the hussars in charging the first line of the enemy in flank are charged by the second, it is necessary to detach instantly from the reserve a body of dragoons sufficient to fill up the intervals of the hussars, which will form a full line without taking up more ground: this can be so much better effected, as there would be no ground on the other side of the troops who are posted sidewise, and that, besides, these troops would be at too great a distance from the main body of the army.

Again, without causing them to fill up the intervals of the hussars, they may be placed in a second line behind them; and when the hussars attack the flank of the enemy's wing, the dragoons will take their place, in order to keep back the enemy's second line. This method hath the same effect, and is performed with less difficulty. It is almost evident, that the second line will not dare advance to protect the first for fear of being charged in flank by the dragoons, but that on the contrary it will be obliged to retreat.

This disposition, the performance of which appears very difficult, is not in reality so, if the general hath taken the necessary measures, and if his troops are well disciplined, and know how to move with order and exactness. Even when this motion is not performed with all the exactness possible, it can never be dangerous, because the front of the two lines will not be destroyed, and because it is also made upon the rear; and that if the dragoons and hussars are attacked and beat in marching up, their defeat cannot be any way prejudicial to the main body of the army. When the field of battle is in an open country, all the troops generally come down, especially when there is no obstacle to prevent them.

On these occasions, it is requisite that the disposition of the troops should be strong in every part; there should always be a reserve, whether of infantry or dragoons, in order to be ready to assist the troops which have suffered.

If it is possible, in an open country, to find any hollow to support the right, and a village to support the left, the general should make choice of that situation, supposing his intention is to accept, and not offer battle. If he designs to give battle, it would be unnecessary to take this position, because he must quit it in order to attack the enemy: but if circumstances require his accepting it, he must seize this post, and place infantry and cannon in the village, and station other infantry in the rear to support that which is in the village.

As to the disposition for the order of battle, especially for the front of the line, it must be regulated by the ground, by the disposition the enemy has taken, by the troops that can most easily act, and by those that the enemy can oppose to them.

If the enemy has pitched upon a field of battle, and the general would attack him in it, he should keep his whole front employed; but should make his chief efforts on one or two parts, upon the wings, or at the centre. This was the method practised by marshal Saxe in all his battles: when he accepted battle, as he was obliged to do at Fontenoy in 1745, he was in ex-

pectation that the opposite army would attack him on one side sooner than another; in this situation the dispositions should be properly regulated, the posts intrenched and occupied, the cannon distributed, and troops placed in the rear of each post to sustain those which are in it: victory should then be expected from the capacity of the commanders, the firmness of the troops, and the assistance that is properly given them. But when a general gives battle, he may attack either the right, the left, or the centre, always conforming to the situation of the ground, and the field of battle which the enemy has chosen, which cannot be ascertained but by a thorough knowledge of the country.

It is dangerous to attack the whole front of the opposite army with equal vivacity, because, if the attack does not succeed, the troops are disheartened, and are witnesses of each other's defeat. If the first line is repulsed, the second is seldom of any great use; whereas, by only employing the whole front of the enemy, and making a strong attack upon one or two parts, and it is successful, the troops can take the enemy in flank; and those which amused his front will then attack him briskly, and prevent him sending assistance to the troops that are beat. If the general does not succeed in the first attack, he can try it again with greater force, by causing the troops of the second line to march, as was done at the battle of Lafeldt fought in 1747: the French troops being repulsed four times, M. Saxe sent them a reinforcement; these troops being united, carried the village at the fifth attack, which determined the fate of the battle.

In a plain but inclosed country, a general can attack only part of an army. Antiquity furnishes many examples of this. Epaminondas, at the battle of Leuctra, attacked only the right of the Lacedæmonian army, with a large column of infantry that formed his left; causing the right to be supported, and making the left march, the whole army, according to the opinion of the chevalier de Polard, wheeled. The battle of Mantinæ, won by the same general, is also of the same nature; with this exception, that it was the centre of the Lacedæmonian army that was attacked. These examples are only proposed as what may possibly happen, but which it would be dangerous to imitate on every occasion, and which should be pursued in circumstances only where a general expects great advantage from them.

As the cavalry can easily act in an open country, and be of great assistance to the infantry, all possible means should be used to contribute to the success of their attack; they should always be supported by troops in their rear. Cavalry is of great use, particularly where the two armies, from the situation of the country, find no obstacle to prevent their joining; and if the cavalry, as M. de Puyfégur observes, is beat, even when the infantry of the same army is victorious, the best thing that can afterwards happen to it is, to retire in good order.

The ground so often varies, that even in an open country there are unevennesses, thickets, morasses, and hollows; in each of these situations the dispositions should be changed. If these thickets happen to be in the line of cavalry, and it can act there, (for if it cannot, it would be a very great fault to place it in them) it should be intermixed with platoons of infantry, ob-

serving also not to take them from the main body of the army, but from the reserve, in order not to diminish the strength of the front; which should never be done on any occasion whatever, unless part of the army, either by its own or the enemy's position, cannot act offensively, by reason of some morass, hollow, or any other obstacle that the enemy may have placed before him: if, nevertheless, a general can take an advantageous position, by causing these thickets or these hedges to be occupied by infantry, he should give it the preference, to enable the cavalry to act with the greater facility.

There is great care necessary, in fortifying a place, to get possession of the most advantageous parts, whether by fortifying that which overlooks the plain, or by levelling that which might command the fortifications; so as, in a polygon, every bastion, and all the out-works, flank and protect each other: in like manner troops drawn out in order of battle ought mutually to protect and support one another. Nothing should be omitted, nothing neglected; advantages in appearance trifling, often become decisive.

The dispositions vary not only according to the situation of the ground, but also according to the general's views. Some draw up the battalions without intervals, or like a wall; others, with small intervals; others leave the distance of half a battalion between each; and others, in pursuance of the chevalier de Folard's method, place them in columns.

The first disposition is without doubt formidable, as to infantry; but, as it has been already remarked, it is defective with regard to cavalry. In the third, the interval of half a battalion is too wide: it would require an immense tract of ground; besides, the battalions would not be near enough to have it in their power to protect each other. The second seems better, because the front is not so large, the battalions are more within reach of assisting each other, and have only the distance necessary to prevent their mixing confusedly together. The fourth is undoubtedly very good; but can a general promise himself, that the soldiers can always march at an equal pace together, and without stopping? The fire of the column is continual, it defends itself on all sides; but its oblique fire does not do much execution, and there are situations and spots where this position in column would be faulty. When it cannot approach the enemy, and is also exposed to his cannon, this disposition would be dangerous; because it is certain that cannon plays with much greater advantage upon depth, than upon breadth: besides, not being able to get near the enemy, there are only the heads of the columns able to fire, and the rest remains inactive, exposed to the cannon. The position of the column is therefore only very good, when it can get up to the enemy and charge him.

The marshal de Puyfégur asserts, that an army in an open country, formed in two lines, the first of which is without intervals, ought of course to beat an army that is formed with intervals.

The reason he gives for it is sensible: it being certain, that a full line keeps itself much closer in marching; and that, charging the first line of the army that has intervals, it ought to have broke through it before the second line, which is 150 toises or 300 paces behind, can have time to come up to its assistance;

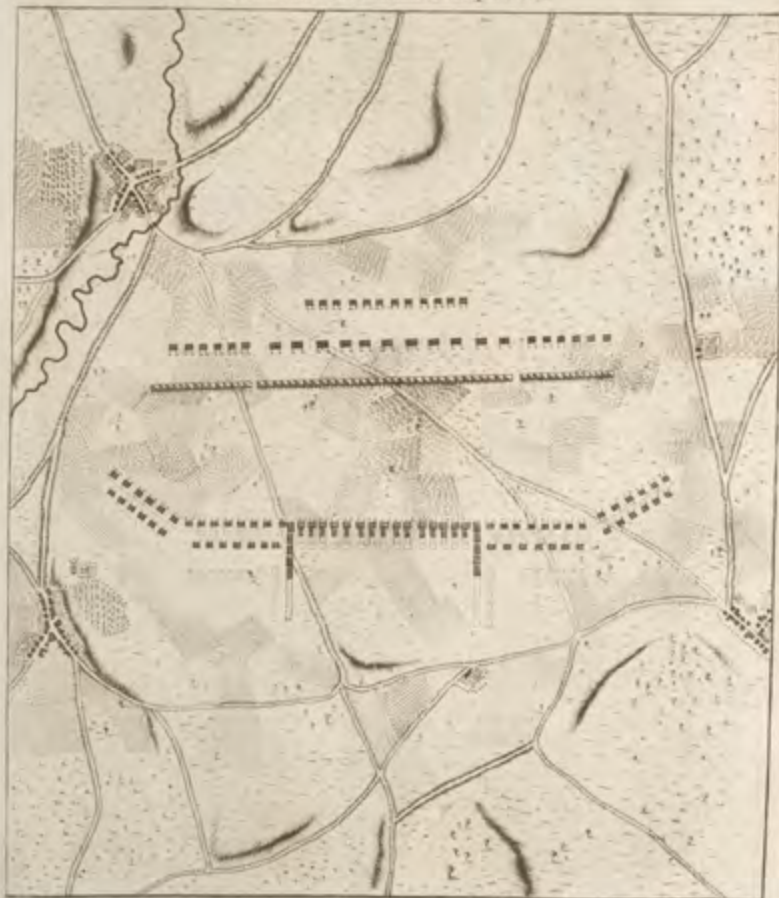
which might very well happen, and examples of it may also be cited. But could not there be another disposition opposed to this disposition in wall, keeping the necessary intervals, not only capable of resisting it, but also stronger, whether by the position and arrangement of troops, whether by the ready assistance they can give each other, without being confused in their motions?

Let two armies be supped in a plain country, without support to the wings of either side, or without any obstacle that may prevent their getting up to each other. The enemy's army, as hath already been said, is in two lines; the first of which is formed in wall, both infantry and cavalry; the second is formed with large intervals, and a body of hussars in the rear. The army to be opposed to it is of equal force, and consists of 40 battalions and 54 squadrons, cavalry, hussars, and dragoons. The following seems to be nearly the manner in which it ought to act against the enemy, who is supposed to be drawn up in wall.

The first line of infantry composed of 15 battalions, has the distance of three toises between each battalion, and the distance of half a battalion between each brigade, eight squadrons on the right, and as many on the left, with their proper intervals: 15 battalions in the second line, 200 paces distant from the first, seven squadrons on the right, and the like number on the left, in the rear of the intervals of those of the first line, supporting the infantry of the second; 10 battalions in reserve in two columns, one of which in the rear of the squadrons on the right of the second line, and the other of the same force posted in the same manner on the left; 12 squadrons of dragoons in the rear of the second line, half on the right, half on the left; and 12 squadrons of cavalry, or hussars if there is not cavalry, in the rear of those of the first line.

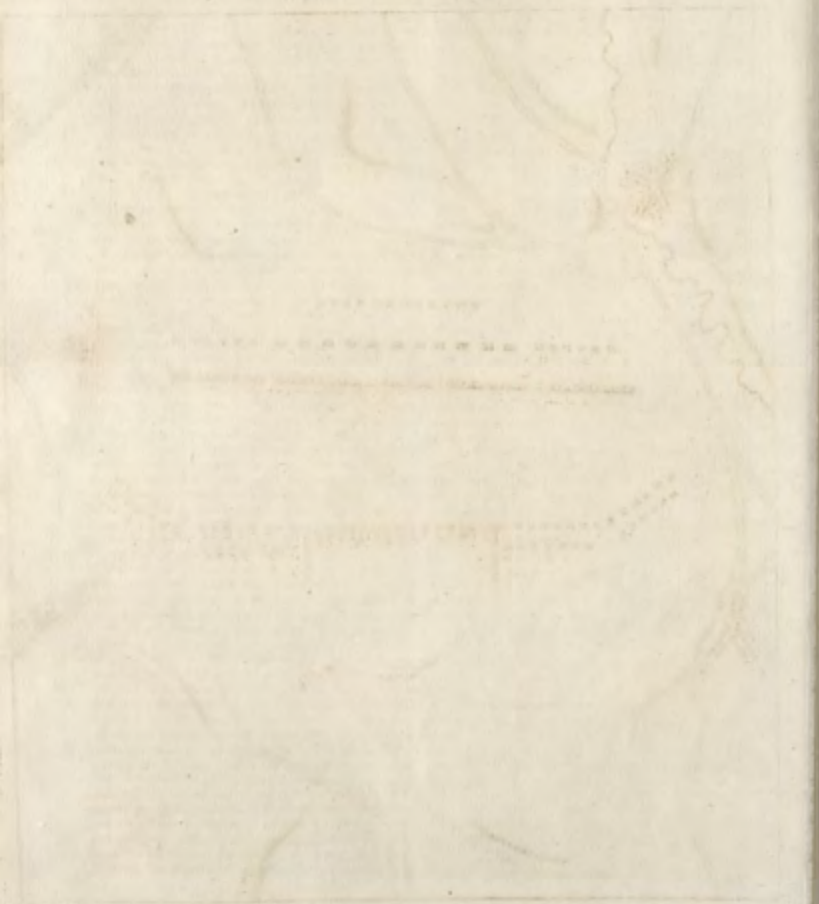
By this disposition, the army appears to be ranged in two lines, with a reserve, and will leave no room for the enemy to doubt of the motions it may make in marching: this disposition will undoubtedly have that effect, and does not appear very formidable; but as soon as the two armies begin to move forward, the second line of infantry must advance as unperceived as possible, forming itself in columns by battalions, each of which, with its head to a battalion of the first line, will form as many T's. The 10 battalions in reserve, which form two columns of five battalions each, will march and fill up the space on the right and left, between the infantry and cavalry. The cavalry, or hussars, which are in the rear of the first line, one by a motion to the right, the other by a motion to the left, will post themselves sidewise, at 100 paces from the wings of the army; the dragoons must post themselves in the rear of them in a second line. This will be performed much easier marching, because it is not complicated; it is also performed in the rear, and the front of the first line is not put into disorder; and consequently, the enemy will not perceive it soon enough to change his position, and oppose the disposition which is presented to him. This first line, by this disposition, forming as many columns as there are battalions, of course ought to break through the enemy's army which is in wall; but not above four deep, because the impression of a column ought to be much stronger than that of a battalion four or six deep. See Plate CCXCV.

WAR.
Plan of an Order of Battle II^d Disposition.



Scale of 1 in. to a Mile
0 1 2 3 4 5 6 7 8 9 10

A. Bell & Co.



Supposing the wings of each T to give way, the battalions which penetrate there will find themselves between two columns hedged in with bayonets; the 10 battalions in reserve, which, according to this disposition, ought to join the right and the left of the infantry, should of course separate the two wings of the infantry, which are on the outside of the disposition in columns. Four battalions should remain in pursuit of them, and the two last take the line in flank, at the same time that it is attacked in head. The cavalry should charge the line which is in wall, with great vigour; and the second line should follow it very close, but in good order: the cavalry, or hussars, which are posted sidewise, will attack it in flank, and the dragoons must remain in their post, in order to keep back the enemy's second line.

Whatever dispositions are made in the drawing up of an army, they should always have some object. A general should foresee all that may be done by the enemy, whose disposition he should always suppose to be a good one, and to which he should oppose one at least as strong, and always better; if possible, he should particularly conceal from him the motions he intends making, or disguise them from him in such a manner, that he shall not have time to oppose them, at least not readily enough: neither should a general be so near as to give the enemy an opportunity of discovering and profiting by the method he intends following.

The disposition of an army in wall is good; but in general, only so with respect to infantry, because that body acting by itself requires but very little ground to retreat, or present itself to the enemy, or to make a motion to the right or to the left. But this same disposition is defective, and even hurtful for cavalry, unless there is a moral certainty of its getting the better: but as, with regard to war, a moral certainty would be a real presumption, this disposition of cavalry in wall would be dangerous, because it may be broke. If that which is opposed to it marches up to it resolutely without confusion, and without being afraid of that mass of cavalry, and charges it the first, sword in hand, how can it retire in order if it is broke, being as much straitened in its retreat as in its disposition? All the squadrons filling up the ground, it will neither be able to make any evolution, or to act; and if it retreats through the large intervals of the second line, it will carry it away with it in its flight: were there even six lines behind it, they would all be carried away, the second by the first, the third by the second, and so on with the others.

It is true that it may give the first charge, and consequently make those squadrons which have intervals give way; but as these last have more ground to act on, they can retreat with greater ease than those who have none, by passing through the intervals of the second line, which is not to be done by a line that hath no interval. They can rally in the rear, while the second will charge the line that is without interval, and which is already disunited by its first attack; even when these two lines are beaten, they can retire with greater ease, each squadron having ground enough to act upon. They will never be so much disordered as the line which has no interval, which cannot escape being cut in pieces if broke, or which can only find its safety in flight; whereas, those that have intervals can retire

one after another, and in a soldier-like manner, sustaining each other.

Besides, in order to prevent the impetuosity of this cavalry in wall, it appears that nothing is to be done but to post hussars, if there is not a sufficiency of horse, behind the squadrons of the first line, who, when the two armies begin to move forward in order to charge, will place themselves on the right and the left sidewise, 100 paces distant from the first lines of cavalry: by this position, they will be able to take the enemy's line in flank, whenever it comes to attack the cavalry. If a part of this line perceiving this motion, divides into two, one part to attack the line that has intervals, and the other the hussars, it is so much strength lost; consequently, the line with proper intervals has fewer troops to fight, and may expect to break them by giving the first charge. If the hussars should be beat, it is of no great consequence, the defeat of those troops never deciding the success of the battle: it is the body of the army the enemy must break, and not two regiments of hussars, which retreat with great ease from before cavalry, and rally and return to the attack as readily as they retired. But if, instead of hussars, cavalry can be posted there, the enemy's line, which is divided into two, will find itself obliged to fight upon equal terms: the certainty of success depends upon the quickness with which the enemy is attacked; and the more so, as he will be obliged to make a motion in the presence of troops already posted and ready to charge. If this line without intervals advances, without showing any attention to the hussars, in order to charge the cavalry, the hussars, at least a great part of them, ought to fall upon the flanks; and the dragoons, which are in the rear of them in reserve, should take their place, to keep back the enemy's second line, and to prevent the hussars from being taken in the rear.

These two dispositions are ideal. A general seldom chooses to fight upon a spot where the wings are void of support; and prevents the enemy, as much as possible, from getting possession of an advantageous post, or at least does not attack him when he cannot prevent him doing it, especially if the ground which he occupies is every where exposed: there are, nevertheless, circumstances where a general is obliged to fight, although not in a post strong by situation. By the two dispositions just now described, the order which would be most proper to be preserved for covering the wings, which may be exposed by the situation of the ground, has been endeavoured to be shown; it has been seen of what consequence it is for a general to know, and to secure all the heights, morasses, hollows, and every obstacle he may meet with. On occasions so important, a general should take the same precautions that he would use under the cannon of a place, if he found heights that overlooked the works; in which case he would not fail of constructing others more advanced, to prevent the enemy from getting there, and retarding their approaches.

If the duke of Savoy, at the battle of Marfalle, gained in 1698 by the French army, commanded by M. de Catinat, had been possessed of the heights of Piosca, the two wings of that prince's army would have been supported; instead of which, his left wing was exposed. M. de Catinat, profiting from this fault,

extended his right to the foot of those heights, of which he possessed himself, and out-stretched the enemy's left: it was from these heights that the disorder in the duke of Savoy's army commenced; it soon communicated to the whole front, and got possession of the whole army: so true it is, that the most trifling object, being neglected, changes the order of things; that the least fault becomes essential; that confidence in the number and in the courage of the troops is often dangerous; and that having a contemptible opinion of an enemy is always fatal. The enemy, although inferior in troops, will soon attain a degree of superiority, if he has the advantage of ground.

In a battle it is impossible that the two armies should be equally well posted. That which is attacked, by taking a good position, and there making up by the assistance of art what is wanting in situation, may maintain itself if that post, and defend itself in it obstinately. On the contrary, the army that would attack, can, in approaching to the enemy, profit only of the advantage the country offers him; and by the disposition of his troops, make up for the badness of the ground, and attack the enemy although advantageously posted: it is on such an occasion, that a general's capacity opens itself, and shows the great man; whether by properly attacking the enemy in the weakest part, by employing his whole front, and by preventing him from sending assistance to the troops attacked with force and vigour; whether by posting his own troops after such a manner, that notwithstanding their facing the enemy in a disadvantageous post, they can be neither surrounded or flanked. It should always be contrived into a fault, when the enemy has time given him to post himself advantageously. It is necessary for a general to be beforehand with the enemy in possessing himself of the post which the enemy had resolved to take; not in order to wait for him and receive battle in it, unless it should be impregnable; but he should seize on it, to prevent the enemy's taking it, and attack him either on his march, or in some situation less strong, which he can neither have perfectly examined, nor had time to fortify. [This must be understood in relation to offensive war; for in defensive war, a general must carefully avoid fighting, and be contented with guarding his country, covering his towns and magazines, in taking such camps as are strongest by their situation, and in joining the assistance of art to nature.]

In offensive war, a general must act in such a manner, as to be beforehand with the enemy in all his designs, in his marches, in the posts he would take; and suppose he hath had time to possess himself of a good situation, he must not have time given him to fortify himself in it, and to render it difficult to be forced.

But a general, whether acting on the offensive or the defensive, ought always to be watchful; sleep is dangerous to him, with whom the safety of the army and the security of the state are entrusted. A dream sent by Jupiter to Agamemnon, in Homer, told him, that a general who presided at so many councils, who had such numbers under his command, and who was loaded with so many cares, should not sleep the night out.

Armies can engage in so many different positions, that it is impossible to particularise all of them. In the beginning of this section two armies have been pre-

sented in an open country, without any support to to their wing: two others have afterwards been posted, one of which is upon a spot advantageously situated, its two wings covered; the other hath only its right wing supported, and its left exposed. It has been endeavoured to give to that, whose left wing is unsupported, the greatest strength in its whole front that is possible, and by the disposition of the left wing it is both strong and secure; but there are such a variety of spots where two armies may meet, that it will suffice to know in general the advantages they may derive from their situation.

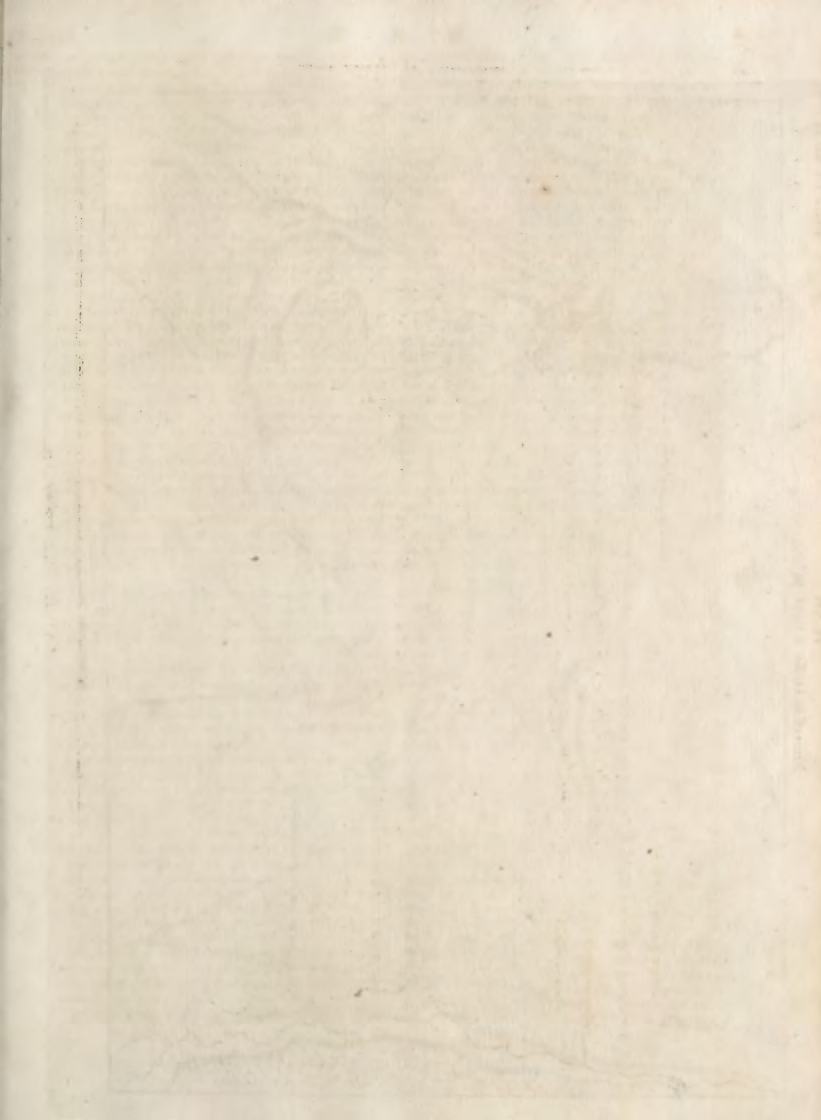
A general may cut off the communication of any assistance the enemy would send to the troops which are vigorously and briskly attacked, by employing his whole front with a few troops; but they must be supported, and not exposed to the danger of being cut off.

It is always a great fault to give battle on a disadvantageous spot; and if circumstances do sometimes require fighting, the general should, as much as possible, contrive that the cavalry be not exposed to the cannon; but should at the same time take care that it doth not quit the support which it gives to the infantry, which cannot be done unless it is covered by a bank, or by hedges, and which, nevertheless, should not prevent its marching on the first order.

A general should, as much as possible, prevent the enemy from getting possession of any post, however trifling, and should prevent also his overlooking him. But if the enemy should get the possession of such a post, he should at least prevent him from fortifying himself in it; he may have spies on whom he can depend, to penetrate into his designs; he should also have advanced detachments, who, by incessantly observing the enemy, may give intelligence of all his motions.

An officer's negligence is more dangerous than his inability. The desire of acquiring honour gives activity; but it is the love of his profession that gives him the penetration necessary for searching into the most secret designs.

DISP. III. This third disposition is very different from the two which precede it. The enemy's army is supposed to be advantageously posted; it hath a hollow on its right, through which run the waters of an impassable morass, forming a rivulet. Its left is supported by a large town, crossed by a rivulet. In the centre is an height, capable of containing 12 battalions; in the front of it is a plain of 700 or 800 toises, which extends from its left to the cavalry on its right. Opposite to this cavalry the plain grows narrower, by reason of an height which reaches to the rivulet, and which the cavalry could not occupy, because the enemy hath taken possession of it during the night. The town is entrenched, and filled with infantry and artillery; 16 battalions in two lines are posted next the town, in order to sustain the troops that are in it. Behind the town there are three bridges upon the rivulet: in the front of the town, on the other side of the rivulet, are posted four battalions and five pieces of cannon, in order to flank the troops intending to attack the town: these four battalions are sustained by eight squadrons of dragoons. The centre of the army consists of 20 battalions in the first line, and as many in the second; eight of which are
next



Plan of an Order of Battle III^d Division.

next to the morafs, fustained by fix fquadrons of dragoons; 12 fquadrons in the firft line, and 12 in the fecond. The cavalry on the right confifts of 11 fquadrons in the firft line, and 11 in the fecond. Thirty fquadrons of huffars, diftributed half on the right, and half on the left, and the whole front of the army lined with artillery.

The army A, which was encamped a quarter of a league from the height by which it is feparated from the enemy, began its march at dark; it halted at the foot of the height, and fent fome detachments of infantry to take poffeffion of the fummit of it. The army I, made the above-mentioned difpofitions, becaufe the army A was too near to be able to avoid a battle. The army I, is compofed of 78 battalions and 90 fquadrons: thefe two armies are nearly of equal ftrength.

The left of the army A, hath a fine plain before it, extending from the morafs to that part where the height commences. In that place are pofted eight battalions, in two columns of four battalions each, next the morafs, with 10 pieces of cannon between the two columns: there are 14 battalions in the firft line, and 13 in the fecond; four battalions towards the height, and next the cavalry. Sixteen battalions occupy the height as far as the fmall wood; four battalions occupy the other fide of the wood, and 32 battalions upon two lines very clofe together; 12 battalions behind the height next the rivulet; 12 fquadrons of horfe, and 20 of huffars, who have orders to pafs three bridges, thrown over the rivulet, and attack the town with three columns of four battalions each, fustained by the 12 fquadrons of horfe, and the 20 of dragoons. In the rear of the cavalry upon the left, are pofted 16 fquadrons of dragoons at a little diftance, with intervals; fo that, if the enemy fhould attack this left and beat it, the cavalry may eafily retire through the intervals of the dragoons, to give them the greater facility of ading, and turn their defeat into an almoft certain victory. Fifteen fquadrons of horfe are pofted behind the height, with their right toward the height, and their left toward the camp, in order to take the enemy in flank, whilft he is employed in purfuing the cavalry of the left, which he has beaten. The chief object of the attack fhould be the town, although the moft difficult. If it is forced, the enemy will be beat without refource: becaufe the infantry who has driven him from that poft, will attack him in the rear; at the fame time that the infantry which remained on the height will come down from it, and join, either to attack, or at leaft to employ the enemy upon the height, and by that attack prevent him from fending affiftance to the troops already driven from the town and put to flight: the cavalry upon the left will advance at the fame time to fupport the infantry, and, if neceffary, to charge the enemy's cavalry.

The 32 battalions which are upon the height in two lines, will be divided into fix columns, of which four of fix battalions will be employed in attacking the town, the laft battalion of every column excepted; which muft remain at the entrance of the wood, with four columns of four battalions upon the left, in order to fuftain the infantry attacking the town, and to keep back the enemy's cavalry upon the left. They will defend from the height under the protection of the

wood by which it is covered, and which ends at about 400 toifes from the town. Thefe troops will be followed by artillery, which muft be pofted between the columns; they muft halt on leaving the wood, and will begin by making a continual fire of cannon upon the town and the cavalry: during this fire of the artillery, the 12 battalions on the other fide of the rivulet ought to attack the four battalions and the eight fquadrons of dragoons belonging to the enemy; and when they have forced them to give way, they will amufe them by a conflant fire of mufquetry. When the artillery fhall have played long enough to have broken down the enemy's entrenchments, and destroyed the order of the troops, the four columns, formed of 20 battalions, will march up, and with their bayonets endeavour to penetrate at fome part; the 12 battalions on the other fide of the rivulet will charge at the fame time; the two columns of four battalions each, as well as the four laft battalions belonging to the columns which attack the town, will remain at the entrance of the wood with the artillery, in order to keep back the enemy's infantry and cavalry which was next the town. If any one of the columns can penetrate as far as the bridge that is in the town, it will take poffeffion of it, as well as of the market-place; the others following it will take poffeffion of the hedges and gardens. One column only will be fufficient to fecure the banks of the rivulet, and take poffeffion of the bridges. As foon as the bridges are free from the enemy, the 12 fquadrons of horfe and the 20 of huffars will pafs and attack every thing they find to oppofe them; then the left ought to advance: the battalions which have remained upon the heights fhould come down from them, and all together attack the front of the army, whofe left wing is already broken and taken in flank.

But if the enemy, after having examined the difpofition of the army A, imagining that the principal attack will be directed againft the town, inftead of remaining in his firft difpofition, changes it entirely, and caufes a part of his fecond line of infantry to march to the town; and if he ftrengthens his right by the cavalry of the left, (a fpot more favourable for cavalry than infantry), the attack of the town will then become impracticable, becaufe of the great fuperiority of the troops defending it; therefore, it would be ufelefs to preffit in it; but his right fhould be vigorously and brifkly attacked. It is true, that it is reinforced by the cavalry from the left; but as the ground between the height and the eight battalions which are next the morafs, can contain but 12 fquadrons, thofe which the enemy hath drawn from the left can only be pofted behind the height or in the third line; if they are behind the height, nothing can prevent their being attacked: but fuppofing the firft line broken, it fhould not be too warmly purfued, for fear of feparating, and being taken in flank by the cavalry behind the height. The 16 fquadrons of dragoons which are behind, ought to remain in that fituation: the 15 fquadrons of horfe, which are with their right to the height, and their left to the old camp, ought to take the place of thofe who have attacked the enemy; and then the 20 battalions which are upon the height, will come down into the plain and attack the enemy's infantry, at the fame time that the 15 fquadrons of cavalry and the 16 of dragoons attack the cavalry

cavalry which is posted behind the height. If they succeed in beating it, or whether the enemy send assistance or not, if he sends assistance, he will weaken his left, and then the 44 battalions, who till this time have remained inactive, may come down from the height and attack the town, not so much with a design of forcing it, as to oblige the enemy not to take any troops from it; if no assistance is sent to the right wing, it will be undoubtedly beaten, being attacked by forces so greatly superior to it: the whole of the cavalry being thus put to flight, the most prudent part the enemy can take is, to endeavour to pass the rivulet by the three bridges behind the town, and by so doing secure himself from farther insult: if the enemy does this, the 12 battalions, the 12 squadrons of horse, and the 20 of dragoons, will retire by the same road they marched up, and they will be in security as soon as they are in the wood: besides, a beaten army is seldom to be feared; therefore, they may retire unmolested, and in order.

But if it happens that the enemy, without changing his position, is not to be forced in any of these attacks, the general had better retire to the height, where there will be no danger of the enemy's endeavouring to attack him: but if he should attempt the attack of the left wing of the army A, it must be reinforced by all the cavalry that can be employed without causing confusion, and two brigades of infantry should be joined to the two which are next the morais. See Plate CCXCVI.

DISP. IV. The fourth disposition is supposed in a country mixed with thickets and plains. The enemy's army hath its right to some mountains, and its left to a river; in about a third part of the length of his front, there is a village a little behind its right. His disposition is, four battalions and six pieces of cannon upon an height which overlooks the plain, to which is also added the cavalry of the right. Behind are two passes entrenched and guarded by four battalions; upon the heights of these passes there are four more, to prevent the enemy penetrating at the flank. There are eight squadrons in the first line, four battalions posted at the village, and 12 in it with cannon: 16 battalions on the left of the village, 14 squadrons and four battalions next the river. The second line consists of 11 squadrons upon the right, eight battalions behind the village, in order to carry timely assistance to it; 12 battalions in the rear of the 16 of the first line; 15 squadrons and four battalions to the river. The reserve consists of 18 squadrons of dragoons next the mountains, (in order to dismount and be within reach of assisting the battalions guarding the passes), and of 24 squadrons of hussars on the left next the river. An island is supposed a little in the front of the first line: in this island is placed two battalions and six pieces of cannon. A stone-bridge is also supposed between the two lines, behind which is posted two battalions, to support those in the island, and to facilitate their retreat. It seems impossible to attack an army thus situated; all the troops are a mutual support to each other: the flanks are secured and well guarded; artillery is planted along the whole front; and the passes are entrenched, and troops posted in them.

In the front of the enemy's army is a large plain, which runs from the mountains as far as the river;

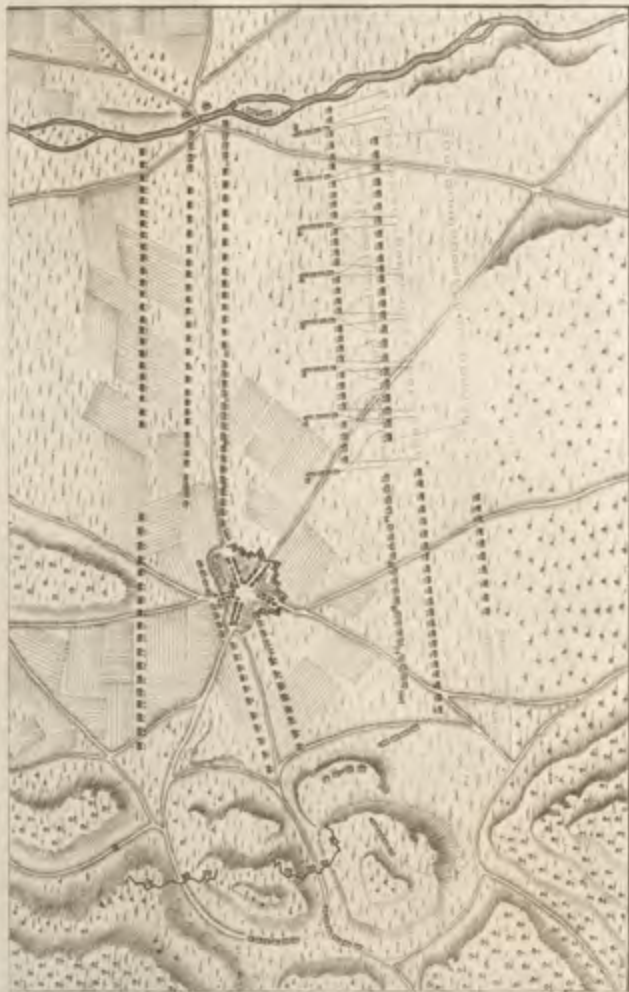
but the largeness of it is broke into by some thickets, where nevertheless cavalry may act: in order to attack this army, thus advantageously posted, a disposition must be made, entirely different from that which it is in. If the village, which is entrenched and well furnished with troops and artillery, is attacked, the forcing it will be doubtful: but supposing it should be forced, it will be without losing a great number of men; which should be avoided, because it is the duty of a general to spare the blood of his soldiers as much as possible, and even, if practicable, to employ but few of his troops against a greater number of the enemy's. If the passes only are attacked in order to take the enemy in flank, it is very certain he can send assistance to it without weakening his front, having it in his power to cause the eight battalions in reserve behind the village, to march there, and to cause the 18 squadrons of dragoons to dismount. If only the left wing next the river is attacked, it is true that attack is more practicable, there being no obstacle or entrenchment to prevent coming up with the enemy; but still there is but one wing beaten; and that, by falling back upon the troops in the village, can retreat by the mountains of which the enemy is master. There is great reason to imagine it will be beat; but the general must endeavour to reap as much profit from that victory as he can: it is therefore thought, that, not to lose the fruit of it, the enemy should be attacked on the left wing, from the centre to within about 200 toises of the river, at the same time that the entrenched passes are attacked. During these two attacks, a brisk cannonade should be kept up upon the village, the infantry and cavalry upon the right, the infantry that is posted in the island, and that which is next the river: by these two attacks the enemy's front and right wing will be equally annoyed; he will not know where to send assistance, and in that state of uncertainty may probably send it to a part where the danger is not so pressing. But suppose he should act in the most proper and prudent manner, as it should always be imagined he will, the assistance which he will send to that part, cannot be effected without furnishing or weakening some other: if he strengthens the passes and the heights of the eight battalions behind the village, they perhaps will not be forced; but he will scarcely venture to take any troops from the village, in order to send them to the assistance of the front that is attacked. But if he should furnish the village, it must then be attacked, and that vigorously; which may be the easier done, as it hath been for some time cannonaded, and consequently the earth hath been tumbled down, and openings made, at least large enough for the infantry to enter it: this attack will not at all prevent that at the front from going on.

In order to execute the attack upon the enemy's army, it is imagined the troops ought to be distributed after the following manner: all the infantry should be placed in the first line, excepting that of the reserve, which should consist of 20 battalions; the second line should consist of the cavalry; and the third should be formed of the dragoons and hussars. The 20 battalions on the left, forming five brigades, should remain in order of battle at the coming out of the thickets, with artillery distributed between the intervals of each brigade; the 28 battalions, after making seven brigades

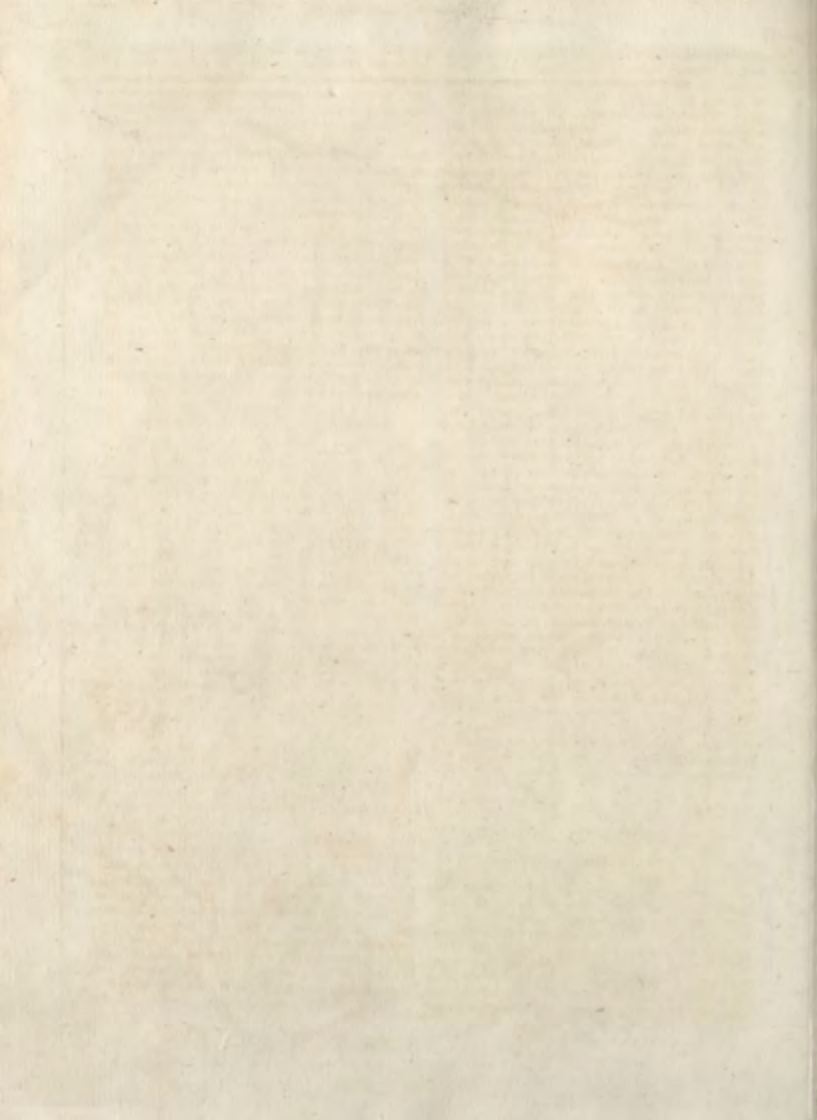
WAR

PLATE CCXC VII.

Plan of an Order of Battle IV Disposition.



Scale of 1 in Longitude
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grades as soon as they come out of the thickets, will form in column: then the 24 squadrons which are in the rear of the infantry formed in column, will post themselves, four squadrons in the intervals of each brigade. The brigade supporting the right flank will advance on the side of the river: and then the seven columns and the 24 squadrons will march up to the enemy and attack him with their bayonets, without losing time in firing. As soon as the columns have broken or staggered the enemy's first line, the cavalry will fall furiously upon them, sword in hand; a part of the dragoons and hussars should follow, in order to be within distance of sustaining the troops who have attacked, or to join themselves to the cavalry who have broken in among the enemy: it should be observed, that as soon as the hussars are engaged and pursuing the enemy, the cavalry should rally in order to sustain them, or to flank the infantry which may still make resistance. The brigade of infantry which supported the right, followed by the seven squadrons, should attack the four battalions on the left of the first line, and the seven squadrons will take them in flank; which they can with the greater ease effect, as the cavalry hath been put to flight. The seventh column should, with four squadrons, attack the four battalions of the second line, at the same time that this attack is executed from the front as far as the river; 16 battalions of the 20 in reserve, should attack the passes, and also the heights; the remaining four will march under cover of the mountains, sustained by a brigade of infantry and eight squadrons, in order to attack the cavalry on the right; thus of the whole front of the enemy's army, there will remain only the village that hath not been attacked, unless there hath been such a number of troops drawn from it, as to render the carrying of it not difficult. It is to be supposed that one of these attacks will succeed; that made by the columns sooner than the rest: the disposition of columns intermixed with cavalry is very formidable, because each body is supported without confusion: besides, it is to be supposed that a column four battalions in depth, and from 18 to 20 men in front, ought to break through a line that is only four deep, and which being once penetrated, the cavalry will find no difficulty in breaking through it. See Plate CCXC VII.

The movement of the infantry to form itself in column, and the evolutions of the cavalry to fill up the intervals of each column, ought to be performed with great quickness, and near enough to the enemy to surprise him, but not at such a distance as to give him time to remedy it.

The nature of the ground, which is continually changing, cannot be followed through all its various shapes; the author hath therefore endeavoured to form his dispositions in those situations which most ordinarily occur, in order that these general dispositions may be assailable to the ideas in more particular and critical situations. Mountainous countries have not been mentioned, because it is very rare that they present an opportunity of coming to a general action: the affairs which happen among them are generally with regard to some post, which can never decide the fate of an army, however brisk they may be. The four dispositions now mentioned, are ideal; and although the pro-

priety of them may be defended, it would be very imprudent to answer for their success; because with regard to the business of the war, the whole depends upon circumstances, and the least accident often renders a disposition, seemingly the best, the most prejudicial that can be taken. A motion of the enemy's troops ill conducted by their commanders, too much sloth or too much eagerness in the execution of orders, an accidental word falling from the mouth either of an officer or a soldier, and which is always increased when told again, may occasion the defeat of an army, however well disposed or advantageously situated. The epithet of "best" should be given to that general who commits the fewest faults; for there is no man who can flatter himself with having committed none: it is impossible for a general to see every thing himself, or to remedy any unforeseen accident that may happen, if he is not assisted by his general officers, who see things which it is impossible he can: they ought not only to be the means of putting his orders in execution; but even, in certain circumstances, they should prevent them, and make the same dispositions which the general ought to make, and would certainly order, was he in their situation.

EXPLANATION OF PLATES.

PLATE CCLXXXVIII. a, The army formed in order of battle, ready to march. b, The park of artillery, where the baggage belonging to the army, and their escorts, also are assembled. c, March of the cavalry, to form the column on the right. d, March of the cavalry, to form the column on the left. e, March of the infantry, to form in three columns. f, March of the artillery and baggage, to form in a column. g, Parties of hussars, covering the flanks of the army, and forming the rear-guards of the column, when the army hath passed. h, Bridges and fords, discovered by the advanced detachments, who have marked the route of the army. i, Bridges built by the same detachments. k, Front and rear-guards of the columns drawn from the troops of which the columns are formed. l, Parties of hussars, marching upon the flanks of the army. m, Parties of hussars marching at the head of the army, to scour the country through which the army is to pass, and also to examine the routes marked by the advanced detachments.

PLATE CCLXXXIX. A, The position of the army, before it begins the march. B, Parties of hussars forming the advanced-guard of the army. C, Parties of infantry of the advanced-guards of the columns. D, The infantry of the army forming the head of the columns. E, The artillery, and waggons belonging to the artillery. F, Battalions of artillery. G, The cavalry. H, The baggage of the army. I, The escort of the baggage. K, Parties of hussars. L, Parties of dragoons. M, The infantry of the reserve, forming the rear-guard of the army. N, Platoons of infantry marching upon the heights, to cover the flanks of the columns. O, Villages in front of the camp the army is to occupy, and of which the light infantry have taken possession. P, The artillery and baggage, with their escorts in the front of the camp.

PLATE CCXC. A, The army formed in order

Offensive
Operations.

Offensive
Operations.

of battle. B, The cavalry, which hath marched some paces in advance, in order to make room for the infantry. C, The infantry, which, by facing to the right, forms the column upon the right. D, The infantry, which, by facing to the left, forms the column upon the left. E, Bodies of infantry, which are to march at the head of the columns of cavalry. F, The park of artillery, where the baggage belonging to the army, and the efforts, also are assembled. G, The march of the infantry, forming in columns. H, The march of the cavalry, forming in column. I, The march of the artillery and baggage with their efforts, forming in column. K, The army in march. L, Hussars of the advanced-guard keeping the roads, marked out by the detachments sent on before. M, Infantry, forming the advanced-guard of the columns. N, Small parties of infantry, marching upon the flanks of the columns. O, Parties of hussars, marching upon the flanks of the army. P, Infantry of the reserve forming the rear-guard of the army.

PLATE CCXCL A, The camp of the main body of the army. B, An advanced camp, composed of dragoons and hussars, in order to cover the right of the army, to guard the passes by which the enemy might make incursions upon the flanks and rear of the army, molest the convoys, and cut off the communications. C, Villages and bridges, guarded by the light infantry. D, Posts of dismounted dragoons in the front of their camp. E, Posts of dragoons on horseback, to secure the communication between their camp and that of the main body of the army. F, Bridges built, to keep up the communication between the grand and the advanced camp. G, Bridges and villages guarded by detachments of infantry. H, Grand guards of horse. I, Guards of infantry. K, Bridge, village, and mill, guarded by the infantry belonging to the army. L, Camp of dragoons and hussars covering the left of the army, and supporting the light infantry. M, Villages and bridges guarded by the light infantry. N, Posts of dismounted dragoons in the front and on the flanks of their camp. O, Posts of dragoons on horseback. P, Posts and detachments of hussars, to patrolle in the front and upon the flanks of the army, and their camp.

PLATE CCXCII. A, The army encamped behind its entrenchments. B, The camp of the troops of the reserve. C, Camp of the dragoons, to secure the rear of the army. D, Camp of hussars, to cover the ground upon the right of the army. E, Villages

and redoubts guarded by the light infantry, to secure the camp of the hussars. F, Bridges built to secure the communication of the army with the ground upon the right, and to favour the retreat of the troops posted on the opposite side. G, Brigades of artillery distributed upon the flanks, and along the whole front of the army. H, The park of artillery. I, A bridge entrenched, to secure the communication between the army and the ground upon the left. K, Villages and farm-houses, guarded by detachments of hussars and light infantry, to patrolle in the front of the army.

PLATE CCXCIII. fig. 1. A, The camp of the army, divided into three parts, for the defence of the river. B, The camp of the light horse, light infantry, and dragoons upon the wings of the army. C, Castle and village, guarded by light infantry. D, A town occupied by the infantry belonging to the army. E, Bridge broken down. F, Islands occupied by infantry. G, Posts of infantry distributed along the side of the river. H, Batteries established along the side of the river. I, Posts of cavalry, to keep up the communication between the camps. K, Bridges constructed to preserve the communication of the islands. L, Bridges constructed for the communication of the camps.

PLATE CCXCIII. fig. 2. A, Bridges of boats. B, Redoubts which cover the bridges. C, A battery, under cover of which the infantry work at the construction of the redoubts. D, A battery to prevent the enemy from annoying the army on its march. E, The march of the army. F, The artillery distributed among the brigades of infantry. G, Infantry, forming in columns to open on the opposite side through the intervals of the redoubts. H, March of the columns into the front of the redoubts, who halt in order to give time for a part of the cavalry to form upon its flanks. I, A battery erected to facilitate the forming of the cavalry. K, Cavalry, which, in gaining the opposite shore, forms in order of battle, and posts itself upon the flanks of the infantry. L, Eight battalions in column upon the right wing of the army, to go and examine the village, and attack the enemy in it, in case he should be possessed of it. M, Hussars and dragoons, who have taken possession of the height which is on the left wing of the army. N, A brigade of infantry posted next the height, covering the left wing of the cavalry. O, The disposition of the army marching up to the enemy.

PART III. Of the PETITE GUERRE.

THE *Petite Guerre* consists in the manœuvres of the Partisan in secret marches, occupying, defending, or attacking posts, reconnoitring countries or the enemy, placing of ambuscades, &c.

SECT. I. *Of the Qualifications of a Partisan, and the Nature of his Corps.*

THEY generally call every officer a partisan who is destined to go at the head of a detachment, whether draughted from the body of the army, or of a party which he belongs to, and for that reason has no other name than that of a partisan.

Of all military employments, there is none which require more extraordinary qualities than that of the partisan.

A good partisan ought to have an imagination fertile in projects, schemes, and resources; a penetrating spirit, capable of combining the whole circumstances of an action; a heart intrepid against every appearance of danger; a steady countenance, always assured, and which no signs of disquiet can alter; a happy memory, that can call every one by his name; a disposition alert, robust, and indefatigable, to carry him through every thing, and give a soul to the whole; a piercing rapid

eye,

eye, which instantly catches faults or advantages, obstacles and dangers of situation, of country, and every object as it passes; his sentiments such, as to fix the respect, confidence, and attachment of the whole corps. Without these dispositions, it is impossible to succeed.

A partisan ought to understand Latin, German, and French, to converse with all nations. He ought to have a perfect knowledge of the service, especially light troops, without being ignorant of the enemy's. He should have the exactest map of the theatre of the war, examine it well, and become perfect master of it. It would be very advantageous to have some good geographers under his command, capable of drawing plans, routes of armies, situation of camps, and wherever they may have occasion to reconnoitre.

He ought to spare nothing to be assured by his spies of the march, force, designs, and position of the enemy.

As chief, he owes the example of an irreproachable conduct to his corps, circumspect in his cares like the affection of a parent, by which he will inspire respect, love, zeal, and vigilance, and gain the hearts of the whole to his service. It is extremely dangerous for such an officer to contract the least attachment to women, wine, or riches. The first makes him neglect his duty, and frequently occasions the most ruinous treacheries: the second leads to dangerous indiscretions, and is sure to draw down contempt: the third leads to guilt, and destroys all sentiments of honour. The partisan must be content without the delicacies of the table, as he may be often exposed to want provision; his bed the same with the mens, a cloak and straw, never stripping but to change linen. Nothing animates soldiers so much as the presence and vigilance of a commanding officer sharing with them the fatigues of the service: the officers follow his example; the men are assured, encouraged, and content.

To form a Corps capable of carrying on the *Petite Guerre* to advantage, prudence requires that it should consist of 1000 men at least; without which a partisan cannot expect to support the fatigues of a campaign, and seize the most important occasions that every where offer, and which a too great inferiority must make him forego.

It is no less important that this corps should be composed of infantry and cavalry; and as it is inconceivable that the cavalry ought to be the most active in carrying on the *Petite Guerre*, it were to be wished that they were likewise the strongest, so as to have 600 cavalry and 400 infantry in a corps of 1000 men, making four companies of infantry and 12 troops of cavalry.

Each company of infantry to consist of one captain, one first and two second lieutenants, four serjeants, and 96 men, including four corporals, four lance-corporals, and two drummers. Each troop of cavalry to consist of one captain, one first and one second lieutenant, a quarter-master, two serjeants, and 48 horsemen, including four corporals, a trumpeter and farrier.

The commanding officer should have the naming of the officers of this corps, or at least have liberty to reject such as he is convinced are not qualified for such service, as every officer who may be ambitious to serve in the corps, though possessed of great military merit, may not have the talents requisite for the duties of the partisan.

To support the honour of this corps upon a solid

and respectable footing, the strictest subordination must extend from the chief to all the officers, and the most rigid discipline inspire vigilance, patience, bravery, and love of glory to the whole corps.

As to the other corps of partisans formed of one or more detachments, drawn from the different regiments of the army, and composed with a view to some particular expedition, their strength and quality is regulated by the circumstances of the affair they undertake, and are more or less numerous according to the exigency of the projected scheme. It is of the utmost importance for the officer that commands, to have the choosing his men and officers whom he knows to be fittest for his enterprise, and thereby preventing many difficulties, contradictions, and dangers, which jealousy and distrust always occasion among strangers.

No recruit for the corps of a partisan, either cavalry or infantry, should exceed 30 years of age; but the younger they are, if they can carry arms, so much the better for such a service, to which youth are particularly inclined, and recruits may be met with every where; but when the necessities of war do not oblige officers to accept of indifferent men, they cannot serve the corps more essentially than in the choosing good recruits. We learn from Vegetius, that the best service is to be expected from men brought up to severe labour, and exposed to the injuries of the weather; men brought up in ease and plenty cannot endure fatigue and want, and they who have tasted fewest of the sweets of life are the least subject to the fear of death. In the choice of recruits for the cavalry, it were not unworthy the attention of officers to prefer men that are lovers of horses, and to recruit chiefly in those countries where such are mostly to be expected.

As for arms, the firelock and bayonet is sufficient for a foot soldier; but in the corps of the partisan, barrels of 36 inches, with a long bayonet, but to have the caliber the same with the rest of the army, which, for the sake of having ammunition made up to suit the whole, ought to be invariably the same; and for the more convenient method of carrying their ammunition, the German manner, of having their cartridges placed horizontal, and covered with wax cloth, is preferable to our wooden blocks. A helmet likewise is preferable to our hats, as the sword is almost the only thing to be dreaded from the enemy's cavalry. Four spades, and four pick-axes should be given to each company of infantry.

The present manner of equipping the light dragoons is so perfect, it is unnecessary to say any thing on that head; but no white horse, stone-horse, or mare, should be suffered in the corps of the partisan, as the least neighing or perceivable colour may make enterprises fail. No horse should be mounted for service till six years old. The size of the light dragoons is very proper for the partisan; and while they have firm ground to act upon, and plenty of forage, none can excel them; but when they come among morasses, and feel the severity of want, perhaps the Hungarian Hussars may be found more equal to the duty: possibly, therefore, in forming the corps of the partisan, 200 horse, such as are bred in the mountains of Wales or Scotland, mounted by the lightest men, might be found of good service.

The principal attention of an officer of cavalry should be, to see that the men feed and dress their horses well,

Hay, straw, and oats, are their common food: too much hay is not good; but when they find wheat-straw newly threshed, they may give them more of it, as it is excellent nourishment. During the whole campaign they should have dry food only, as green weakens them.

When the exigency of the service requires the horses to be kept saddled day and night, every horseman should seize some moment to turn the saddle-cloth, which greatly comforts a horse, keeps him at ease, and less apt to gall; and care should be taken to keep the cloth soft, and clean from sweat and dust.

SECT. II. *Of Posts, &c. and the different Works with which they may be fortified.*

Posts are generally such places as bodies of troops can fix in when detached from the army, to cover and secure the frontiers; and upon the vigilance and resistance of the parties that are detached there, depends the safety of the army. Whatever the abilities of a general may be, it is scarce possible that he can have an eye to every detail that contributes to their defence; it is sufficient if he knows that the guards are properly placed, and the line that they make properly established. It is then the business of the particular officers who command them, to make the best disposition for a vigorous defence, and answering the views of the general.

An officer who is detached to a post, is either to relieve a party, or take possession for the first time. In the first case, if the guard which he relieves happens to be intrenched, as soon as he arrives at the post, and has taken his instructions from the officer who commands, he should prepare himself for his defence, as shall be mentioned in that article. In the second, if an officer who is detached is to intrench himself, he must examine if the place is advantageous for the execution of his projects, the defence of his people, and the securing a retreat.

He must consult, 1st, Whether the situation be convenient for sending parties to discover the enemy; whether to give intelligence of their situation and march, or to disturb and surprise them. 2^d, If it has some natural defence on its front or flanks, such as a river, rivulet, morass, or small wood that can be easily penetrated. 3^d, If he can preserve his communication with the army, and if there are some covered places to favour his retreat. 4th, If he can discover all the approaches; because if the enemy can come within a small distance of the post without being seen, he will place himself under cover there, and rest while the besieged are obliged to remain continually under arms, and will watch the moment for making an attack. If then he finds hollow roads, clumps of wood, or any place where the enemy can secure himself in the neighbourhood of his post, he must fill them up, or guard them with detachments of six or seven men. 5th, He must take care not to be commanded by any neighbouring heights, or must prevent the enemy from profiting by that advantage; because if they can take his soldiers in the rear, it will be impossible for them to defend themselves. You will see afterwards how to ward off this inconvenience, when you cannot prevent being exposed to these heights. 6th, The extent of the work must be proportioned to the number of men

that are to defend it. Good sense and numberless examples prove, that too large intrenchments (such as are commonly constructed) can only be defended by considerable bodies. Excesses of this kind are extremely reprehensible; and it were much more eligible to give in to the opposite, by making them smaller. 7th, He should take care to have all the parts of his intrenchment nearly of an equal strength, so as to be able to make an equal resistance every where; and lastly, he will take care to fulfil exactly the intention of the general in posting a guard in that place.

There are some places so advantageously posted by nature, that though they are not fortified, they may in a short time, and with little charge, be made so strong, that it will require as much art to besiege them as many others that are perfect fortifications; such as islands, peninsulas, and places seated on eminences of difficult access, or in morasses.

If the post is in a level country, or upon a height that may be surrounded, as happens almost always to small detachments, they should construct a redoubt or small square fort, composed of a parapet with its banquette access, or in morasses.

The ground being chosen, you must trace a straight line AE, (fig. 1.) and raise the perpendicular BC, as directed in practical geometry; observing to give to each of these lines which mark the interior side of the parapet but two toises, or two and a half for 30 men, four toises for 50, and eight for 100; which will leave a space of two feet at least against the parapet for each man.

Having traced the two first lines A, B, you must put the cord over the picket C of the perpendicular B, and with the same length trace the arch D, then put the cord over the picket E of the line A, and trace the arch F. The point where the arches intersect each other, is the point to end the lines EH and CG. These four lines mark the interior side of the parapet.

Then trace four other lines at the distance of two or three feet parallel to the first, as I, L, M, N, to mark the size of the banquette, which should be greater or less according to the number of soldiers you would place in a file. Then trace a third parallel square on the outside of the first, as O, P, Q, R, to mark the exterior side of the parapet; and to determine its thickness, which is usually eight or nine feet, or 18 if it is to resist cannon, which you should always be prepared to do.

Then trace a fourth and last square, ST VX, to determine the width of the ditch, which is the same or two feet more than the thickness of the parapet; leaving a picquet planted at all the angles, as likewise at the lines already traced, so as not to lose the points from whence the lines were drawn.

While you are employed with two or three men in tracing, five or six men should be ordered to cut down the trees that are in the neighbourhood of the post, not only to open the approaches, but to serve for constructing the intrenchments. The smallest branches serve to make fascines, which are a sort of faggots about six feet long, two feet thick, and of the same size all over, tied in the middle and at the two ends, to serve for supporting the earth, which would tumble down without that support. The middling branches
serve

serve to make pickets proper for mixing with the fascines, and fixing them in the ground, or one above another to raise the parapet. The trunks to which the large branches are left, serve to increase the strength of a post, as shall be mentioned afterwards.

Having traced all in the manner directed, fix a row of fascines upon the small square ILMN, to support the earth of the banquette; then fix a second row upon the square ABGH, to support the interior side of the parapet; then a third row on the third square OPOQ, to support the exterior side of the parapet. You should observe in the beginning to picket the fascines, to leave a passage of three feet PB, on the side least exposed to the enemy, to serve for an entry to the redoubt; but if this passage can be taken in a straight line, it should be made like a mortoise, as you see at Y, fig. 2.

After having picketed the three rows of fascines as directed, you must dig the ditch AB, as in the profile fig. 3. a foot distant from the exterior side of the parapet. This distance or breadth is called *berme*, and serves to support the earth, or receive what falls from the parapet by the enemy's cannon. This *berme* is more or less according to the solidity of the earth; the earth to be thrown into the intervals C, D, E, marked for the parapet and banquette, taking care to make the men tread it well down, and observing to leave a *talus* or *slope* on the two sides of the ditch FG, more or less, according to the consistence of the earth, so that it may not tumble down. The slope F, which is on the side of the redoubt, is called, *the scarp*; and the opposite slope which is next the country, is called *the counter-scarp*. Care must be taken, in picketing the fascines with which the parapet is raised, to bring them nearer one another by degrees in raising it as at H, so as to leave the same slope on each side. The distance DE mark the banquette; the distance DC the thickness of the parapet at the bottom; the distance IL the thickness of the parapet at the top; MN the width of the ditch at bottom; AB the width of the ditch at top.

If the ground is level, the banquette of this work must be raised two feet; but in low places two banquettes are necessary, the one above the other like steps: but if this banquette is raised on account of some neighbouring heights from whence you may be taken in the rear, the parapet must be raised to such a height, that the enemy's shot can no longer plunge down upon you. A slope must be left on the top of the parapet, as IL, so that the soldiers may see round the post, and fire easily towards the country at O.

Though the square form of a redoubt which we have given the method of constructing, is almost the only one used in the field, yet it has its faults, which ought to make it be rejected, at least for those posts which ought to defend the environs equally. Experience shows us that we ought never to depend on the oblique firing of musquetry, as the soldiers almost always fire right forwards, as at A, fig. 4. and often even without taking aim. This being the case, there are large spaces opposite to the angles of the redoubt at B that are not defended, and where we may say that the enemy remains in safety. The chevalier Clairac proposes an excellent method to prevent this inconvenience, by constructing the interior edge of the parapet, like the

edge of a saw, in form of small redans, to hold a man or two in each side, fig. 6. which by the cross fire takes the enemy on the two flanks, so that there are no approaches but what are defended; but the construction of this redoubt is too tedious and complex to be executed by small detachments.

The same author prefers constructing circular redoubts as at C, fig. 5. because all the points of the circumference being equally disposed, the soldier posts himself indifferently over all; and the exterior spaces D which are defended, varying every moment, the enemy is nowhere in safety.

The circular redoubt then is the most perfect that can be constructed; but where a road or the edge of a river is to be defended, the square, or long, or triangular redoubt is preferable, because they ought to oppose the faces of the intrenchment as parallel as possible to the places they are to fire at, observing always to round the angles.

To trace a circular redoubt, after fixing the central point of the post, let a picket be fixed in that point, fig. 5.

and draw from it as center the circle EE, with a length of cord in proportion to the number of the party, to mark the interior side of the parapet; then trace another within the first, at the distance already given, to mark the banquette; then trace a third FF, to mark the exterior edge of the parapet; then trace a fourth GG, to mark the width of the ditch; which being done, picket the fascines, and make them take the bend of the circle, finishing as in a square redoubt.

If an officer is posted with a detachment on a passage or before a bridge, in a defile, or opposite to a ford, he may make a parapet either bending or straight, with a banquette or ditch which should shut up the whole entry; or he may make a redan, which is a work with two faces, and in such a situation should be made with a re-entrant angle, (that is, the angle pointing from the enemy); taking care, when he is to guard a ford, to construct it so near the river that the enemy cannot have room to form after they have passed. A deep ditch may be dug opposite to the ford, into which they should let the water of the river pass; they may likewise make the banks steep; throw trees across, and scatter chausse-traps, which are instruments of iron with four spikes, made so as to have always one point erect.

The strength of a redoubt or any other work may be augmented by blocking up the passages that lead to it; in a mountainous country, by cutting large ditches perpendicularly down, across the roads; by placing carts above one another in the defiles, with some soldiers behind them; and by throwing, wherever it is necessary, large branches of trees half buried in the ground: taking care not to break the way by which you must retire, so as to prevent your making a retreat; but on the contrary to leave an easy passage made in form of a draw-bridge, or any other way defended by seven or eight soldiers.

If detached into a level country, very deep ditches should be dug in the avenues and approaches of the post; or deep pits covered over with small branches and a little earth over them; taking care to scatter the earth that is dug out all round, so that the enemy may not be able to discover whereabouts they are; and chausse-traps may likewise be scattered in the avenues

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and on the glacis. Lastly, they may plant pickets all round the post near to one another, inclining a little outwards, six feet out of the ground, and the point's made sharp after being drove.

But the most formidable obstacle, and which is preferred by Monsieur Folard, is to shut up the defiles, to block up the roads, surrounding the post with felled trees, and sinking their trunks three or four feet deep in the earth, which must be dug on purpose, leaving a number of large branches on them, which must be sharpened at the ends, and the leaves taken away, and placed as near to one another as possible, so that the branches may mix, and taking care that they incline towards the enemy. Two or three rows may be made in this manner; but they should be at least two toises distant from each other, that the enemy may not burn them all at once, to approach the intrenchments. M. Saxe in his *Reveries* says, that redoubts are proportionably advantageous as they take less time in constructing, and are proper for numberless circumstances, where one often may serve to stop an army in a close country, hinder them from troubling you on a critical march, or to occupy a large space of country when you have but few troops.

Intrenchments are sometimes made with felled trees alone, when there is no design, or time is wanting to raise an intrenchment of earth. The trunks should be placed towards you, and very close upon one another, with the branches sharpened and pointing to the enemy. This makes a very formidable parapet, when rounded so as to prevent the enemy getting sight of your people. There is no need to mention large works, which require engineers to construct, and great bodies to defend them; but a redoubt, such as A, fig. 7. may be strengthened by filling the ditch with water, by turning a rivulet, or cutting a river or pond. If the ground is uneven, so that the water cannot be put equally in all parts of the ditch, dams should be left in digging at C; or little traverses of earth to form banks proper for keeping the water in the upper part of the ditch D, from whence it may be let run into the lower E. These banks should have but half a foot in thickness at the height D, which should be raised sharp; but a good deal more must be left below at E, by sloping the two sides pretty much. Dams likewise are made of planks or boards, as at F; but they must be strong, and supported by large stakes, so that the body of water above may not overturn them; and then they are reckoned preferable to those that are of earth.

Particular Explanation of Fig. 7. A, The ground within the redoubt. B, The bottom of the ditch. C, D, E, Dam of earth. F, Dam of planks, boards, or fascines. G, Upper part of the redoubt constructed of fascines, and the earth dug out of the ditch. H, The lower part of the redoubt dug in the earth. I, The berme or space left at the bottom of the parapet to support the earth. L, The entry of the redoubt. M, The inside of the parapet. N, The upper part of the parapet. O, The banquette. P, The glacis. Q, Rivulet from whence water may be let into the ditch of the redoubt.

But it is not only with the works already mentioned that an officer may fortify a post; there are likewise an infinity of ways to stop an enemy, to tire him, and

even to repulse him, which it is necessary that he should not be ignorant of.

All the schemes for opposing the enemy, of which we have given a detail, serve only to add to the exterior strength of posts; there are others which have some natural fortifications, such as churches, church-yards, mills, or farm-houses, &c. An officer who is sent to a post of this kind, which is detached from other buildings, ought to observe, before he begins to work, to make the inhabitants go out, and the magistrates of the nearest place to receive and lodge them. You should then intrench the house with a turning parapet, if you have people enough to defend it; but if you have only a few, you should make a breast-work of felled trees round the house, especially opposite to the angles, to prevent the enemy from undermining it. You must likewise take off the tiles and slates, lest the enemy get up by ladders and crush your people that are within. If the house is covered with thatch, it should be pulled off and burnt, as well as every thing combustible that can be found in the neighbourhood, lest the enemy make use of it against the house.

Though the house is surrounded with a parapet of felled trees, you should not fail to pierce the walls with loop-holes, about a foot from the ground, so as to discover the enemies legs, that they may not get footing on the outside. These loop-holes should be four inches wide, and three feet distant from one another; and a little ditch should be made a foot and a half from the wall within the house, to place the soldiers in who are to defend it. Other loop-holes should likewise be pierced seven or eight feet from the ground, opposite to the interstices of the lower ones, and of the same width, placing the soldiers that are to defend them upon tables, planks, or ladders; and taking care to pierce a greater number opposite to the avenues, before, and at the sides of the gate, and the angles of the house, because these are the places where the enemy usually makes his greatest efforts. If the house has an inner-court, the walls should be pierced which inclose it, so as to fire upon the enemy after he has made himself master of it.

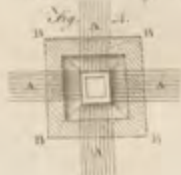
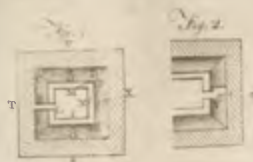
If there are several gates, they should all be blocked up except one to be left for an entrance to the post, which should be made so as to admit but one man at a time.

If there are low windows which are not grated, they should be shut up with dung, planks, stones, earth or trees. If there are any out-houses, such as stables, cellars, &c. several trees should be buried up to the branches before them, to prevent the enemy from forming, if they are about to penetrate into the house; and one or two trees should be put three or four feet within the entry, to prevent the enemy from penetrating right forward.

If there is a broad staircase for going up to the first floor, it should be broke down, or blocked up with stones or casks filled with earth. If it is a winding stair, the wall should be pierced in different places with loop-holes, to fire upon the enemy that are already entered, keeping ladders for yourselves to get up to the first floor, which should have the boards pierced with a number of holes about four inches diameter, to fire down upon the enemy, observing to pierce them only where there are no trees below, but

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A. Bell, Sculp.



to have a greater number over the door and other weak places which the enemy can force.

Loop-holes should be pierced breast-high in the wall of the first floor, with about ten inches opening, and opposite to the interstices of those immediately below. If there are not people enough to defend the windows of the first floor, they should be barricaded, to prevent the enemy from firing upon those within; and a large opening should be made in the pavement opposite to each window a little longer than the width of the window, which is to serve by way of ditch, into which you may tumble those who penetrate that way.

The same way may be done with the second and third floors, so that there may be an equal resistance over all; but instead of piercing loop-holes in the highest floor, the tiles and slates being taken away, the wall may be taken down to breast-high for the men to fire over, the stones kept to throw upon the enemy, and the rafters to throw upon the ladders which happen to be placed against the house. A post intrenched in this manner may resist a great while, and even tire out the besiegers if defended by resolute men.

Captain d'Enfernay of a French regiment, with a company of volunteers, in the campaign of 1748, took post in the church of Bevera, two miles from Ventimiglia. It is detached from other buildings, and he fortified it with a parapet and ditch full of water; but his intrenchment was commanded by some houses in the village, so that the enemy could fire down upon his party. He remedied this defect by covering the commanded part with a kind of blind made with rafters, leaning one end on the wall of the church, and the other upon posts raised a foot higher than the top of the parapet, which left room to fire through. This blind, covered with fascines and earth, prevented the enemy's fire from piercing, and did not prevent his firing upon them, so that they durst not attack him.

This example is mentioned to shew how to secure a post that is commanded by a height. When there is no redoubt or intrenchments of earth, the interior side of the parapet which is commanded should be raised, or a sort of penthouse should be made with rafters, placed perpendicularly against the inner side of the parapet, upon which planks or fascines are nailed, taking care to leave room between the bottom of the penthouse and the top of the parapet for the men to fire through.

If an officer has not time to oppose all the schemes which have been mentioned to the enemy, when the general wants to make a forage, and throws infantry into the house to form a line, he should immediately place a couple of trees across before the door, pierce the boards, shut the windows, and prepare for his defence; which gives time to the foragers to retire, and the supporting parties to advance.

SECT. III. *Of the manner of fortifying Villages.*

THE manner of intrenching which has been mentioned, is only for posts that are detached from any building; but if an officer has a village to defend, he may cut out a much harder piece of work for the enemy. When we speak of intrenching a village, it is meant only of such as have the houses collected, and sometimes surrounded with a wall. An officer de-

tached to a post of this nature, ought to go several times round it, and observe the adjacent houses before he begins to intrench, and cause loop-holes to be pierced in them: the entries of those that have passages leading to the country should be blocked up with trees; and if he has time, he should make a good parapet of felled trees, and intrench the entries of the streets.

An officer who would fortify a post of some extent, ought to make a kind of plan of the village, and the intrenchments which he intends, which will often furnish ideas of defence, which escape on viewing the country. A street is to be defended, like a ford or bridge, with a redan, described above, or with a simple parapet in a semicircle with a ditch; making loop-holes in the houses at the entrance, and deep ditches across the streets, with chausse-traps thrown into the bottom of them. The streets should be blocked up with trees, carts, and casks; you should likewise open several passages in the back parts of the houses, to keep up a communication with the different streets: but above all, if you have but few men, the middle of every open place or square must be filled with felled trees, to prevent the enemy from forming if he penetrates.

As cannon or fire are most to be dreaded in the defence of a village, an officer ought to break up the roads by which cannon can pass, which is an easy matter in a mountainous country; but if the village happens to be in a plain, large ditches should be cut across the avenues, at every little interval placing trees across that take up the whole breadth. If there is time, the joists of the houses should be propped up with trunks of trees, or large pieces of wood put up like bricklayers' hories, to prevent their tumbling down and crushing the besieged. The best security against fire, is to burn all the materials that an enemy can make use of for that purpose; but if there is a quantity of wood, straw, or hay, the general should be asked whether he chooses to have it burnt, or carried off to supply the army.

Another essential thing for an officer to attend to who is detached to a village, is to secure his retreat in case he is forced at the entry of the street, or in his first intrenchments; he should therefore choose a church or large house separate from the rest, after having dislodged the inhabitants. When soldiers who defend a post know that they have a place to retreat to, they do not think of surrendering while they see themselves in a state of obtaining an honourable capitulation. But if the houses of a village are scattered, and there are gardens or courts in the centre, they must be content with intrenching a single house, church, or churchyard, where they may be covered with an intrenchment of earth, and employ all the schemes already given in the preceding section.

If the works with which posts, especially villages, are fortified, were to be executed by the soldiers of the detachments, who ought never to be fatigued, it would be too laborious and tedious; therefore an officer should cause a number of peasants, by the appointment of the magistrate, to work alone, or jointly with a third of the party, while two thirds remain under arms to prevent surprises. The soldiers and peasants should

be

be relieved every three hours by fresh men, taking care that they have no concealed arms, and work without interruption until the work is completed.

SECT. IV. *Of going on Detachments and secret Marches.*

DETACHMENTS are particular bodies of soldiers detached from a greater body, to guard a post, or to go on an expedition.

When an officer is ordered on a detachment, he should provide himself with a cord regularly divided, in case he has occasion to entrench; and be at the parade by times, to get information from the brigade-major, whether he is destined to relieve a detachment, or to occupy a post for the first time. If to relieve a party, he is only to know where the guide is who is to conduct him; the guide is a soldier sent by the officer who is to be relieved, as orderly-man to the major-general, who by having been at the post before can lead a new detachment to it.

If it is a post that is to be occupied for the first time, the officer is to ask the brigade-major for instructions relating to its defence; which being got, he must inspect his party, and take care that every soldier is properly equipped; his firelock loaded, fresh primed, and a good flint well fixed; his cartouch-box filled with cartridges; and that he carries provision for 24 hours, which is the time that detachments commonly continue, and are not allowed to go away to eat. Care must be taken to have spades, pick-axes, hatchets and wood-bills, one or two of each kind; and if any thing is wanting, to apply to the brigade-major for it, that they may have every thing necessary for entrenching.

One general rule in military projects that depend upon us alone, should be to omit nothing that can insure the success of our design; but to that which depends on the enemy, to trust something to hazard.

When an officer has inspected his party, he ought to get information from his guide, whether the way is broad or narrow, open or inclosed; if the enemy's posts are near; if they go on patrols, or see their parties in the day; and lastly, if he is to pass mills, farms, manors, &c. and from these informations take the necessary precautions for his march.

Secret marches are such as are to be made unknown to the enemy, to reconnoitre, to surprise, or to cross a country which they occupy. It is here that a commander has need of all his prudence to succeed and not to be betrayed. Before he sets out, he ought secretly to have procured the best information of the different routes that can be taken; the situation of the enemy's posts that are to be avoided; and the kind of country that is to be passed over. For better precaution it will be advantageous for the commanding officer to be provided with a plan in the manner to be explained in the following section (fig. 2.); and likewise to take along with him one or two sure intelligent guides.

When the whole are ready to march, the advanced guard A, (fig. 8) which should consist of cavalry only, should let out. It is surprising that all the authors who have wrote on this part of the art of war, have neglected to show sufficient attention to so essential a point: the greatest part are silent, and the

rest passing slightly over the different duties of this corps, are content that it should be composed of infantry; though, on the least reflection, in the most ordinary cases of a secret march, reason must determine that none but cavalry ought to be placed there, whether it be to stop passengers who may discover your route, or suddenly to attack an advanced guard of the enemy whom they meet face to face, or to harass their corps in order to gain time for your own to form: it is inconceivable, that for all these purposes, cavalry has greatly the advantage of infantry; who are by no means capable of running here and there to seize passengers, or of pouring suddenly on an advanced guard of the enemy; or of resisting their cavalry a moment in case of a sudden encounter, when they must expect to be thrown down and trod under the horses feet, and the corps attacked before the commanding officer has had a moment to prepare for his defence.

As examples serve best to illustrate opinions that have been seldom declared, the spirited behaviour of Cornet Nangle of the 15th regiment of light dragoons merits our particular notice, and will serve as a proof of the great advantage of having the advanced guard of cavalry. In the campaign of 1761, when the French army under the command of Marshal Broglie and the prince of Soubise were retiring towards Hoxter, where they passed the Weser, Prince Ferdinand followed close after them for several days, and on the evening before they gained the pass over the river, one of Prince Ferdinand's German aid-de-camps desired the grenadiers and Highlanders who were in front, to push on and take some of the enemy's baggage, which was a little way before them and but weakly guarded. They were immediately formed, and marched in a hurry over a plain with a thick wood in front, which they were told was clear, and had got within 400 paces of the enemy's baggage, when several squadrons of French dragoons rushed suddenly out upon them from the skirts of the wood upon both flanks, and were hewing them down without mercy, when Cornet Nangle with an advanced guard of twenty men coming up the hill got sight of the attack, and instantly rushing on, charged the French cavalry, who, startled at the briskness of an attack which they were not expecting, immediately reined back; when the rest of the regiment getting in view, came on; and attacking the French, drove them off, having killed and wounded a few, and taken some prisoners. The determined bravery of this young officer with his twenty men saved a great number of the grenadiers and Highlanders from being cut to pieces, and shows what may be effected by the sudden attack of an advanced guard of cavalry.

An advanced guard by night should be of double the force of one by day. In an open country, it is a matter of indifference at what distance they advance, provided they keep in view of the commanding officer, who should continually observe them; but in covered places, and in the darkness of the night, they should not be more than 50 paces distant.

This advanced guard should have an advanced corporal B, with six horsemen divided into three pairs; one in the centre B, the two others out of the road on the right and left at CC, to examine as wide as possible, silently

Plate
CCXCIX.

Plate
CCXCIX.

silently and attentively searching all hollow and covered places, taking care that there is nobody lying on the ground, or hid in dry ditches, behind trees or bushes. At the same distance of 50 paces upon the flanks of the corps, should march two wings DD, consisting of eight or twelve horsemen, each according to the strength of the corps, led by a non-commissioned officer. They can harrafs an enemy who may happen to rush suddenly out of ambushade, and give time to the corps to form. Each wing to detach two men EE, keeping 50 paces wide from the others, and preserving the same route as exactly as the face of the country will permit. At the entrance of the wood NN, the horsemen should spread, and close again at coming out, and do the same at meeting any little hills, to examine them on both sides. When they perceive any traces of a party, they should immediately communicate it from one to another, till it comes to the commanding officer.

The advanced guard ought to march slowly, and the commanding officer at the head of the corps should follow at the same rate, so that the rear of the detachment may not be obliged to gallop. As the rear-guard H is only established for form, there is no need of its being numerous. The officers and quarter-masters should be careful to keep the men from sleeping, as a horse is easily hurt under the irregular motions of a sleeping rider, which retards the march. The whole corps should be forbid to smoke or speak; and if any one is obliged to cough or spit, let him cover his mouth so as to make no noise.

When the corps is numerous, the cavalry should march by squadrons, the infantry by platoons, to follow alternately, so that each platoon of infantry FFF may march at the head of a squadron of cavalry GGG; which disposition will preserve the whole at an equal pace, and keep them readier to form in case of meeting the enemy, or being suddenly attacked, as we are about to mention.

When the advanced guard perceives an enemy at a distance, whether it is day or night, they should not pursue them for fear of falling stupidly into some ambushade, if it is not in a country that has been well examined; but if they meet them suddenly face to face, as may happen at the entrance of a hollow way I, opening obliquely upon yours, then your advanced guard, without deliberating about their strength, should instantly rush upon them. This manœuvre cannot fail against infantry, and gives a great advantage in a rencounter with the cavalry; but if your advanced guard falls back, they expose the whole body to be defeated with them.

When the commanding officer sees the action of his advanced guard, he will instantly turn the infantry on the side of the road most proper to protect them from the enemy's cavalry, and will form them quickly at the side LLL, or on some neighbouring height MM. If it is day, they ought to face the cavalry, stooping down till the instant of the attack, while the first squadron advances to sustain the advanced guard. If the enemy appears desirous to renew the charge, and obstinate in disputing the passage, you may make use of a feint, and by falling back bring them opposite to your infantry, who will have them in the flank, and by a well-placed fire put them instantly in disorder.

Your cavalry profiting by this, must immediately face about, and fall upon them with all possible violence; which cannot fail to complete their defeat.

All villages, hamlets, and houses, should be avoided, especially by night (which is the most common time for the partisan), to avoid being discovered by the barking of dogs, or being seen by peasants who can inform the enemy. You will see equally how dangerous it is to keep the great roads by day, or to cross places that are too open in an enemy's country.

If you cannot avoid passing through a village, it should be done in a hurry, marching confusedly, very close, and filling up the whole breadth; by which you will conceal your strength from the peasants; some officers should remain at coming in, and in the rear, till the whole are passed, taking care that no one stops or withdraws. The same care should be taken at every road that opens upon your route. At the approach of every place that is covered or hollow, such as house, wood, gully, &c. they should halt till it is well examined, and continue attentive in passing it.

At the passage of defiles, bridges, or fords, the advanced guard should stop at two paces, and form till the whole corps is passed and in order. The ancients employed dogs to discover the enemy in ambushade; but it will be well to distrust such spies, and to suffer none with the corps, as there is nothing more dangerous; their disposition leading them to bark at meeting the least animal, will furnish the enemy with a thousand opportunities of observing you, before you can know where they are.

You should always detain the guides that were taken at setting out; but if necessity requires another, the quarter-master should go and take one without making a noise, and lead him a round-about way, that none of the peasants may discover either your party or route. If any of the party discover passengers in sight of the march, they should be stopped and brought to the corps, and care taken to prevent their escape.

The party should never refresh in a village, but in a wood by day, and open country by night, causing every necessary to be brought them from places in the neighbourhood, which ought to be received from the peasants at a distance, so that they can neither discover the number nor quality of your corps. During the whole time of stopping, you should not be sparing of centries, and have always six horsemen ready to secure any person by whom you imagine you are perceived; when their number becomes considerable, they should be tied together, and great care taken that none escape till the stroke is struck. The officers should be equally attentive that no soldier gets out of sight; and if they meet a deserter from the enemy, he should be conducted immediately to the corps, and then to the army, under the care of a non-commissioned officer.

When necessity obliges you to stop in the neighbourhood of some farm or hamlet, you must take possession of it, and carry off the farmer or chief of the place at going away, threatening to kill him and set his house on fire if any one stir from the place before he is released. Every horseman should take care to have a spare fore-shoe, and a peck of oats.

The best season for secret marches is the cold time of winter, when neither peasants nor their dogs stir abroad,

abroad, and the enemy are quiet, only thinking how to preserve themselves from the cold, which your people get the better of by marching. When you find yourself in the night in some stony place near a post of the enemy, and you are afraid of their hearing the noise of your horses feet, it may be deadened by stretching the men's cloaks on the ground, which was an expedient of great use to Mr Jency in Italy.

If an officer of the infantry marches a detachment to relieve a post at a distance, he should not mount his horse till out of sight of the camp, and should dismount on coming in sight of the post; but if it is only about a league distant from the army, and near the enemy, it is better to go on foot, so as to be less encumbered in case of engaging with any parties of the enemy. The men should not be pressed too much for fear of lagging in the rear, but should march close without stopping, and in as many files as the roads will permit, keeping profound silence, that they may hear any orders that are given.

An officer who marches at the head of a party ought to keep exact order and profound silence, that they may be in a state to execute whatever he may order for their defence; but in giving his orders, he should take care to do it with a firm and determined countenance, so as to make the soldiers think that he is sure of what he is about, and that nothing better can be done. When the men see their officer hesitating, or varying in his orders, they imagine he does not know what to do; and seeing him disordered, they become so. It is upon such occasions that an officer should be ready to restrain his party, and make them instantly obey. The danger is greater on a march than in an attack. Here the soldiers have their arms in their hands; and, seeing the enemy before them, are ready to engage. It is otherwise on a march; they are less upon their guard, and have not their arms in readiness: then, says Vegetius, an attack confounds them, an ambuscade disorders them. An officer ought therefore to take every precaution in examining by his advanced guard, all places that may conceal any of the enemy.

As it is difficult, or rather impossible, to examine all the villages where it is necessary to pass, and where the inhabitants are often to be dreaded more than the enemy, an officer had better avoid them if possible, by making a circuit at some distance, and coming to the road afterwards. The most experienced soldiers should be employed to make discoveries, with orders not to stop to drink or amuse themselves, to talk with the peasants, or lose sight of the detachment; but to stop every person that would pass before them, and come quickly to tell the commanding officer what they have perceived.

But as the greatest precaution cannot prevent an officer on a march from being attacked, it is necessary, as soon as he perceives the enemy, to observe if the party is superior to his detachment; whether it consists of cavalry or infantry, or both together. If it is cavalry, and superior, there is no necessity for being discouraged; but on the contrary he should profit by every advantage that offers, by gliding into land that is furrowed, uneven, cut, and difficult or inaccessible

to cavalry; or if the country is inclosed, he should line the hedges, and cheer up his soldiers by some encouraging language, while he dispatches a trusty fellow with advice of his situation to the general. If the enemy march up to him in this situation, he must do all that he can to sustain the attack, by ordering his party not to press upon one another, to keep up their fire, and not to discharge their pieces till they are at the muzzles.

Every country presents some natural fortifications which, however despicable they may seem to be, there are brave people who have defended them with extraordinary valour. The duke de Rohan in his memoirs makes mention of seven soldiers in a wretched cottage of earth near Carlet, who stopped the army of the Marshal de Themines for two days, though of 7000 foot and 500 horse.

When you have the advantage of rocks or other obstacles to the acting of cavalry, continue the route as near as possible, keeping the party close, and always ready to receive the enemy. If the number of the enemy's cavalry do not exceed your party, you may continue your route; and keeping your men close together and prepared, they will not venture to attack you. If the men could be depended on, and you could scatter them so as to leave no particular object for a body of cavalry to charge, they would have a still greater advantage; but this manœuvre is only for a small detachment, and would require particular instruction for the execution of it, which is impracticable with an occasional detachment.

If an officer sees no means of possessing an advantageous post, or of getting to the post he was detached to, he can do nothing better than to retreat to the camp, along some river or wood, to prevent being broken; but if he is so closely pursued that he cannot avoid being beat or taken, there is no better manœuvre to imitate than that of the Barbets (A); who scatter themselves, and retire from tree to tree, from rock to rock, and destroy a party, who can neither beat them, nor take one of them.

The moment of taking possession of a post is the most critical that a detachment can have; officers have been frequently attacked at the very time they thought they had nothing to do but quietly take the necessary measures for remaining in safety.

If the party which arrives at a post is to relieve another, the officer that is to be relieved gets under arms as soon as his sentries give notice of the approach of the relief. The detachment being known, they are permitted to enter and occupy the post in the room of those that are to depart; at the same time, the corporals go to relieve the sentries, and the officers and serjeants give the counter-sign, with the detail of all that is to be done at the post by day or night. He ought likewise to get information from the officer he relieves, if the enemy make incursions in the neighbourhood; if their guards are distant, whether cavalry or infantry, and whereabouts placed. After these precautions, let him guard against his post being surprised.

The sentries being relieved, the officer that is to go out must form his detachment, and return to camp with

(A) They are peasants subject to the king of Sardinia, who abandon their dwellings when the enemy take possession, and are formed into bodies to defend the Alps which are in his dominions.

with the same precautions as in coming. The new detachment remain under arms till the other is gone 50 paces; then the officer is to make them lay down their arms against the parapet, putting their haversacks against the gun-locks, to prevent dust from spoiling them, or the dew of the night from wetting the powder. In an open country without fortification, the men must not go to any distance from their arms when they lay them down in the day, and keep them between their knees when they sit round their fires in the night, with the locks inward, to prevent accidents.

SECT. V. *Of Reconnoitring.*

PARTIES ordered to reconnoitre, are to observe the country or the enemy; to remark the routes, conveniences and inconveniences of the first; the position, march, or forces of the second. In either case, they should have an expert geographer, capable of taking plans readily: he should be the best mounted of the whole, in case the enemy happen to scatter the escort, that he may save himself more easily with his works and ideas.

All parties that go for reconnoitring only, ought to be but few in number. They should never consist of more than 12 or 20 men. An officer, be his rank what it will, cannot decline going with so few people under his orders; the honour is amply made up by the importance of the expedition, frequently of the most interesting consequence, and the prospect to recommend the prudence, bravery, and address of any officer that has the fortune to succeed.

It must be evident that the success of such a commission depends upon secrecy, and that it is impossible to fulfil the intention without keeping out of sight of the enemy. It is incontestable, that a numerous party cannot glide along so imperceptibly as a small handful of men. As these detachments must finish their course quickly, it is necessary that they should consist of cavalry only; but if they are to go far, they may increase each with 30 foot, to remain in ambush about half way, in a wood or covered place, with whom the cavalry can leave their provision they brought with them.

An officer charged to reconnoitre in front, should take his instructions in writing, and set out at such time as to arrive at the place proper for beginning his observations at day-break. Every time that he has occasion to stop, the party should face toward the enemy, and send a non-commissioned officer with two horsemen to run over the neighbouring heights, and closely examine the environs. - When near the enemy, avoid stopping in a village.

The officer, and geographer who is supposed to be present, should remark every interesting particular: The heights, woods, ponds, morasses, rivulets, rivers, fords, bridges, roads, crossings, difficult and dangerous passages, by-ways, meadows, fields, heaths, gullies, hills and mountains; the distance and strength of villages, hamlets, houses, farms, and mills; what sovereign the country belongs to, and what are its productions.

If the enemy comes in sight, the officer should quickly assemble his party, though his reconnoitring be not finished, and let him retire to his infantry, if he placed any; but if not let him gain some other

place that he has chosen for a retreat. After being refreshed, let him go back with the cavalry to finish the reconnoitring; but if he was obliged to return quite to the post, he should not go back till next day. Mid-day is the time of being least incommoded, as detachments are less frequent at that hour. The commanding officer ought always to avoid coming to blows, even though he thinks himself secure of success, unless he happen to be on his return, and near to his post, so that he foresees the grand guard, hearing the firing, cannot fail to run to his assistance. If obliged to engage with a party who are cutting off your retreat, and that no other means is left of turning them, you must risk all without hesitating, by rushing on, and try to save the geographer with the fruits of his commission, especially if the reconnoitring was of importance to the general of the army, and merits the sacrificing a dozen men, which they can easily retrieve on another occasion.

When they go to have news of the enemy, they ought to approach as near as possible, but cautiously: day-break is not the time proper for such a purpose, because at that time the enemy send their different parties and patrols to make discoveries; you should therefore prevent them by approaching in the night. You may easily reconnoitre their position and extent by their fires, which they never extinguish at the head of the guards and pickets; and you may easily remark if they are about to change their position, by hearing a more than ordinary noise; besides, as it is easy to approach by night, you may discover a number of things by the light of the fires.

The officer and geographer must take care to remark every thing, and let nothing escape their memory; but the best time for the geographer is by day in the mountainous country, where they may slip along from one mountain to another, from mid-day till three o'clock, which is the most favourable time to shun parties, who seldom stir from the army at that time of the day. They must stop all who pass in sight of the party, and release none till the retreat is secure.

A partisan ought not to neglect to reconnoitre every place round his post for two or three leagues, or farther, if it is possible on the side of the enemy; and for that purpose, employ the method of Mr Jeney for getting intelligence without approaching, and taking plans and observations: so that if the enemy come to possess the country, you may have every necessary instruction for making approaches to surprise them, without having recourse to the peasants.

During the campaigns that Mr Jeney made, he often examined the enemy's posts without approaching, in the following manner, which he recommends as infeasible, he having always succeeded.

I suppose myself, says he, with my party at Soest in Westphalia A, (fig. 2.) and the enemy posted at Bervick B, two leagues from me. To know the situation of this place without stirring from Soest, I take the map of the country; and from Soest as centre, I draw a circle whose circumference passes half a league beyond Bervick. I draw a circle of the same size upon a leaf of paper, to make my plan as in (fig. 2.), and then place Soest in the centre A; and I mark all the villages which I find in the map

near the circumference, upon my plan, with the distances and bearings as they are represented in the map, making use of a pencil to mark the places DDD, so as to correct the errors more easily which the map may have led me to make.

Having thus formed my plan, with a scale of two leagues (which is the distance I suppose Bervick), I go to the burgomaster of the town of Soelt, where I cause some of the most intelligent inhabitants to come, speaking to them freely, and openly induce them to communicate all the information I have occasion for.

The better to conceal my designs, I begin my reconnoitring by Brokhufen, a village distant from the enemy. I ask the distance from Soelt to Brokhufen; if they say it is seven quarters of a league, I correct the distance of my plan which made it two leagues: then I inform myself of all that is to be found on the road from Soelt to Brokhufen; chappels, houses, woods, fields, orchards, rivers, rivulets, bridges, mills, &c. If they say that at a half league from Soelt they pass the village of Hinderking, I mark that place upon my plan. I ask if the road from Soelt to Hinderking is crossed by any other road; if there is any morass or heath; if the road is inclosed, paved, or straight; if there is any bridge to pass, and at what distance. I take care to mark every thing in my plan, forgetting nothing, even to mills, bushes, gibbets, gullies, fords, and every thing that can be got from their informations; which will probably be perfect, because one always knows more than another. I continue my questions from Hinderking to Brokhufen; and advancing by little and little, observe the same method on the roads of the other villages round, marked DDD. In this manner I cannot fail to acquire an entire knowledge of all the places; besides, I find myself imperceptibly instructed in the position of the enemy, by seeing the different routes by which I can approach most secretly.

It is plain that such a plan must be very useful to regulate secret expeditions. It is chiefly useful, not to say necessary, for a commander of a party, who can give more ample and precise instructions to his officers, by accompanying them with a copy of the routes marked out, which they can consult even in the night, if it happens to be clear; by which they will be guarded against being deceived by ignorant or treacherous guides, which occasion the mistakes of so many who go unprovided with such helps.

There is still another means to secure a reconnoitring party; which is, to compose them of people who speak the language of the enemy, and give them surtouts of the colour of a regiment of the enemy, and cockades the same. This scheme may be carried so far as to line the surtouts with the colour of another regiment of the enemy, provided that by turning the surtouts, they appear to be a different corps, and deceive guards, spies, and peasants, and confound their reports.

An officer who goes to reconnoitre a post which he intends to attack, should set out the beginning of a dark night, and give particular instructions upon the subject to those he takes with him to assist in making discoveries: such as examining the places by which they pass, to approach the post; sounding with long sticks if there are any traps or covered ditches into which they can tumble; to leave branches of trees

with their leaves on, to serve for a mark where they find any, against they come to make the attack; to observe exactly where the sentries are posted, and how many there are of them, and how far distant from one another; to advance even to the ditch of the entrenchment, and sound with a stick or plummet to know the depth of the water; to examine if the post is fraied or palissaded, made with earth or fascines, or covered with masonry; in which last case, they must observe its height, to proportion the ladders accordingly. They ought likewise to know how many men are to defend it; in what they are negligent; if they are near assistance, and have cannon. It is on all these heads you can go and examine yourself, or be informed by the reports of deserters or peasants, so that you may form your scheme of an attack. If you are only instructed by information of others, be careful how you believe people too readily who may wish to betray you, or come only in hope of a recompence. They should be questioned separately, writing down what they say; and by comparing their informations, judge of what is true or false.

SECT. VI. *Of the Defence of Posts.*

When a partisan has taken every precaution that prudence suggests in reconnoitring a place where he would fix a post, he is to take possession in the following manner. The infantry remain under arms in the middle of the place, the cavalry to patrol without, while the commanding officer, escorted by a dozen horsemen, goes to examine the environs to make his arrangements; having sent several small detachments before, to cover him in time of reconnoitring.

Having remarked the places proper for his guard, defence, and retreat, as well as the dangerous ones by which the enemy can make approaches secretly to surprise him, he should choose the most convenient in the front of his post to fix his grand guard D, (fig. 1.) which must face the enemy. He must mark the heights for this guard to place their vedettes EEEE, and regulate the number according to the exigencies of the situation. In a covered country you must not be sparing of them, and must reinforce every guard. At 50 paces before the front of the grand guard, a subaltern or non-commissioned officer with eight horsemen should be always ready to set out at K, to go and reconnoitre, when the vedettes have observed any party.

The grand guard being fixed, you should form another in the middle of the village, called the *ordinary guard*, composed of cavalry and infantry, placing sentries at the entries, and vedettes all round; the last at such distance as to see one another. A picquet should likewise be fixed before the quarters of the commanding officer, which should be near the ordinary guard and the whole corps. In the day, half the cavalry of the picquet must keep their horses bridled and ready to mount; but if the enemy is near, they must remain on horseback, the other half to unbridle till the hour of relief.

According to the arrangement we have given for composing the corps of a partisan, the grand guard may consist of a captain, a first and second lieutenant, a quarter-master, two serjeants, four corporals, a trumpeter, farrier, and 52 private horsemen. The

ordinary guard to have cavalry equal to the grand guard, with a captain, a first and second lieutenant of infantry, two serjeants, and 60 men, including four corporals, two lance-corporals, and a drummer: the picket to consist of the same number of cavalry and infantry as the ordinary guard.

If there is any dangerous place capable of covering the approaches of the enemy in the environs of the post, and out of the circuit of the patrols, there should be a guard placed there, more or less strong according to the importance of the place, and care should be taken to preserve the communication. The guards and pickets being placed, the detachment that was sent out on the roads must be called in, and then go to work to lodge the party in the gardens that open upon the country, and the commanding officer's quarters; beating down hedges, filling up ditches, and levelling a piece of ground large enough to draw up the whole corps. The horses to be put under cover in barns contiguous to the gardens; but in case there are no barns, they may substitute sheds open on one side, that the horses may go out altogether in case of an alarm.

The officers should occupy the houses in the neighbourhood of the sheds, and one of each company remain day and night with the company, to prevent any of the men from entering the village without leave, upon any pretence. The commanding officer must acquaint the officers of his having chose the place M for the rendezvous in case of a retreat; which ought to be at some distance from the village, and on the side he judges most convenient for retiring to the army. At sun-set the grand guard to return to the post and join the picket, the one half of each to mount alternately till day-break, and then the grand guard to return to the place they possessed the day before. The sentries and vedettes should be doubled, and all the passages shut up with waggons placed in two rows, except one for sallying out at, in case of a retreat, made wide enough for the passage of the patrols or the whole cavalry.

The corporals of the ordinary guard should lead the relief of the vedettes every hour, setting off together; but when they come to the passage of the post A, (fig. 1.) they must separate into two parties, the one to the right to relieve the vedettes BBB, the other to the left for the vedettes CCC; then each of them with the parties they have relieved should go on at their head a quarter of a league, by the two routes pointed out in the plan, to examine the environs, supposing an hour to each. Besides this reconnoitring, the captain of the grand guard should send two patrols in the night. To fill up the intervals, they should set one about half an hour after the corporals, and make the same round. At returning to the post, the corporals to make their report to the officer of the ordinary guard; the conductors of the patrols to the captain of the grand guard.

A little before sun-rise or sun-set, a grand patrol detached from the corps should be sent under the conduct of an officer to search the whole environs of the post minutely, especially the dangerous places, because at these times the enemy are most likely to attempt a surprise. If the patrols discover them, they will be in a state to repulse them, or at least to harass them

till the commanding officer, upon the first notice, draws up the whole corps. The officers should take great care to instruct the sentries in their duty, explaining it to them every time of their mounting, and forbid them to smoke, as the least fire can be easily perceived in the dark, and serve to direct the approaches of the enemy. No sentry to move more than 50 paces to the right, and as many to the left of his post; and let the weather be ever so bad, he must not get under cover. No one to be allowed to go out of the post without leave of the commanding officer; and to prevent desertion or marauding, the sentries and vedettes must be charged to let no soldier pass.

The vedettes must stop all passengers, and take them next to the sentry, who must call a corporal to conduct them to the commanding officer. If there are a great number passing at once, the vedette at the challenge must hasten to stop them at 100 paces, till the officer has sent to reconnoitre them; but if he finds them to be a party of the enemy, he must fire upon them and retire. At the first alarm, the grand guard and picket ought to mount, and each of them to detach a subaltern officer immediately at the head of the best mounted horsemen, to go quickly to encounter the enemy. The rest of the grand guard and cavalry of the picket to follow immediately, led by their captains to sustain the first detachments, to repulse or keep back the enemy as long as it is possible, and give time to the commanding officer to form the whole corps.

If the commanding officer observes that the enemy are of no very extraordinary force, he must without hesitating put himself at the head of his cavalry, and instantly charge them, pouring upon them with his whole force, which is the best way to succeed; and in the mean time, the infantry should form to sustain the cavalry. One essential circumstance should not be forgot here, which is, that at the going of the detachments of the grand guard and picket, all the infantry of the picket should march immediately to the place appointed for the rendezvous in case of a retreat, and a strong detachment of cavalry should follow to occupy the place. If it is at the entrance of a wood or some covered place which the enemy may occupy, and thereby cut off your retreat, you must prevent it by fixing the infantry of the picket in the post, to remain day and night, with a lieutenant at the head of 20 horsemen to clear round it. If the enemy is too superior, and appears to form an attack on that side, the commanding officer should get there before with all his force to oppose them, till all his detachments join, and then regulate his retreat, as will be seen in the section of the Retreat.

To be better secured in a post which you expect to remain in for some time, and where you find that the enemy will not fail to disturb you, it will be proper immediately to employ some of your people with the peasants, to form some intrenchments in a hurry in the most dangerous places, to have breast-works of felled trees in the woods; herbes placed in the fords; pits dug at the entries and plains without defence; so that the cavalry coming full speed to charge you, may tumble in. If there happen to be a bridge either in the front or on the flanks of the post, as at N, by which the enemy can facilitate their approach or retreat, it must be instantly destroyed, unless you find it

may be of use, and necessary to fix a good guard on it.

To regulate the attack and defence most advantageously, you should take care to observe the places by which the enemy can approach, and form a plan of operations for cutting off, or taking in flank the different routes which he can attempt. You should inform your officers, and not fail to hearken to the advice of those, whose talents, genius, and experience, render them competent judges of your designs. These arrangements will be of great use in surprising the enemy's parties, who will come from time to time to reconnoitre the post. If the enemy approaches in the night, take care how you attack him; you cannot reconnoitre his force, and you ought to suppose that he is informed of yours.

Do not suffer any suspected woman to approach the soldiers; their visits are dangerous in debauching your people, and the enemy frequently employ them to discover your strength. Let no deserter stop in your post; and if he comes in the night, keep him till day-break is near, and then send him to the army. Every party that approaches your post will profess belonging to you; but if they are not provided with a proper passport from the general, or if you do not know any of the officers, trust neither to their word nor uniform; desire them politely to return the way they came, telling them, that if they do not, you will treat them as enemies; and take care that your party remain under arms till they are out of sight of all your guards.

Even if it is another party of your army approaching your post, as soon as you are acquainted with it, you ought to reconnoitre them, and follow or receive them with all the attention which war requires.

When a partisan has taken all these precautions, he may reckon himself secure of never being surprised. If in a country the most exposed, or the most covered, by executing every point of the service as has been mentioned, the enemy cannot approach your post nearer than a quarter of a league without your being informed by the noise of the vedettes and patrols, who cover your post day and night more than a quarter of a league round, which is sufficient to guard against surprise, five minutes being sufficient to form, and ten being still left to deliberate upon the part that is to be taken, whether to attack, defend, or retire.

When a partisan happens to establish his post in an enemy's country, it is then his duty to take care of the subsistence of his corps, and to take every proper measure to provide his people with necessaries: for which reason he should send some parties as far as possible towards the enemy, to summon the chiefs of the villages to deliver forage and provisions in proportion to their abilities, taking care to be sparing of the nearest places, and more particularly of the post itself, which ought not to be touched but in the greatest extremity. A partisan cannot be too diligent in giving the general an account of his position, projects, success, and all his operations, and therefore will take care to preserve his communication with the army.

These instructions may serve for the corps of a partisan according to the proposed arrangements; but partisans of less force must regulate their precautions according to their strength; and detachments of 30, 50,

or 100 men, will seek to post themselves in redoubts proportioned to their number, or in mills, farms, hamlets, detached houses, churches, church-yards, &c. observing that the more a post is extended, the more care and fatigue it requires.

The principal object for an officer that is detached, says Monsieur Vauban, is to foresee every troublesome event. The want of exactness, and the smallest relaxation in the service of out-posts, may have the most fatal consequences; and history furnishes a thousand examples of camps being surprised, and armies cut in pieces, by the negligence of detachments that ought to have watched for their preservation.

The manner of relieving detached posts has been mentioned; but if an officer is detached to a mill or house, let him draw up his party about 15 or 20 paces from the post, and send a serjeant or corporal with five or six men to search the chambers, cellars, and bars: which being done, the sentries must be placed, the post taken possession of, the arms ranged so that every one can find his own without confusion, and the inhabitants lodged in some other house; and then entrench himself according to the rules given.

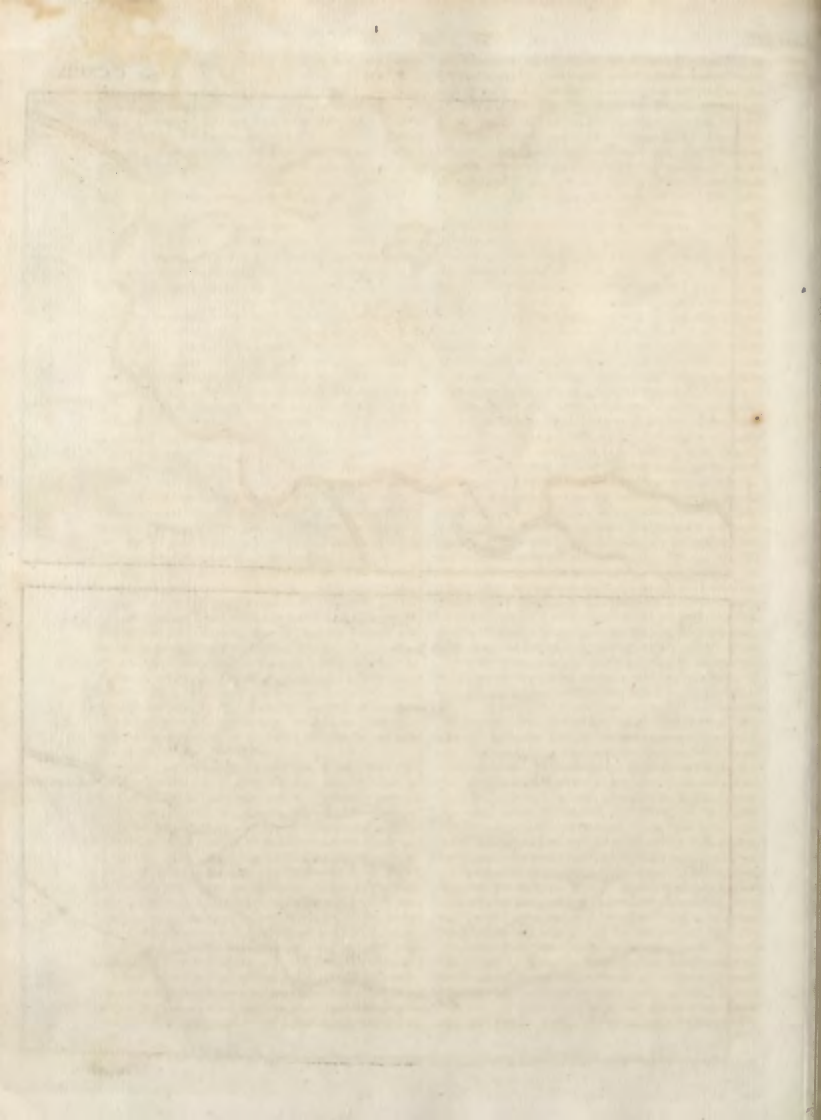
If an officer is to fix in a village where it is difficult to examine every place where the enemy may lie in ambush, he should fend for the magistrates to come and speak with him, while his party remain drawn up at the end of the village, that they may declare if they know whether there are any of the enemy's parties, suspected persons, or concealed arms in the place; which being done, the sentries are to be placed, and the party to take possession; putting small detachments of five or six men, more or less, according to the strength of the party, at the avenues; and examining the church, or any detached house, to make the principal post in case the advanced posts are forced. The men best acquainted with the duty should be planted on the most exposed and distant places, so as to see all the approaches; and sometimes in trees, that they may see at a distance, and remain concealed from the enemy.

If he finds any place near him where the enemy can lie concealed, he should place a corporal with six or seven men there, with orders to fall back upon his post if attacked, or remain till they find themselves disengaged. The soldiers of this lesser post should take care to make no fires, because it would serve for a guide to the enemy to avoid them when they want to fall upon the principal post; but fires may be lighted in the places where they have no guards, to make the enemy think they have them every where, at the same time placing soldiers in ambush where there are none lighted. This scheme may serve for all posts in a level country, where two or three soldiers should be kept going all night to stir up the fires.

The exterior arrangements being made, and sentries placed on the avenues, bridges, and steeples, the works for fortifying the post should be marked out, and executed by the workmen, and the magistrates ordered to send straw to the nearest houses for lodging the soldiers, who must never absent themselves. The officer must always be in readiness to go where his presence may be wanted, and make his serjeants and corporals frequently go the rounds.

Monsieur Vauban says, that if an officer is to remain but four hours in a post, he ought to intrench; and he should





should cause the works which are to be constructed to be well executed, so as to defend every place where the enemy can come. Monsieur Folard gives an excellent maxim, to attack an imaginary post, that we may be able to defend a real one. And the Baron de Travers says, that with regard to the strength and means of resistance in posts, they should be in proportion to the force the enemy can bring against them. If to pass only some hours in a post, it is a good way to make a parapet of felled trees; or if it is in a village, to intrench a detached house.

The way to guard against being surpris'd, betray'd, or made prisoner, is to take precautions against all that the enemy can undertake; and whatever distance he may be at, we ought not to found our security on probabilities, but extend them even to possibilities. Neither stranger nor soldier of any other party should be admitted into the post; and the roll should be call'd three or four times a-day, that the men may not absent themselves: he should likewise examine the sentries, to see whether they are acquainted with the detail of their duty, and should show them how to defend themselves in case of being attacked; observing to them, that if the enemy make such a manœuvre, they should oppose such another; if they try this scheme, to resist with that, and deceive them at every step. He may make some of them try to scale the intrenchment, to show the difficulty of mounting it; and by exercising them in this manner, he will prepare them to resist the enemy; it will flatter their vanity, and give them a confidence in him. But let him take care not to be too familiar, lest in a brisk attack he orders something not to their mind, when, instead of obeying, they will resist his orders, and mutiny; but when he has shown his soldiers the advantage of a party that are entrenched, over those who are exposed in the attack, he must take care to preserve subordination, and not allow himself to fall into the snares of the enemy.

An hour or two before day, the men should be kept alert, sitting on the banquette near their arms; and the patrols sent at that time, rather than in the night, to march slowly, to listen attentively, and examine every place round the post where a man can conceal himself.

It frequently happens that two armies are encamped opposite to one another, and have several posts on the same line, and two patrols meet in the night. As it is impossible to distinguish whether they are friends or enemies, they who first discover the others, should conceal themselves on the sides of the road, behind bushes, or in a ditch, to examine if they are stronger; and in that case to let them pass in silence, and return another way to the post to tell what they have seen: but if they find them weaker, he who commands the patrol should make the signal which is ordered for the patrols of the night, which is commonly a stroke or two on the cartouch-box or butt-end of the fire-lock, which is answered by an appointed number; but a word is the safest. If the patrol does not answer, they should advance upon them with fixed bayonets, fire upon them if they see them retiring, and make them surrender. In the war of 1745 in Italy, there were old soldiers who used to beg for this employment, and took pleasure in it.

If detached opposite to the enemy, it is to be pre-

sumed that you may be attacked: therefore small detachments should be advanced between the sentries in the night, about 30 or 40 paces from the post, with their bellies on the ground, in these places where they imagine the enemy may come; with orders to those who command these detachments, to make a soldier reconnoitre any parties that are seen, so as not to confound their own patrols with the enemy's parties, and to retire to the post on the first firing.

In villages there should be great care taken of suspected persons, or of the peasants revolting; and for this purpose, you should make the magistrates order two peasants, the best known in the place, to be put on duty with the sentries of the party, at the passages left in intrenching. These peasants, whom the magistrates must cause to be relieved every two hours, should be charged to recollect all who pass out or in of the village; and both one and the other must be told, that they shall be answerable for all the accidents that may happen from the treachery or negligence of those sentries who have let enemies in disguise enter the village.

They must likewise order the soldiers who guard the intrenchments, to let no peasant approach, and to shut up the passages with two trees across in the night, and not to open them till day, except for the passing of the patrols. They must examine with iron spits, or their swords, all carts that pass loaded with hay, straw, or casks, or any thing that can conceal men, arms, or ammunition.

The inhabitants should be prevented from making processions, holding fairs or markets; because under favour of these assemblies the enemy may often enter and seize posts.

An officer cannot watch too carefully to prevent schemes that may be contrived against him; and the attempt on Brisac, in the month of November 1704, is so much to the purpose, that it ought not to be passed in silence. The governor of Fribourg having formed the design of surprising Brisac, set out in the night of the 9th or 10th of November, with 2000 men, and a great number of waggons loaded with arms, grenades, pitch, &c. and some chosen soldiers: all these waggons were drove by officers disguised like waggons, and were covered with perches, which had hay placed over them, so that they appeared like waggons loaded with hay coming in contribution. They arrived at the new gate by eight o'clock in the morning, under the favour of a thick fog: three waggons entered the town, two full of men, and one with arms, when an Irishman, an overseer of workmen, observing 30 men near the gate, who, though they had the dress, had not the manner of peasants; he asked them what they were, and why they did not go to work like other people. Upon their not answering, and appearing confounded, he struck some of them with his cane; upon which the disguised officers run to the arms which were in the waggon next them, and fired 15 or 20 shot at him within half a dozen paces, without wounding him. The Irishman leaped into the ditch, where they likewise fired several useless shot at him, while he called *To arms, to arms*, with all his might.

At this noise, the guards of the half-moon and the gate run to arms, and would have pulled up the draw-bridge, but were prevented by the waggons which the enemy had placed upon it. The officers and soldiers

who

who were in the waggons, rushed out with their arms, and having joined the rest, attacked the guard commanded by a captain of grenadiers; but being repulsed, and five of them killed, the rest were dismayed, and fled either into the town, or out into the country. The captain of the guard made the first gate, which was a grate, to be shut, across which the enemy, who were upon the bridge, fired at all who appeared; and having left the half of his guard, he mounted the rampart with the other half, and continued firing upon the enemy. A lieutenant who commanded 12 men of the advanced guard, was attacked at the same time by an officer who presented a pistol to his breast; but snatching it from him, he fired it at him, and killed him: this lieutenant defended himself to the end of the action; but having received several wounds, he died that day.

Upon hearing the noise of the surprise, the commanding officer of the place distributed his garrison to their proper posts: and having made every disposition necessary for his defence, the enemy saw that their design had failed, and retired in disorder, leaving a number of waggons behind them, and more than 40 soldiers who were killed or wounded. Such was the enterprise on Brifac, which failed by a trifling accident.

Another example will prove how necessary it is for officers in detached posts to take every precaution. Captain Vedel being detached to a village, where the curate of the parish had obtained leave from the commanding officer in the country to make a procession of the penitents of a neighbouring convent to a chapel in the village which he named, alleging that it was an annual custom: but captain Vedel, astonished to see such a numerous procession composed of the peasants, called to arms, and having drawn up his party of 50 men, disconcerted their scheme. Many of the penitents whom he stopped, were found armed with pistols and swords; with which he acquainted the commanding officer, who immediately caused the curate and several of the penitents to be hanged.

This example, and many others which might be cited, show that an officer who commands in a post cannot be too much on his guard to prevent his falling into the snares which the enemy prepare for him, as the seizing of a post, of however little importance it may seem, may be attended with the most troublesome consequences.

Henry IV. of France lost Amiens in Picardy by a waggon letting fall a sack of nuts as if by accident; and when the soldiers of the guard were picking them up, the Spaniards, who had disguised themselves like peasants on purpose, rushed out of a house near the gate where they had been in ambush, put them to the sword, and carried the town.

These instances, with many that could be mentioned, show that we cannot be too distrustful of the numberless ways there are of being surprised. If peasants come to visit their friends or relations in the village, the sentries should stop them, and acquaint their officer, who should not allow them to enter till the magistrates, curate, or responsible inhabitants, answer for them; and this permission to be granted only on working days, and not on Sundays or festivals, on account of their being unemployed these days.

In an enemy's country, the inhabitants are always

ready to revolt and betray; therefore the commanding officer ought to take one or two of the magistrates children, or three or four of the most considerable families of the village, and keep them in the principal post as a pledge of the fidelity of the inhabitants. The children (to whom they should take care to do no manner of hurt) should only be kept half a day each, and changed for some others. The commanding officer should forbid the inhabitants to assemble in taverns or public walks, or any place whatever, and cause these orders to be fixed up at the door of the church. If they are seen to stop and converse at coming out of church, or in the market-place, let the patrols oblige them to retire. The tavern-keepers and all the inhabitants must be forbid to receive any stranger without acquainting the commanding officer. None to be permitted to stir abroad after retreat beating, on pain of being killed by the sentries who see them, or stopped and conducted to dungeons by the patrols; who ought to march slowly, stop from time to time to hearken if they hear any noise, go over all the quarters that are marked out to them, and give an account of any thing they have discovered that can cause any alarm in the post.

If fire breaks out any where, or the inhabitants quarrelling among themselves, an officer should take care how he sends a party to their assistance, because these are frequently snares of the enemy to divide the strength of a detachment on purpose to attack them; he should therefore ring the alarm bell, make all the different posts get under arms, and order those who command them, to make the soldiers remain armed against the parapet, so as to observe what passes without the village. The soldiers of the principal post should likewise get under arms, and the officer detach four or five men with a sergeant or corporal to part the fray, or set the inhabitants to work in extinguishing the fire.

As all the necessary precautions for the safety of a post are too many to have them executed by giving them verbally, the commanding officer should give his orders in writing, and have them fixed up in all the lesser posts. One thing to which officers who are detached to a village should give particular attention, is, not to vex the inhabitants by making them furnish too much: whatever they are allowed by the general to exact, such as firing, forage, candle, &c. for the guards, should be demanded in proportion to the abilities of the inhabitants; and an officer cannot be too delicate in preserving the character of a gentleman in ordering contributions, and preserving the inhabitants from being robbed, or treated ill by the soldiers.

It is not sufficient for the preservation of a post, to raise intrenchments, nor to take every precaution against being surprised. As the enemy must attack with a superior force, your dispositions must be made in such a manner as not to confuse one another, and every one being properly placed, contributes to the common safety.

If it is a doubt, or other intrenchment of earth that is to be defended, seven or eight trees with their branches should be kept in reserve, to throw into the breaches the enemy may make, and the parapet kept well lined with men, who ought not to fire till the enemy are on the glacis. They should be provided with

with grenades to throw in the midst of the enemy who have jumped into the ditch, may even ashes or quicklime, whose burning dust cannot fail to blind the enemy, should be had if possible. If the strength of your detachment will admit of it, eight or ten soldiers should be placed in the ditch (on the opposite side from the enemy), so divided as to take the enemy on the flanks, who have jumped into the ditch. This kind of sally, by running round upon the right and left at the same time, must astonish an enemy who could not dream of being attacked.

If there are heights from whence the enemy can crush your people with stones, they must be occupied with eight or ten men covered with a breast-work, to prevent the enemy from possessing them, or guard against them, as has been formerly directed.

In the defence of houses, mills, &c. as well as regular fortifications, the men should be made acquainted with the different manœuvres they may employ for their defence; without which they do not foresee the intentions of their officer, and may counteract one another by their being in disorder.

The obstinate defence of a post is the action where an officer detached singly can acquire the greatest glory; the resistance not proceeding from the number of soldiers destined to defend it, but from the talents of the officer who commands. It is in him that the strength of the intrenchment lies; and if he joins to determined bravery the abilities necessary on these occasions, and can persuade his soldiers that the lot the enemy prepares for them is a thousand times worse than death, he may be said in some sort to have rendered his post impregnable.

When an officer who is posted in a redoubt is attacked by the enemy, he needs not to be employed in firing himself, but in seeing that the soldiers do their duty, and do not throw away their fire in the air. If he sees their ardour slacken in the rage of the attack, he must encourage them; if he sees the enemy making greater progress on one side than the other, he must weaken one to support the other: this movement may be dangerous, and it were better to have a small reserve in case of need; but an officer with a small detachment that can scarcely line in the parapet, cannot spare men for a reserve, but must employ every means they have been preparing for their defence, as directed above.

In the defence of detached buildings, there are so many different retreats, that it becomes an arduous task to succeed in an attack, when brave people are to defend them. They have the loop-holes on the ground floor to defend, when beat from the intrenchments without, and may resist great numbers, by retiring gradually to the different floors of the house, where they should have large buckets of water provided to throw upon the enemy, which, though it may appear trifling, is one of the most disagreeable that can be opposed to the assailants; for at the same time that it wets their powder, arms, and cloaths, it hinders them from seeing what is doing above, prevents every scheme for setting fire to the house, and may oblige them to desist from the attack.

The Chevalier Folard in 1705 had a small country-house near Brescia to defend with four companies of

grenadiers, against the chosen troops of Prince Eugene's army, who were obliged to retire after penetrating into the court.

The prince of Wirtemberg, says Monsieur Folard, believing that there were succours coming to us, imagined that if he could get possession of a pigeon-house, from whence a very hot fire was kept up, the post would soon surrender: he therefore caused it to be attacked; and our soldiers having taken away the door to light a fire within, the officer who commanded below being wounded, and not able to resist the firing which was levelled through the door-way, was made prisoner. There were seven grenadiers on the top of the pigeon-house, who were summoned to surrender, but who thought themselves too well posted to submit so soon: they therefore replied that they would not yield till the pears were ripe, as they were capable enough of holding their post; and accordingly kept a constant fire upon the enemy, till the prince of Wirtemberg retired, and left the place covered with dead.

Having formerly observed that the defence of a post does not depend upon the soldiers who are destined for that service, but upon the officer who commands, the following example may serve to confirm the observation, and will at the same time show the utility of having stones collected to throw over upon the enemy, as formerly recommended.

In the month of September 1761, captain-lieutenant Alexander Campbell of the 88th regiment, with 100 men under his command, was pitched on to defend the remarkable post near Cassel in Hesse, called the *Hercules*. Monsieur Roziere the celebrated partizan and engineer of Marshal Broglie's army, with 600 infantry and four squadrons of cavalry, arrived in the neighbourhood of the post the morning of the 22d; and having beat a parley, surrounded and carried off the two men who were sent out to receive the message. After having examined them separately, he caused a detachment, under cover of his musquetry from a hill that was opposite to the principal passage, to advance and mount the stair, three men abreast; which they did so slowly and without any interruption, that the whole stair of about 100 steps was full of men, when Captain Campbell (who had made an excellent disposition for the defence of all the parts of his post), having some chosen men at each side of him, waited to receive those who advanced first upon their bayonets, and firing at the same time, gave the signal for the rest to throw over large stones which he had collected and disposed for that purpose; which made such havoc, that Monsieur Roziere, startled at the unexpected reception, and despairing of success, wished to get his party off. Captain Campbell seeing the destruction of the enemy without a man of his being hurt, and that he could renew the reception as often as they choose to repeat the attempt, was elated with his success and encouraging his men, when he happened to move from the wall that covered him, and received a musket shot from the opposite hill, which entered a little below the left temple and came out at the same distance below the right; upon which he fell, and the party beat the chamade and surrendered. After two hours possession the French retired, carrying off the prisoners, and leaving Captain Campbell, whom they thought

thought dead, to be saved by our troops, who soon took possession again, and sent him to be recovered, and to display new merits in his profession.

Vegetius very particularly recommends the collecting of stones to throw over the walls, and it is certain that nothing better can be done against an escalade; though they should have some long forked sticks to pass through the loop-holes and overset the ladders, while they shower down tiles, slates, stones, ashes, and lime, as well as the rafters from above.

If the enemy take cannon to force the post, it does not appear how it can be resisted, unless the house is low, and they cannot range round the entrenchments, as every shot can make a large opening in bad built houses, and may crush the besieged. The only means then to shun being massacred is to capitulate, or to rush out briskly upon the enemy when they least expect it. The first is not resolved upon but when the honours of war can be obtained, which is to march out with drums beating to return to the army with a proper escort. But if this capitulation cannot be obtained, the besieged having nothing left consistent with true bravery, but to rush out sword in hand, and cut their way through the enemy. The necessity of conquering changes the brave man into the determined soldier, which gives him the means of retiring to the army or some neighbouring post.

It was by a manœuvre of this kind that Marshal Saxe saved himself at Chrachnitz, a village in Poland, where a party of 800 horse had a design to carry him off with 10 men that were his attendants. The marshal, after having resisted a long time in the chambers of the inn where he was, and seeing he could hold out no longer, rushed out upon them in the night sword in hand, fell upon one of the guard who did not expect it, run him through the body, and retired to Sandomir where he had a Saxon garrison.

If a post is to be abandoned when it can be no longer held, and you are going to make the fall, you should continue to fire with spirit, taking away barricades from the door through which you are to pass with as little noise as possible. When they are assembled, the whole party should go out close together, rushing with their bayonets to the place the officer thinks the least guarded. You ought never, says Mr Polard, to wait for day to execute these sallies, which cannot succeed but in a dark night, by which you easily conceal from the enemy the road you have taken; for which reason you should not fire, but open to yourselves a passage sword in hand, lest the enemy come where they hear the noise.

The Baron de Travers says, that not to be met by the enemy we should take the contrary way to that he expects us to take, and which it appears we ought to take: a small party can hide themselves every where, and as it is not common to search places on the enemy's side, there they are most secure, and may pass the day, to take another road under favour of the night.

Officers should be attentive to distinguish between the true and false attacks, and not despair when beat from their first entrenchments. The defence of posts is so easy, that it is surprising they do not hold out longer than they commonly do. There wants only resolution and vigilance, taking every advantage of the ground, and persuading the soldiers that nothing but

the most manifest baseness can let the enemy penetrate. The example of Cremona, surprised by Prince Eugene in 1702, will remain a proof to posterity of what determined bravery can do; and show, that though an enemy is master of half the ramparts, and part of the town, he is not master of the whole.

Prince Eugene having formed the design of surprising this town, which was defended by a garrison of French and Irish, got some thousand Austrian soldiers admitted at a secret passage by a priest. These troops seized the two gates, and a great part of the town; the garrison buried in sleep were waked by the assault, and obliged to fight in their shirts; but by the excellent manœuvres of the officers, and resolute bravery of the men, they repulsed the Imperialists from square to square, from street to street, and obliged Prince Eugene to abandon the part of the town and ramparts of which he had been in possession.

What then can be the reason they do not defend posts and villages as well now-a-days, especially when they have secured a retreat fit for making a good defence, or obtaining an honourable capitulation? It seems to proceed from their not applying enough to know the causes of the misfortunes they fall into, and being unacquainted with what has happened to those who have gone before. The people who attack have nothing supernatural in them, and are not different from those who are attacked.

Posts have often resisted the first and greatest efforts of the assailants, and have yielded or been abandoned to subsequent attacks, though much less spirited. How comes this? It is owing to an officer's not daring to abandon his post at the first attack: he repulses the enemy, because if forced they will be put to the sword with their whole party; but when the enemy comes back, he thinks he has nothing to reproach himself with, having defended it for some time, so retires, or surrenders. Since he could repulse the enemy when in good order and quite fresh, how much more easy and less to be dreaded when they return harried with fatigue?

Is not the great cause of misconduct among military men the want of encouragement to excite emulation? An officer who is not protected, who is never sure of the least favour, neglects himself, and takes less trouble to acquire glory, rarely heard of, though merited by the bravest actions, than to enjoy the tranquillity of an ordinary reputation.

It is not expected that an officer who is placed in a post should seek to engage; but that he should steadily resist when he is pressed, and die rather than abandon his entrenchment.

Historians have been very silent about posts being well defended; though the lessons to be drawn from them may be more generally instructive, and as agreeable to read, as those left us of the best fortified places of a state. We are astonished at the account of 100,000 men perishing before Ostend in 1604, and their general, the Archduke Albert, with the ruins of his army, not making himself master of it, till after a three years siege: nor is our wonder less, to see Charles the XII of Sweden, in the year 1713, with seven or eight officers and some domestics, defend himself in a house of wood near Bender, against 20,000 Turks and Tartars.

Several historians mention the defence of this house because it was done by a crowned head; but brave actions, whoever are the authors, should never be buried in oblivion, as they excite emulation, and are full of instruction.

SECT. VII. *Of the Attack of Posts.*

ALTHOUGH the taking of a post is always difficult when you have to do with people who know how to defend it, nevertheless you may succeed in attacking them by surprise and stratagem. We ought never to form a scheme for an attack upon simple speculation, because from reasoning we often think things are feasible, which we find impossible in the execution. When you intend to undertake an action of this kind, you ought to form a just idea of it, by examining all the branches separately, and the different means you can use, so that, by comparing them together, you may see if they concur, and answer to the general purpose; and lastly, you are to take such measures as may in a manner render you certain of success before you begin.

As it is not the practice of the army to choose a particular officer for the attack of an entrenched post if he does not offer himself, so an officer should not embark in such an enterprise, without having examined the means of succeeding, and being capable of showing the general a plan of what he has projected, to see if he will consent to the execution of it. If the general approves the plan, he must beg leave to go to reconnoitre the post with a man or two, that he may take his measures more justly for the execution of it.

When he has been to reconnoitre, as is directed in a former section, and has got every necessary information, he should go to give the general an account of his discoveries, and receive his last orders for the attack, for the soldiers of his party, and for those who are to march to sustain him.

The choice of men that are to go upon the attack of a post, is so much the more essential, as the success of the enterprise depends on it. None but volunteers of determined bravery ought to be taken, men who are not stupid, and have no colds upon them; because he who does not attend to the orders of his officer, runs on with blind zeal; and he who coughs or spits, may discover the party to the enemy's sentries, and cause the best concerted scheme to fail. As to those who are to support them, they may be taken according to their rank in the guard or detachment, as the general judges proper.

The disposition for an attack must depend on the discoveries that are made, so as not to be obliged to return in the midst of the execution. The men being chosen, they must be inspected, to see that nothing is wanted which can contribute to their success; because, if the post is fortified with an entrenchment of earth or fascines, the two first ranks should be provided with spades and pick-axes beside their arms; if fraised or palisadoed, they must likewise have hatchets; and if covered with masonry, they must have ladders.

The men should be in their waistcoats, to be less constrained. If they propose to make one or two true, and as many false attacks, so many platoons must be formed of the chosen party, as they are to

make true ones, and the sustaining party to make the false attacks, so as to divide the enemy and share their fire. A man must be placed at the head of each platoon, who is capable of commanding them, and, if possible, the same who had been employed before to make discoveries, as he may more easily guide the division. The orders which should be given to those leaders, are to march together to the place where they are to separate, and then each to go to the spot which is appointed for them, in the neighbourhood of the post, and wait there, with their bellies on the ground, for the signal to jump into the ditch and scale the post.

If you are to be conducted by spies or guides, they should be examined about every thing that can be of use, before they are employed, especially about the road by which they propose to conduct you. The reason of this is, because we often see simple people, animated with the hope of gain, imagine they can easily lead a party, when they have only a great deal of good-will; but if you find in those who offer all the necessary qualities, you must immediately secure them to you as much as possible, by making them dread the destruction of their houses, and pillaging their goods, if they lead the party into a snare; you may likewise ask their wives and children as pledges of their fidelity, and, the moment of setting out, place them between the corporals of the first rank, tied with a small chain; which precaution is the more essential, as traitors have often been known, on pretence of conducting a party to seize a post, to have led them where they have had their throats cut in the middle of the night, and have disappeared at the very moment of its execution. If you make your guides hope for a recompence proportioned to their services on one side, on the other you must make them fear the cruellest punishment if they do amiss.

The night being the most proper time to march to the attack of a post, you should set out soon enough to be ready to make the attack an hour or two before day. Care must be taken that it is not moon-light when you propose making the attack; the soldiers ought to march two and two, with the least noise possible, especially when passing between the enemy's sentries: you must likewise recommend to them, neither to speak, spit, or smoke. The detachments must get as opposite as possible to the salient angles of the entrenchment, as it is probable that they will be the least defended by the enemy's musketry. If a patrolle of the enemy comes while you are on your march, or ambushed in the environs, you need not be alarmed, nor make the least motion which may make the enterprise fail, but remain concealed in the profoundest silence, that the patrolles may pass without perceiving any thing, and afterwards pursue your design.

If the post which you want to carry is a redoubt with a dry ditch and parapet of earth, your two first ranks must have spades and pick-axes, with their arms slung, and, on the signal being given, jump into the ditch together; because it ought to be a general maxim in attacking a post, to strike all at once. When the first rank have jumped down, the second must stop a moment, that they may not fall upon the shoulders or bayonets of the first. The two first ranks having got into the ditch, they should immediately run to sap the angles of the scarp and the

parapet of the redoubt, to facilitate the mounting of the rest of the party; the leaders of each division should observe at the same time, that the soldiers who remain armed with their firelocks, and who have likewise leaped into the ditch, do not interrupt those who are demolishing the scarp of the redoubt, but protect them by presenting their bayonets to the right and left, and be ready to repulse any of the enemy that happen to be placed in the ditch.

If the parapet is raised, they should break as many of the fraises with hatchets as is necessary to let the men pass. When the breach is made, the workers should drop their working tools; and taking their arms from the slings, mount up with fixed bayonets, and rush upon the enemy huzzaing.

When you march to attack a redoubt or such post, where the enemy have a connection with more considerable posts, the commanding officer should charge on that side, so as to cut off the communication. People who see themselves briskly attacked without hope of succour or retreat, will very soon beg for quarter.

When the scarps and parapets are of stone, they can only be carried by scaling; but you may succeed by being brisk in surrounding and sustaining the attack. An officer who is to attack a post of this kind, should take care that his ladders are rather too long than too short, and to give them in charge only to the stoutest of the detachment. The soldiers should carry these ladders with the left arm passed through the second step, taking care to hold them upright at their sides, and very short below, that they may not dislocate their shoulders in leaping into the ditch.

The first ranks of each division provided with ladders, should set out with the rest at the signal, marching resolutely with their firelocks slung at their backs to jump into the ditch. When they are arrived, they should apply their ladders against the parapet, observing to place them towards the salient angles rather than the middle of the curtain, because the enemy have less force there. They must take care to place the ladders within a foot of each other, and not to give them too much nor too little slope, that they may not be overturned or broken with the weight of soldiers mounting upon them.

The ladders being applied, they who have carried them, and they who come after, should mount up and rush upon the enemy sword in hand. If he who goes first happens to be overturned, the next should take care not to be drawn down by his comrade; but on the contrary, help him to pass between two ladders, and immediately mount himself, so as not to give the enemy time to load his piece.

As the soldiers who mount the first may be easily tumbled over, and their fall may cause the attack to fail, it would perhaps be right to protect their breasts with the fore-arms of light cuirasses; because if they can penetrate, the rest may easily follow.

The success of an attack by scaling is infallible, if they mount the four sides at once, and take care to shower a number of grenades among the enemy, especially when supported by some grenadiers and piquets, who share the attention and fire of the enemy.

During the siege of Cassel, under the Count de la Lippe, in the campaign of 1762, a young engineer undertook to carry one of the outworks with a much

smaller detachment than one which had been repulsed; and succeeded with ease, from the use of grenades; which is a proof that grenades ought not to be neglected, either in the attack or defence of posts.

If the ditch of a post is filled with water, and but middle-deep, that should not hinder you from jumping into the ditch to attack, in the manner that has been mentioned; but if there is a greater quantity, and you cannot pass, the soldiers of each platoon should carry fascines, or faggots of small branches well bound, and made as large as possible, to fill up the ditch, and make a kind of ford, so as to get at the parapet, either to demolish or scale it.

Many ways of filling up the ditch, recommended by different authors, might be mentioned; but the fascines are preferable to them all, as the soldiers can easily carry them before them, march quicker, and make use of them as a defence against musketry, and, reaching them from hand to hand, soon make a ford.

If the approaches of the post are defended by chevaux de frise, the first and second rank of each platoon must break them down with hatchets; or with iron grapplings tied to ropes, they may pull them to them, and separate them. If it is a breast-work of felled trees, you must have fascines thrown against the points, or upon the branches, upon which the soldiers can easily pass. If there are two or three rows, you may burn them with dry fascines lighted at one end, and thrown in the middle row. In case of trying this last scheme, the soldiers must retire to a little distance after throwing the fascines, that the enemy may not see to fire at them by the light of the fire, but place themselves so that they can fire upon any who may attempt to extinguish it. If there are chausse-traps, they must be swept away, by dragging a tree or two over the ground where they are scattered.

In the attack of detached buildings, you must seize the approaches, and strive to scale them; to get on the top, and crush the people who are below, with the tiles or slates; but if the enemy has uncovered the house, you must throw as many grenades as you can in at the windows and doors; or dry fascines, with lighted faggots dipped in resin; or fire-balls, to endeavour to set fire to them, and smoke them out. If the weather is windy, you should profit by it to set fire to the house, and try to shut up the loop-holes which the enemy have pierced near the ground, with bags of earth, so as to sap the corners. If you have some cannon, you may shorten the ceremony, by planting them against the angles of the post. If you have none, you may successfully suspend a large beam by a rope, to three bars placed in a triangle, in imitation of the Roman battering ram: this beam pushed violently against the walls, will soon make a breach; but you must observe, in suspending it, to do it in a dark night, so that the enemy cannot prevent it by firing at the soldiers who are employed in the work. If it is glorious to get out with honour on such an attack, it is no less so, to make it so as to cost but few people. The blood of the soldiers is precious, and cannot be too much prized, and an able chief will neglect no means that can contribute to their preservation. The comparing of two examples will show the importance of what is advanced.

During the two sieges of Barcelona, by Monsieur de

de Vendome in 1697, and Monsieur de Berwick in 1713. The first of these generals caused the convent of Capuchins, situated out of the place, to be attacked sword in hand by several detachments of infantry, and carried it in three hours, with the loss of 1700 men. Marshal Berwick caused the same convent to be attacked in the year 1713. They were equally entrenched, and reckoning to make him pay as dear as Monsieur de Vendome had done; but this general having opened a fort of trench before the convent, they not expecting to be attacked in form, surrendered at discretion, after having held it 24 hours. The reader is left to judge which example to follow.

You should prepare for the attack of a village, or such like post of large extent, as has been directed in the section for detached posts: but as these fort of attacks are always more difficult than others, on account of the multiplicity of schemes they have to encounter at every step, an officer should not march there till he is acquainted with the strength of the entrenchments; the situation of the smaller posts; the obstacles to be met with in every street or square; and even what terms the inhabitants are on with the soldiers of the garrison.

If an officer takes his information from country people, he should inquire in such a seemingly careless manner, that they may not discover his design to the enemy, and they take measures to prevent them: he must likewise endeavour to be well assured of the reports of the peasants, by comparing them with those of the deserters, and with what he has discovered himself. When he is well informed of the situation of the enemy, he should then make his dispositions for the attack, and observe to mention to those who are to command the different platoons, all that they ought to do, either in real or false attacks. The real attacks should be made in places that appear inaccessible, because the enemy, trusting to the difficulty of access, are always less guarded there. He may likewise attack the houses situated at the entrance of streets, because when they are once gained, it is easy to pierce the walls that separate the houses, from whence they can easily crush the enemy with stones, and force them to fly to their last entrenchment.

In an enemy's country whom you would not spare, it is easy, by setting fire to the four corners of the village, to force the besieged to surrender; but, besides its being inhuman to use means which tend to the devastation of a country, it is very dangerous to drive the inhabitants to despair, because they then fly into the woods, gather in parties, scatter themselves every where, murder the soldiers who stray, assassinate the sutlers, hinder every peasant from carrying provisions to camp, and may destroy an army.

While the assailants have penetrated into the village, the commanders of each division ought to take care to leave small detachments at all the churches and squares they find; to stand firm and sustain the main body in case they are repulsed. You must watch very carefully that the soldiers do not withdraw to pillage the houses of the inhabitants, as whole detachments have been driven from towns and villages where they had penetrated, from having neglected this precaution.

Three days after the surprise of Cremona in 1702, some Germans were found in the cellars, where they

had got drunk, and were astonished when they were told that they must quit these agreeable retreats. An officer who would shun a disorder so fatal, should forbid his soldiers to stir from his party on pain of death; and by placing a sentinal in the rear of each division, take care that no one falls behind.

If you find cavalry drawn up in the squares or open places, the assailants should remain firm at the entrance of the streets that meet there, while some go up to the houses that are at the corners, and fire upon them from the windows: if this causes any disorder among them, they should be charged with fixed bayonets to make them surrender. If the interior part of the village is defended with cannon, you should march quickly to the place where they are, and take them, or nail them up, or turn them against the enemy or principal post of the village.

Polybius, in his seventh book, gives an account of an attack full of instruction for military men. The blockade of Sardis by Antiochus the Great, had lasted two years, when Lagoras of Crete, a man of extensive knowledge in war, put an end to it in the following manner. He considered that the strongest places are often taken with the greatest ease, from the negligence of the besieged, who, trusting to the natural or artificial fortifications of their town, are at no pains to guard it. He knew likewise that towns are often taken at the strongest places, from their being persuaded that the enemy will not attempt to attack them there. Upon these considerations, though he knew that Sardis was looked on as a place that could not be taken by assault, and that hunger only could make them open their gates, yet he hoped to succeed. The greatness of the difficulties only increased his zeal to contrive a means of carrying the town.

Having perceived that a part of the wall which joined the citadel to the town was not guarded, he formed the design of surprising it at that place: he observed that this wall was built on the top of a rock which was extremely high and steep, at the foot of which, as into an abyss, the people of the town threw down the carcases or their dead horses and other heaps of burden; at which place great numbers of vultures and other carnivorous birds assembled daily to feed; and after having filled themselves, they never failed to rest upon the top of the rock or wall, which made our Cretan imagine that this place was neglected, and without any guard upon it.

On this thought, he went to the place at night, and examined with care how he could approach it, and where he ought to place his ladders. Having found a proper place for his purpose, he acquainted the king with his discovery and design; and the king, delighted with the project, advised Lagoras to pursue it, and granted him two other officers whom he asked for, and who appeared to him to have all the necessary qualities for assisting him in his scheme.

The three having consulted together, they only waited one night, at the end of which there was no moon; which being come, they chose 15 of the stoutest and bravest men of the army to carry the ladders, to scale the walls, and run the same risk that they did. They likewise took 30 others to place in ambush in the ditch, and to assist those who scaled the wall to break down a gate into which they were to enter.

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The king was to make 2000 men follow them, and favour the enterprise by marching the rest of the army to the opposite side of the town. Every thing being prepared for the execution, Lagoras and his people approached softly with their ladders; and having scaled the rock, they came to the gate which was near them, and having broke it, let in the 2000 men, who cut the throats of all they met, and set fire to the houses, so that the town was pillaged and ruined in an instant.

Young officers who read this account, ought to reflect on this attack. The attention of Lagoras, who went himself to examine the places proper for fixing the ladders; his discernment in the choice of the officers and soldiers who were to support him; and the harmony of the whole means that were employed on the occasion, afford very excellent lessons for any officer who may attempt such an attack.

SECT. VIII. *Of Surprises and Stratagems for seizing Posts.*

All the environs that have any relation to the place the enemy occupies must be known; on what side lie the avenues, morasses, rivers, bridges, heights, woods, and all covered places that are in the neighbourhood, without which it is scarce possible to regulate approaches prudently. It is equally necessary to know nearly the number and kind of troops with which he possesses the post, that you may not attack him with insufficient force. It is likewise necessary to know if the enemy is careful or remiss in carrying on his duty. The knowledge of these circumstances contributes infinitely to form a project of surprise well, and to conduct the whole expertly.

As to the manner of surprising a post, it is impossible to establish certain rules on the subject; because, among a thousand means which chance offers, there are rarely two alike. The quickness of a concealed march upon a distant post negligently guarded; a thick fog which prevents being seen; a river where there is a ford the enemy is ignorant of; an aqueduct; a subterranean passage; a hollow road which is not guarded; a frozen rivulet; a blocked up passage; a secret correspondence; a fair or market day, and disguises of every kind, are the different stratagems that may be used as occasion offers, and by which we may promise ourselves success though they have been frequently employed.

It must be observed, that there are stratagems with which it is impossible to succeed without a proper force to sustain them. A town or village, for example, where we are introduced by a secret correspondence, cannot be carried without being well seconded. The only means of managing the surprise of posts well, is to have for a maxim to divide your force instantly, to seize the castle, church, church-yard, or public squares. It has been said, that troops so divided can act but weakly, and run a risk of being defeated separately. But by making as many detachments as the enemy has posts, in the dismay caused by surprise, it is easy to carry these posts before they who defend them have time to dispute them or even look round them. The enemy being likewise obliged to divide, and not knowing what side to prefer, there is almost a moral certainty, that, surprised with the noise which they hear

all round, they are ready to let their arms drop out of their hands: beside, the horrors of a dark night, and the dread that cannot fail to seize a party who are surprised, represent objects much greater than what they are, so that they imagine they have to do with a whole army.

The bad success of the affair at Cremona makes nothing against this opinion. If instead of stopping to make prisoners, a detachment had gone directly to the citadel, which should be the way in all these kind of actions, it would have been impossible for these brave officers who drove out the Imperialists, to have made so glorious a defence.

M. de Schöwer did otherwise when he surprised Benevar in Spain in 1708, and did not fail. He learnt that the Spaniards neglected the guard of an old castle which was at the entrance of the place; and marching in the night he took it, and detached several parties to attack the town. Surprised with such a visit, they sought for safety in flight, and ran to take shelter in the citadel, but were scarcely entered when they were made prisoners. The enemy did not think of the attack being begun where they were strongest; but it is the best way, as it is to be presumed they have divided their forces to be able to defend every where.

M. Menard, in his history of Nîmes, gives an account of the surprise of that town, which merits our attention. Nicholas Calviere, called captain St Cosme, having resolved to make himself master of this place, engaged a miller whose mill was situated within the walls, at the side of the gate, to file the bars of a grate which shut up the entry of an aqueduct through which the water passed into the town, for several nights to put wax on the filed places to conceal them in the day, and to receive 100 men armed into his mill, while a considerable body of cavalry and infantry should arrive from different places to sustain the enterprise.

The day for the execution of his project being fixed for the 16th of November 1569, and proper orders given for the rendezvous of the troops, St Cosme came out of the mill with his party at three o'clock in the morning, and advancing to the guard at the gate, put them to the sword, and opening the gate let in 200 horsemen, with each a foot soldier behind him. These troops having entered the town, formed several detachments immediately: one of which went to block up the citadel; while the rest, scattering over the squares of the place, and sounding their trumpets instantly, made themselves masters of the town.

There are a number of circumstances mentioned in this surprise, which convey a great deal of useful instruction. Captain St Cosme knew how to profit by the negligence of the governor, who omitted to guard the entrance of the aqueduct; to make a proper choice of cavalry for advancing so readily with the infantry from different quarters; the justness of the orders given the troops, which brought them 15 leagues from Nîmes at the hour and place appointed for the rendezvous; the precaution with which he invested the citadel, to prevent his having to do with the garrison in the streets; his attention in dividing his troops into the different quarters of the town, and making them sound their trumpets, that the inhabitants might imagine they were very numerous.

There

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There are instances of surprises succeeding from singular address. Captain Brachis, wanting to make himself master of a tower in the territory of Amberla, caused one of his soldiers to disguise himself like a woman, and gave him a basket in his hand with a sickle. This man so disguised ran as fast as he could to the tower, pretending to have fled from a party of the enemy: the guard let him enter and mount a ladder to the top of the tower to show the sentry where the enemy was; but he was scarcely got up, when he clove the sentry's head with the sickle, seized his arms, and obliged those who were below to abandon the post.

The active corps of the partisan, without trusting to the stratagems that others have succeeded by, must find other resources than those against which people are so prepared now-a-days; and as the surprising of the enemy is the great business of the partisan in carrying on the *Petite Guerre*, he must see what can be effected by his hardiness and activity.

The expedient which appears to be the most proper for an officer who has 400 infantry under his command, and is certain that the garrison is only 200, (for surprises should be always attempted with a double force) is to choose very bad weather; the strong winds, for example, and fogs in winter; or the storms and tempests in summer, when, after excessive heats, violent winds rise suddenly, and agitate the air.

When you have meditated such a scheme, then is the time to put a part of your infantry in covered waggon, which should be kept ready for the purpose. The whole party ought to be provided with dog-skin covers for their gun-locks and cartouch-boxes, to take off readily when there is occasion; and the rest of the infantry to be mounted behind part of the cavalry. Both parties to assemble at some place a league distant from that which you would surprise, and there to stop; when, if you see the bad weather dissipating, you must retire till another occasion. If you renew it ten times, you need not despair; a strong place deserves this trouble; the blow is too honourable and too important to lose courage, and success will overpay every fatigue.

But on the contrary, if the storm forms, and the wind increases, direct your approaches in such a manner, that you may always have the wind on your back; because if you have it in your face, the enemy's sentries can look forward and discover you; and likewise if it is in your face, your horses cannot be made to advance without a great deal of trouble. These precautions being taken, you advance more quickly as the storm increases, the horses and waggon going with great speed before the wind. You need be in no uneasiness about the enemy's sentries seeing you, or hearing the noise of your march; because the severity of the weather obliges them to enter their boxes, and turn their backs to the wind, to save their eyes from the dust and sharpness of the air.

At 300 paces from the place, the foot and part of the cavalry should dismount and fix their bayonets, the rest of the cavalry to remain with the waggon near some trees or houses, the waggon turned for a retreat. Divide your infantry into five detachments, and instantly run at a great rate, keeping your men as

close as possible, and passing the barrier and gates, seize all the sentries and the guard without firing or making the least noise, which may be executed with an extreme quickness, to be acquired by practice. While the first detachment seizes the gate and all the sentries of its environs, the rest must run rapidly into the town. One must go quickly to seize the main guard; another to seize the governor or commanding officer; the fourth, which should be the strongest, should fly to the caserns or mens barracks, to seize their arms; the fifth to remain in the street near the gate for a corps de reserve.

Every detachment must be conducted by prisoners made at entering; and orders sent with all speed, to cause half the cavalry to advance and patrol the streets, as the infantry get forward.

As this kind of surprise can succeed only under favour of a storm, which rarely continues any time, it is evident that the march and execution must be conducted with inexpressible swiftness, and the orders be perfectly understood. It is true, that rain is inconvenient for the infantry, whose feet slip on clay-ground; but they must do their best, and frequently it is found that the roads which are most used are not therefore the most slippery.

If it happens that you are perceived in taking possession of the gate, and they take the alarm, you must quickly divide your party into two wings, mounting them on the rampart, the one to the right, the other to the left; and seizing the loaded cannon, turn them upon the town; and at the same time summon the garrison to surrender. If you happen to fail, and are obliged to retire, you do not risk much, as they will not care to molest your retreat.

There may be a reluctance in attempting such a surprise; it may appear to be hazardous and rash, and a conduct too nice not to despair of success: but Mr Jeney says that experience convinces him of the validity of the means proposed, and relates what happened to him upon two occasions, to prove that the cold east winds or storms are the most proper times for attempting surprises.

Being at the head of 30 hussars, says he, and willing to shun a storm which was gathering behind us, I pushed to get to a place which was well fortified and occupied by a numerous garrison: the wind was strong, and I passed the barrier and all the gates with my horses, which made a great noise, without any sentry either seeing or hearing; and though I called to the first guard to declare myself, no one perceived me. I crossed the whole town without seeing a soul in the street; and hurrying to an inn in the other suburbs, I went out at the gallop, and saw only the sentry at the last barrier, to whom I answered without our comprehending one another; nevertheless the rain had not begun to fall, but the wind was violent. I experienced the same during the winter, when the east wind was very proper to facilitate the surprise of a fortified town or post. On Christmas night 1757, I passed through the country of Hanover with 80 horse between two guards of the enemy without being perceived. I marched over the middle of a plain when the night was clear, with a violent east wind, which prevented any sentry from turning his head to look.

look at me, and I went quietly to carry off horses in the rear of their army. The following night at my return, I passed two different posts of our army; the one guarded by a party of hussars, the other by a regiment of dragoons, without being seen but by one sentry in the middle of the dragon post, who durst not challenge, because it was no longer time, having passed the first guards.

You may likewise take the advantage of bad weather to scale all sorts of posts surrounded with walls, as towns, abbeys, castles, &c. to do which, you must approach in the dark, and seize the moment of a great squall, or when a cold east wind obliges the garrison to take shelter from the rigour of the season: then there is no one upon the ramparts, and the sentries turn their back to the wind, or remain in their boxes, while your people are warm with marching, and animated with the hopes of success. You need not be apprehensive of the enemy seeing you if you advance on the side next the wind to place your ladders, because the sentries will cover their faces, and bend down their heads to save them from cold.

The time of a thick fog is not less favourable for approaching and forcing an entrenched post. When the fog is low, the infantry should creep on all fours, the better to conceal them from the enemy's sentries. These sort of surprises are the least dangerous, you run scarcely any risk; but if you cause some false attacks, the garrison will not fail to run to arms, and sometimes make you pay dear for failing.

When you would surprise the enemy in a village, farm, monastery, or some place detached from the army, you should divide your party into two bodies, each composed of cavalry and infantry; the one to take the enemy in the rear, the other in front, taking care to cause some waggons to follow, which may carry off the wounded in case of need. You must calculate exactly the time it will take the first detachment to go round the enemy. The two commanders should agree on a word for rallying, and the time of making the attack, which should be in the night, especially if the post is so distant from the army that they can receive no assistance; for in that case the time is favourable till day-break. They must regulate their departure according to the distance they have to go; and the detachment which goes round the enemy, ought to take no more infantry than can be carried behind the horsemen. This detachment having got round, should form about a quarter of a league from the post, and 100 paces out of the road.

When the other detachment has arrived within a quarter of a league of the post, your cavalry should form out of the road with the waggons and drums near them, who are not to advance till ten minutes after the departure of the infantry, who must advance towards the fires of the enemy, stopping as much as possible. They must take care to conceal themselves from patrols, as has been directed; and when they see them passed or entered the post, the infantry must hurry on to gain the village, and clear the entry by which the cavalry must pass, in case it has been barricaded with waggons. You must run rapidly to the place where you see the fires lighted, and make as many detachments as you see fires, in order to surprise the whole at once.

The cavalry who followed slowly, must instantly join to the noise of your arms and cries their trumpets and drums, advancing with all speed, and leaving only a non-commissioned officer with some horsemen near the waggons. The detachment, which is advanced on the other side of the village to turn the enemy, on hearing the alarm, must immediately advance, sounding trumpets, beating drums, and attacking all who would save themselves on that side. You may rely on it as certain, that the enemy, seeing all his guards surrounded by your infantry scattered in the village, and hearing the march of different bodies of foot and horse who arrive on all sides, will not delay to surrender, or seek to save himself by a disorderly flight; it will be easy then for your cavalry to fall upon the flying, and stop them. The party should be forbid to pursue the enemy more than a quarter of a league in the night; but no pursuit at all should be attempted, if it is in an inclosed country.

The post being taken, the booty and prisoners should be sent off immediately under the care of the infantry, putting the wounded in waggons, or on the horses that are taken, the cavalry making both the front and rear-guard, and taking care to have the last the strongest. When the enemy's post is ten leagues or more distant from yours, it is certain that they will have less distrust, and be more easily surprised. In that case the infantry, with a lieutenant and 20 horsemen, should stop at half way, concealed in a wood or farm, keeping constant guard.

The commanding officer should leave this place at the head of the rest of the cavalry; and if he finds that he cannot arrive that night, he must cause them to carry refreshments. He must likewise take an intelligent guide from thence, to whom he must not communicate his design, till they have gone some way on the road towards the enemy. He must accompany his declaration with promises and threats, assuring him that he will generously reward his zeal and fidelity; but will kill him or set his village on fire if he attempts to deceive or run away.

At some little distance from the place, you must quit the road on the right or left, and be conducted to another, which leads to some height the most convenient for passing a league on one side of the enemy's post. In bad winter weather you need not keep at such a distance, because there is less risk of meeting any one in the country.

When you get as far as the post, you must move obliquely to the road which leads from the enemy's army, and by which you must advance to attack the post. If it happens, that for want of roads the guide must conduct you over fields and meadows, it is of little consequence, provided that the route is conformable to the design.

A genius for war has sometimes pushed boldness so far, as to surprise the wings of an army, encamped in a level country, on a plain uncovered on all sides. This sort of surprise is a temerity that is scarce to be imitated. The danger is great; and the retreat of so small a corps as that of a partisan, runs always the risk of a total defeat, unless it happens in the middle of a dark night, which can conceal your approach or your flight; but it likewise exposes you to take some very dangerous steps in the dark; to wander from your route, and

and to disperse your people: for which reasons such attempts are never advisable,

The case is very different when the enemy's camp extends into a mountainous country, covered with woods to secure your retreat; for then, with the assistance of a good guide gained by money or promises, you may be conducted in the night into woods, and secure your approaches by gullies and bye-ways.

You must take great care, in coming out of the wood, that you do not come upon some post in the front of the wing you want to surprise; because, in that case, you must leave a detachment of infantry at the passage. While your cavalry advance to get round their advanced post, another detachment of cavalry and infantry must place themselves opposite to the flanks of the post. You must then fall briskly upon the wing of the camp with cavalry alone, and at the same instant the detachment left on the flanks must attack the post with the infantry slooping as they advance; and in the attack, both should let up a most frightful cry to alarm the whole army.

As it is certain that the piquet of the army will not delay to run to their assistance, you must instantly seize and carry off whomsoever you meet, officers, soldiers, or their horses, and every thing you can take away, making haste to regain the passage. The cavalry should go first with the booty and prisoners, the infantry making the rear-guard till they are out of the wood, and then take the front. You must endeavour to make at least half the retreat that night, and before that the enemy does not follow you in the night, lest you be taken in flank.

There is no time more precious for a partisan, or that merits so much attention, as that of a battle, when every one is attentive to the great firing which they hear on all sides; to the manoeuvres of the armies that are engaging; to the decision of an affair of the greatest importance, upon which the fate of each depends. It is then that he can employ his skill to the greatest advantage; strike the severest blow that is possible; cause the ruin of the enemy; pillage the quarters of their generals; carry off their equipages; defeat their guards; set fire to their camp, and spread an alarm over all, which may contribute to the defeat of an army.

But measures must be taken to execute so great, so brilliant a project, with success; and it should not be engaged in, till after having prudently regulated the design on three principal circumstances, viz. the situation of the enemy's camp; the means of approaching it; and the hour of engaging. When the enemy's camp is in the middle of a great plain, or on a height with an extensive view on all sides, it is certain that one cannot approach without being seen at a distance: and in that case, prudence will put a stop to zeal, and prevent rashness from attempting impossibilities; but when their position extends over a country covered with mountains, woods, or villages, the occasion is more favourable, and may almost insure success.

It is then very advantageous for a partisan to be perfectly acquainted with the situation of places that are in front of his army; especially when he foresees that the enemy will sooner or later come to encamp there. What assistance would it not give for the direction of his project, if he knew how to take a plan

of that part of the country which he proposes to invade, before-hand? Then, without the weak and dangerous assistance of spies and deserters, he can by his own proper knowledge think of every means for executing a design, which ought to be regulated and conducted with impenetrable secrecy.

When he perceives by the motions of the armies that they are on the eve of an action, he must not delay to acquaint the general with his project. If he consents, he will regulate the rest, and the time of departure, according to the advices which he receives.

As these sort of expeditions cannot be made but by long circuits, they must take the time necessary for the march. In the campaign of 1757, the duke of Richlieu caused his army to advance near Zell to attack our army; and sent a partisan with 100 horse to the rear of the camp the day before, who, having made a march of 22 leagues, arrived without any accident: but the prudence of the prince of Brunswick defeated his design, and left him to admire his retreat; nevertheless, they picked up some stragglers, horses, and waggons.

Among the measures that ought to be taken to secure the blow, and strike it more effectually, it should not be forgot to distribute cockads like the enemy's to all the cavalry; and to give a tick of six feet long to 20 of each detachment, with a bit of torch fixed on the end, and covered with a little dry straw or hemp, to kindle instantly.

The whole party to set out from the camp A, (fig. 1.) marching under the conduct of a good guide Plate. CCC by covered ways, at a distance from the enemy. Being come to the place C, which ought to be in the environs, and as high as the field of battle, the infantry should be concealed out of the road far from the sight of passengers. This must be the centre of correspondence with the army; the rendezvous of the booty; and support the retreat of all the cavalry, of which there should be as many detachments formed as you purpose to make attacks. We shall suppose six of a hundred men each, and they must go secretly by particular routes to their respective post E, D, F, G, H, I. Neither trouble nor expense should be spared to procure good guides. Each detachment should lie in ambush half a league, if necessary, from the object of the attack, BKKKK.

The noise of the musketry of the armies to be the signal for their irruption; and then bravery, intrepidity, and courage, will give wings to your people. The second detachment D will glance imperceptibly between the villages, and fall like thunder upon the camp B; and while B attack all whom they meet, the other 20 should light their torches at the fires that are to be found every where, and spread the flames rapidly to the straw of the tents. As they cannot fail to have the piquet of the camp soon at their heels, they must strike their blow with all possible quickness without stopping to plunder; being content with the glory of having excited a general alarm, capable of confounding the whole army, and contributing to the gaining of a battle.

At the same time that the detachment D attacks the camp B, the others E, F, G, H, must with equal violence attack the villages K, K, K, K, which they have in front, doing the same the first did in camp, except

except that they may plunder every thing which they can easily carry off of the generals equipages, with which these villages are commonly filled; seizing the best horses, hamstringing others with the stroke of a sword, and setting fire to all the places which contain the enemy's baggage. Each detachment should cause some horsemen to advance beyond the village, to observe the motion of the troops that will not fail to run to their assistance. As soon as they perceive them, they must make their retreat as fast as possible by the routes which the commanding officer has premeditated, and which are proposed to be represented by the coarser hatched lines. The sixth detachment I, in ambush on the side of the road leading from the camp, should remain there, to seize all the enemy who think of saving themselves by flight.

There is no danger to be apprehended in these expeditions, during the critical instant while the armies are engaged, and all the troops a great way in the front of the camp; you meet none but sutlers, servants, lame people, and some piquet guards scattered here and there, whom you may easily defeat as they advance. The commanding officer ought to have an eye over all; and as soon as he perceives some bodies of troops advancing upon him, he ought to retreat quickly, and at least gain the entrance of the wood.

Each detachment having rejoined the infantry, must there wait the fate of the battle; so that if it is decided in favour of their army, they may speedily regain the properest places for harassing the enemy on his retreat. These moments are the more favourable, as disorder, dread, and noise, render all defence impracticable. But all these sort of surprises require places proper to cover approaches and retreats.

Having mentioned the necessity of a partisan's being master of the languages, and the advantage deriving from address in carrying a post by surprise, the following instance may serve as an illustration of it.

In the campaign of 1760, that excellent general and true genius of a partisan, the prince of Brunswick, was situated at some distance from Zerenberg, at that time in the possession of the French; and being informed by two Hanoverian officers, who had been in the town disguised like peasants, that the garrison were very remiss in their duty, trusting to the vicinity of their army, and the distance of ours, the prince was resolved to surprise them; and after appointing a corps to sustain him, he advanced in the night with Major Maclean of the 88th regiment; and 200 Highlanders, with bayonets fixed and their arms not loaded, followed at a little distance. Upon the first sentry's challenging, the prince answered in French, and the sentry seeing but two persons advancing, (whom he believed to be French,) he had no distrust; so that the major getting up to him, stabbed him, and prevented his giving the alarm. The Highlanders immediately rushing in, attacked the guard with their bayonets, and carried the town, having killed or taken the whole garrison of 800 men.

The French officer who commanded at that time in Zerenberg concerted a scheme for being amply revenged, which failed only by a most trivial accident. When almost every house in Bremen was filled with corn, being the grand magazine and grand hospital of our army, this officer held a secret correspondence

in the town, which informed him of the state of the garrison, and that there was a general order to let couriers going to the army pass out at all hours. He dispatched about 20 hussars to scamper over the country, who were all that were heard of his party, while he marched 15000 infantry from Duffeldorp to Bremen (about 200 miles), concealing them in woods by day, and marching in the night. He arrived at the gate at the appointed hour; when a person on horseback blowing a horn came along the street, and desired to pass out to the army. The officer of the guard had the keys, and happened to be out of the way; and while a messenger went for him, the people without growing impatient, began to break down the outer barrier, which made the sentry fire at the place where he heard the noise; and the guard taking the alarm, got upon the rampart, and likewise fired at the same place: upon which the pretended courier galloped back; and the French, believing that they were discovered, relinquished their scheme, and retired.

This example proves that no distance is a security from surprises, and that very considerable parties may pass over a great extent of country without being discovered. The following instance of that presence of mind so much the happiness of all who possess it, and more particularly of a military man so exposed to surprises, deserves to be recorded.

In the month of February 1761, when Prince Ferdinand beat up the quarters of the French, they were obliged to retire a great way without being able to resist: However, when they came to collect their force, and to recoil upon our army, Sir William Erskine with the 15th regiment of light dragoons was in a village in our front. In a very foggy morning, soon after the patrols reported that all was well, Sir William was alarmed by his vedettes having seen a great body of cavalry coming to surprise him. He instantly mounted his horse, and sallied out at the head of the piquet of 50 men, leaving orders for the regiment to follow as fast as they could mount, without beating a drum or making any noise. He attacked their advance-guard in the cursory manner of the light cavalry, and continued to do so, while his men were joining him by tens and twenties and the French cavalry forming to resist an attack, till he collected the whole, and then retired, the surgeon of the regiment (Mr Elliot) having in the mean time carried off the baggage.

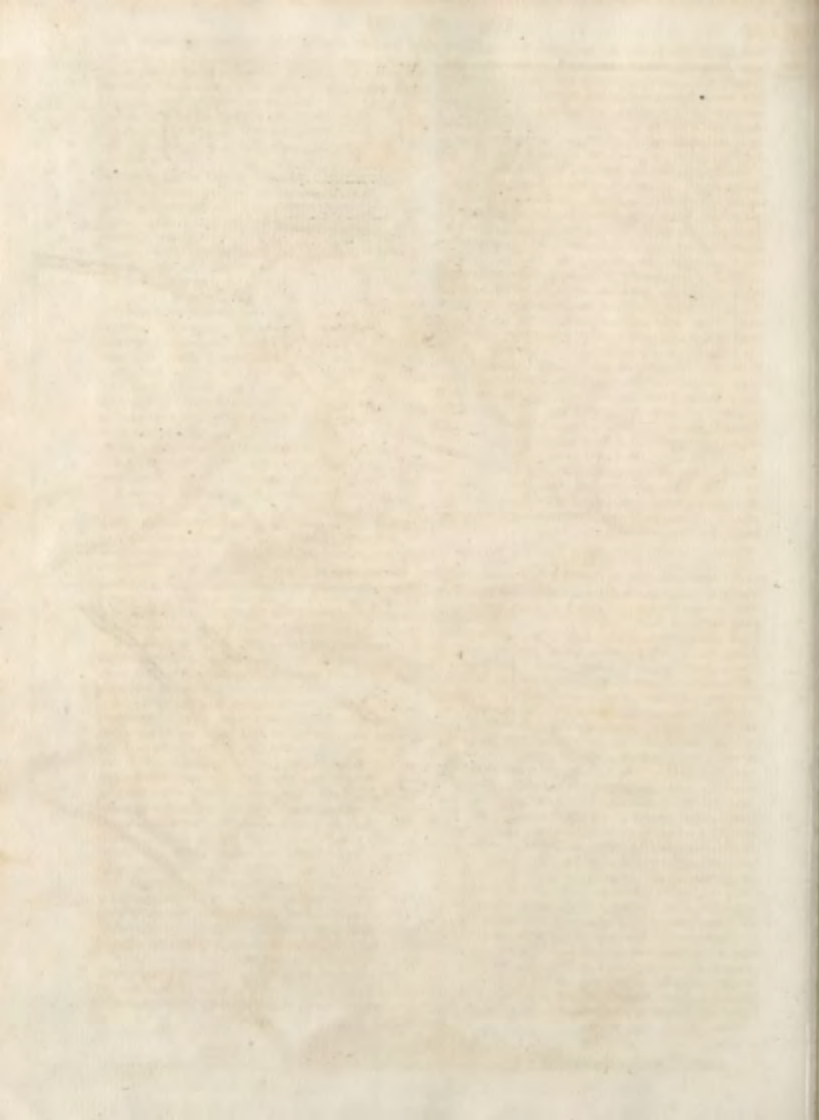
Strokes of this kind display a superiority of genius, and to that alone was the preservation of the regiment owing. Had a drum beat to arms, the enemy must have known that they were unprepared, and probably would have rushed in and destroyed them; but the attack convinced them that they were discovered, and made them think only of their own preservation.

Among many instances in the course of the war, the success of this officer on another occasion, where he displayed the most singular address, likewise merits our attention. After a repulse, and a march of 72 miles in one day, when the men were fatigued and scarcely a horse able to trot, he saw a regiment of French infantry drawn up with a morass in their rear. He left his own corps, and advancing to the French, desired to speak with the commanding officer, whom he entreated



Fig. 2





to surrender to prevent their being cut to pieces by a large body of cavalry that were advancing. The French officer desired leave to consult with his officers, which having done, they refused to submit; but upon Sir William telling them that their blood must be on their own heads, and turning to move off to his own corps, they called to him, and laying down their arms surrendered to his harassed troops.

Such stratagems overleap the bounds of instruction, and no author will presume to propose them for imitation. Here was the reaching out the hand to fortune which Vegetius recommends: but there are few who have the requisite talents from nature; and we may as properly say of the soldier as of the poet, *nasitur non fit*.

To surprise and carry off some general officer, or other considerable person in some distant place in the rear of the enemy's army, you should take only a detachment of 12 horsemen, known to be worthy the confidence of the commanding officer, and who you can depend upon will not desert to betray you. Each horseman should have a double stoutout with the two sides like two different regiments of the enemy; so that, being perceived under one colour, they may quickly turn them, and appear again under another. This disguise will hinder the country people from making a just report, and agreeing in the route the party have taken. They must take great care to keep at a distance from all roads, and not to stop but under cover. The quarter-master must take care to procure refreshments from some place in the neighbourhood, where they must pay ready money, and not fail to do so till the blow is struck.

SECT. IX. Of Ambuscades from the Partisan.

An ambuscade may be formed in any place covered by art or nature in which a party may be concealed to surprise the enemy in passing; and the proper use of them is, of all the stratagems in war, the best calculated to display the genius, skill, spirit, and address of a partisan. They are easily carried into execution in woods, buildings, and hollow places; but require a more fertile imagination, and greater trouble, in a level country. Both ought to be regulated by the knowledge of the enemy's march, and the extraordinary means that may be employed to surprise them.

When a partisan has information that can be depended on of the march of some part of the enemy; whether a convoy of artillery, baggage, or provisions; a body of recruits, or horses to remount the cavalry; an escort of a general officer going to rejoin, or reconnoitre some country; he ought to apply directly to procure a sufficient knowledge of the route that the enemy is to take, the situation of the places he is to pass, and of the post he goes to. The better to cover his design, he must get information of the roads that lead to opposite places, which he must pretend to be attentive about, as has been mentioned in the section of Reconnoitring.

Having perfectly concerted his plan, he should set out at the head of his detachment if possible, and leaving his post on the side opposite to his true route, the better to conceal his design. If the place where he intends to plant his ambuscade is not distant, he should come into his true route about half way, and there place

half his infantry in ambush to favour his retreat. But when the country where he proposes going is distant, and the march requires at least two nights, he must conduct his party by meandering from wood to wood, if there are any. He must not forget to provide necessary refreshments for the day, which must be passed in some concealed place where he may not be perceived, and must cause three rations of oats to be carried for each horse.

The first night you must make to some wood or other place proper for passing the day near some rivulet, and, if possible, on the road of your retreat to leave a part of your infantry in ambush, in case there is no other water to pass till you come to the place of your principal ambuscade; for when there is still a river or canal to pass you must conduct the infantry to the passage, and choose the most convenient place to fix them in ambuscade.

If there is no bridge or ford, the cavalry must swim over, in which we suppose the horses are practised. When there is a ford, half the infantry should pass behind the cavalry, to go along with them. In case there is a bridge to pass near the village, the officer who is left in this post with some infantry, should be enjoined to allow no one peasant or soldier to leave the place; and for greater security, a small detachment of cavalry should remain with him, to stop any who may attempt to run away before the return of the whole corps, who ought not to delay long. If the enemy come in the interval to attack the bridge, it must be defended till the return of the party, that their retreat may not be cut off.

The following case will prove its importance. The Count Esterhazy being detached with 300 cavalry to levy contributions in the environs of Strasburg, left a lieutenant with 30 men to guard the bridge at Wolfshcim: the lieutenant, from some motive or other, quitted his post, when, happily for the detachment, chance brought Mr Jeney there with 10 chasseurs; and he was scarcely arrived, when he saw three large parties of French hussars advancing to take possession of the passage. He had only time to throw himself with his small party in a hurry into a mill that seemed to command the bridge, and having made loop-holes through the wall, he kept such a constant and deadly fire, that he disputed the passage till Count Esterhazy's detachment, hearing the noise of the musketry, came almost a league, surprised the enemy in the rear, and in five minutes took 80 horses and several prisoners.

Every precaution being taken to guard the bridge, the commanding officer should be diligent to arrive at the place of ambuscade two hours before the enemy is to pass, and place the ambuscade on the side he would retire to; never on the other side, if possible, lest the advanced guard happen to discover you, and oblige you to repass in sight of the corps, who, seeing your strength, may rush upon you and drive you back.

The infantry A (fig. 2.) ought to be ambushed at least 600 paces behind the cavalry B, so that if they are pursued, they can fall back to A, and both afterwards to the guard at the bridge, or to the infantry that are in ambush at half way.

If the ambuscade is placed in a wood, an intelligent non-commissioned officer should be chosen to get upon a high tree C, from whence he can see the march

of the enemy, and give notice of the most essential circumstances. There are three: the first is, the seeing the advanced guard; the second is, the approach of the corps; and the third is, the time when their front is advanced as far as the ambuscade B: for which the commanding officer should instruct the observer what signals he is to make from the top of the tree, to communicate the necessary information without speaking, which may be done by the means of a small cord D, of a brown or green colour, so as to be least perceptible. Let this cord be placed as in the plan, so that no branch interrupt it, with one end in the hand of the observer, and the other in the commanding officer's in the ambuscade B.

As soon as the advanced guard appears, the observer must pull the cord, and the commanding officer cause the party to mount and remain in deep silence. If by a stratagem, which is frequently practised for particular reasons, the advanced guard is immediately followed by the corps, which may easily be known by their being more numerous than ordinary, and not followed by any other corps, that you may not be deceived by the enemy, the cord should be drawn a second time, and a third time when their front is advanced as high as the ambuscade; upon which you must rush out, and pour furiously upon the flank of their centre in the following manner.

If the advanced guard E is formed only of an ordinary number, they should be left pass; and at the approach of the principal party or convoy F, the chief to be informed by the second pulling of the cord. At the moment the head of the convoy shall be advanced as high as B, the cord must be pulled the third and last time; at which signal the whole party must rush out without being perceived, and suddenly attack the centre upon the flank, engaging only with their swords, and making such a noise as to prevent the enemy from hearing the orders of their officers. They must disarm all whom their bravery or chance throws in their way, taking care not to scatter or pursue too far, unless you are sure that they are so far from their army or other parties that they cannot be assisted; for in either of these cases, they will not fail to run at the noise, and disturb your retreat.

In all secret expeditions you ought to be extremely circumspect that you may not be seen or betrayed. If the advanced guard discovers you before the blow is struck, abandon the enterprise immediately, and retire. When your guide, or some one of your party deserts, and you cannot catch them, think immediately of retreating, or placing your ambuscade somewhere else; therefore, to prevent such a misfortune, the officers should be charged to examine frequently if they have all their people.

You should never form an ambuscade for cutting off the enemy's retreat, as this manoeuvre will give him an idea of rallying, and attacking you in despair; but the case is different when you are well informed that you run no risk in stopping his whole force, either from the nature of the defile where they cannot form, or from the smallness of the number which cannot resist.

It is equally difficult and dangerous to form several ambuscades at once; the more are formed, the more they are exposed to be discovered, and less in a state

to unite for a retreat: but we except when they are to be employed to seize foragers; for then it is very proper to form several, and to dispose them in such a manner that the sentries can see from one to another. These dispositions being made, they who chance to be next the foragers must strike the blow, while the others march to secure the retreat of their companions, as soon as they perceive it.

In all ambuscades, no sentries should be placed but officers, or non-commissioned officers. On downs, behind mountains, or in gullies, the sentries should lie with their bellies on the ground, and their feet towards the ambuscade, the body covered with a grey or green cloak, according to the colour of the ground, with their heads a little raised, and wrapped in a handkerchief of a straw-green colour, or white in time of snow, so as not to be perceived. The number of sentries cannot be determined; but should be disposed so as to watch on all sides of the ambuscade, and keep every one who from ignorance approaches too near. The sentries should give notice of what they discover by gestures, to which all the officers should be very attentive.

In countries where there are no woods, vineyards, or hedges, you may place an ambuscade in a field of hemp or corn, or some sort of grain, provided it be high enough to cover you, at least with the help of art. When the stalk of the corn, &c. is not high enough, you must get some of the infantry to work with spades and pick-axes, which they must have brought along with them.

The commanding officer must mark out the ground A (fig. 1.) which they are to prepare for an ambuscade, entering at the side B, and raising in the front and at the two flanks a kind of parapet C, made with an insensible slope outwards, covered with corn raised from the surface of the ambuscade in form of square turfs of a foot thick D. They should be ranged and placed one against the other till they have gained six feet and a half. If the grain is not more than three feet high, it is plain, that forming the slope imperceptibly to a foot and a half high, with the earth dug of the same depth, the grain which borders the ambuscade will be six feet and a half from the bottom, reckoning the thickness of the turf, which serves to show that such a work ought not to be declined in arable ground so easily worked. When the soldiers have finished the work, a subaltern officer must lead them back to the place destined for the infantry.

The ambuscade being thus made at 100 paces from the road where the enemy are to pass, they should lead the horses into it one after another by the bridle, so as not to enlarge the entry: the horsemen to range themselves standing, and holding the bridles in their hands, with the reins slackened on the horses' necks. The officers should be continually employed in visiting the party, and waking those who sleep; and be equally careful to deface all traces of the entry, that none may appear near the ambuscade.

Ambuscades may be placed advantageously in hollow roads when they open obliquely behind that of the enemy, as the road K (fig. 2.) which enters by an acute angle upon the route F of the enemy; nor is there greater difficulty in concealing themselves in the gullies of some rivulet G, when the borders are of a sufficient height, or have shrubs that run parallel

ralled with the road of the enemy. It is extremely dangerous to fix there when the road of the enemy approaches towards, or crosses too near, the ambuscade, as they cannot fail to discover it.

As these gullies are not very large, it is necessary to have a number of ways to rush out quickly on the enemy: We suppose four, H, H, H, H, by which the cavalry can dart out suddenly upon the enemy at F.

It will be proper, before the placing the party, to cause the rivulet to be cut somewhat higher, to give it a new course I, so that the horses feet may be dry in the gullies, and make less noise; and the shorter way they have to go, they will more certainly succeed. The commanding officer will not fail to dispose them in such manner, that the whole can rush out at once by the four passages, and pour in great numbers upon the flank of the enemy.

In such sort of ambuscades, the commanding officer should himself be the sentry, leaning upon the edge, and covering himself so that he may see every thing without being perceived.

In deserted villages they may fix an ambuscade in the gardens G (fig. 1.) or in the barns H. The doors fronting the enemy must be shut up, and the passages which are marked by small dots made use of; for it is a general rule in all ambuscades, to fall forth in such manner as to take the enemy obliquely behind their front.

You ought never to employ infantry in the ambuscades we have been describing, where the cavalry act, unless to favour their retreat: but when you go at hazard, seeking to draw the enemy into an ambuscade, then the infantry should have their turn. Neither woods, villages, nor any places which are much covered, are proper for them; however unskilled an enemy may be, he will not follow a party on the skirts of a forest, or in the neighbourhood of some covered place: for which reason there are no places fitter for succeeding with ambuscades of infantry, than heaths, hilly countries, hollow roads, corn-fields, ditches at the side of great causeways; provided always, that you do not plant them on roads that lead to your army, for then the enemy will take care how he pursues you too far.

When you would place an ambuscade on a heath, or in a country full of little hills, your infantry must lie down with their bellies on the ground. If there is some water near them, it may suggest to them to wet their cloaths and cover them with dust, to give them the colour of the ground: but that this party so laid on the ground may not be crushed or trod upon by the enemy's horse when hurried along with violence, they must preserve the flank of the ambuscade I, next the enemy, with a bar K, which may be made in a hurry with some stakes drove in the ground, at ten feet from one another, and above five or six feet high, held together by cross pieces tied above five feet from the ground, which can be easily done in the neighbourhood of a wood. The time for the infantry to fire, is when the enemy's cavalry L, passing before the front, stretch their flank the whole length of the ambuscade; then your cavalry M, must quickly face about and attack the enemy. Their defeat will be so much the more certain, as the fire of your infantry happens to have driven their squadrons into confusion.

To ambush in the ditch of a great causeway, you

must choose the deepest place, and at the edge of a corn-field which is pretty high, and there place your people sitting or kneeling. You should collect as many small round bushes as possible, which are to be found in plenty in the country, which should be planted, as if naturally, along the side of the road in front of your party, and beyond the ambuscade on the side you expect the enemy, and here and there so open, that the enemy being accustomed to them may pass without distrust. You should then make the corn lean over to cover the ambuscade; but if there is none near enough the ditch, you must have as many squares cut in the manner directed above, as will cover the edge of the ditch. Some of the corn so transplanted should be beat down, but to appear as if done by hail or wind.

Mr Jeney ambushed in this manner with fifty men, when under the command of Captain Palski, who advanced with his cavalry upon the causeway leading to Straßbourg; and as soon as he was perceived, 400 Bavarian dragoons advanced to attack him: he wheeled about, and the dragoons believing themselves masters of the booty, did not fail to pursue, and arrived before the ambuscade without suspecting. Mr Jeney let their front pass, and fired such a deadly fire upon their centre, that he brought to the ground 17 killed or wounded: at the same time, the cavalry who pretended to fly, faced about and attacked the enemy; and would have completed their defeat, if it had not been for the great support of cavalry and infantry hurrying out of Straßbourg to sustain the dragoons; nevertheless he carried off more than 50 horses.

An officer having placed his infantry in ambuscade, ought to send on the cavalry at day-break, a non-commissioned officer with six of the best mounted horsemen making the advanced guard: they should advance as far before the party as the commanding officer can see. At sight of the enemy, they should begin to retire slowly without flying, at least till the enemy comes to pursue with keenness: in that case, the advanced guard makes the rear guard, and may drop a few shot at the enemy, to harass them and draw them on, or make pretended delays to excite them to pursue, till they fall by degrees into the ambuscade.

When you cannot place your infantry in ambush without having a village between them and the enemy, the cavalry should not be sent beyond the village, because the enemy will never expose themselves to cross it in following your party, for fear of falling into some snare: but instead of going beyond it, your cavalry should enter the village, and demand refreshment for 50 men, if the party are 100; then make three or four peasants carry orders to the magistrates of the villages that are towards the enemy, to come to you, and regulate the delivery of waggons and forage, or some other pretence. As the peasants will not fail to acquaint the enemy, and to describe your strength and situation according to what they have heard, the enemy will certainly come with superior force; and that they may come more speedily, they will bring no infantry.

As soon as the peasants are gone, you must be careful to let none of the inhabitants leave the place, and send continually some strong patrols to the rear on the road of your retreat, and especially to the passages by which they can cut off your communication with

the ambuscade. Every horseman holding his horse by the bridle must be ready to mount, so that upon the enemy's appearing, you may retire quickly from the village, and fall back one after another upon your ambuscade.

When a partisan has no infantry, he may form an ambuscade with cavalry, which should be as near as possible to the enemy. In the night, he should send out two or three waggons covered with white linen, that they may be seen at a distance: care must be taken that the harness be in good order, so that no troublesome accident happen by the want of attention to it. Each carriage to have four horses mounted by two dragoons disguised like waggoners, with their arms in the hands of two or four comrades concealed in each wagon, so that they may repulse any patrol they chance to fall in with.

The waggons should go slowly on some road parallel to the front of the enemy, and passing at some distance from their post (for it is not necessary that they pass through them), and regulate their march so, that they may be within half a league of the ambuscade at day-break, and readily perceived by the enemy; then let them stop while one mounts a tree or some height to see round them. When they perceive the patrol of the enemy, they must move off, for the others will not fail to follow; but if the enemy appears not to be inclined to follow, which the non-commissioned officer must attend to, and make one of the drivers stop, as if something were the matter with his wagon, which will draw them on till they fall into the ambuscade.

Among the thousand opportunities that the different marches of the enemy offer for ambuscades, there is none more proper than the retreat of an army which decamps to fall back. When a partisan happens to get information of it on the eve by good spies, he ought to set out immediately with his whole party, making such a round as has been drawn in fig. 1. leaving his infantry in ambuscade at half-way.

The cavalry must be diligent to arrive at the place of ambuscade by day-break, which ought to be placed on the route that the enemy is to take, and two or three leagues in the rear of his camp.

To be more secure of his retreat, he should leave two or three detachments of cavalry between him and his infantry, at a good distance from one another; the remainder to line the road in several ranks parallel to it, and 300 or 400 paces behind one another, concealed from the view of passengers by the favour of hollows, woods, or hills.

The first line being near the road must take care of sutlers, equipages, &c. which are the forerunners of an army, and the first to decamp when they are retreating. When they secure some waggons or mules, the first detachment should pass them to the second, and so on till they come to the infantry.

You must hasten to carry off what you can for a full quarter of an hour; after which you must press your retreat, expecting that the alarm will soon pass to the army, and the light troops be instantly at your heels.

SECT. X. *Of the Retreat.*

EVERY march in withdrawing from the enemy is called a *retreat*. That which is done in sight of the

enemy, who pursues with a superior force, makes the present subject; and is, with reason, looked upon as the glory of the profession. It is a manœuvre the most delicate, and the properest to display the prudence, genius, courage, and address of an officer who commands.

The success of the retreat depends upon the knowledge of the country that is to be passed over, and the goodness of the disposition that is made for the troops to defend themselves. The first offers advantages, and contributes greatly to the seizing them; the second restrains the ardour of the enemy, and keeps up the force of a party to its highest pitch. Both deserve to be studied.

1st, Every officer who commands a detachment ought to apply himself carefully to reconnoitre every step he takes, and examine perfectly every route that can conduct him from one place to another; he should observe attentively all the stratagems that can be employed for ambushing infantry, or posting cavalry; the course of rivers, their bridges and fords; the roads most covered with woods, hills, gullies, and villages; and in a word, he should know all the advantages, as well as the dangers that lie in his way. It will be easy for him to acquire a knowledge of all this, if he will use the method recommended in a former section. With the assistance of such a plan as is there described, he may regulate his retreat with ease, and put it in practice to advantage, profiting by every means proper for his defence, or surprising the enemy.

2^{dly}, The dispositions that ought to be made for a party, to sustain their retreat in the face of the enemy, depend upon the number and kind of troops in both corps; for they must be varied according as they happen to be of cavalry or infantry united, or of either singly.

Every forced retreat in consequence of an unfortunate action, would be almost impracticable, if it were not premeditated before you come in presence of the enemy, or when you are obliged to fly by unknown routes. That which can be made in a fog, or in the night, is easiest, when your rear is secured, as you can slip out of sight of the enemy without any difficulty, and they will be afraid of following you for fear of being surprised in the dark: we shall only therefore speak of that which is to be made in open day, and under the fire of the enemy.

To conduct it properly, you must absolutely know the strength of the enemy; for it is shameful to be the dupe of a false alarm, and to retreat precipitately from an ill-founded fear at the approach of an inferior enemy. You must therefore be convinced of his great superiority, and know what his party consists of.

If they come with a strong cavalry, united to a more numerous infantry than yours, you must immediately render their acting useless, by hurrying your infantry as quick as possible to retreat to the first place where they can lie in ambush, and serve the cavalry advantageously, if they can draw on those of the enemy, as has been said in speaking of ambuscades.

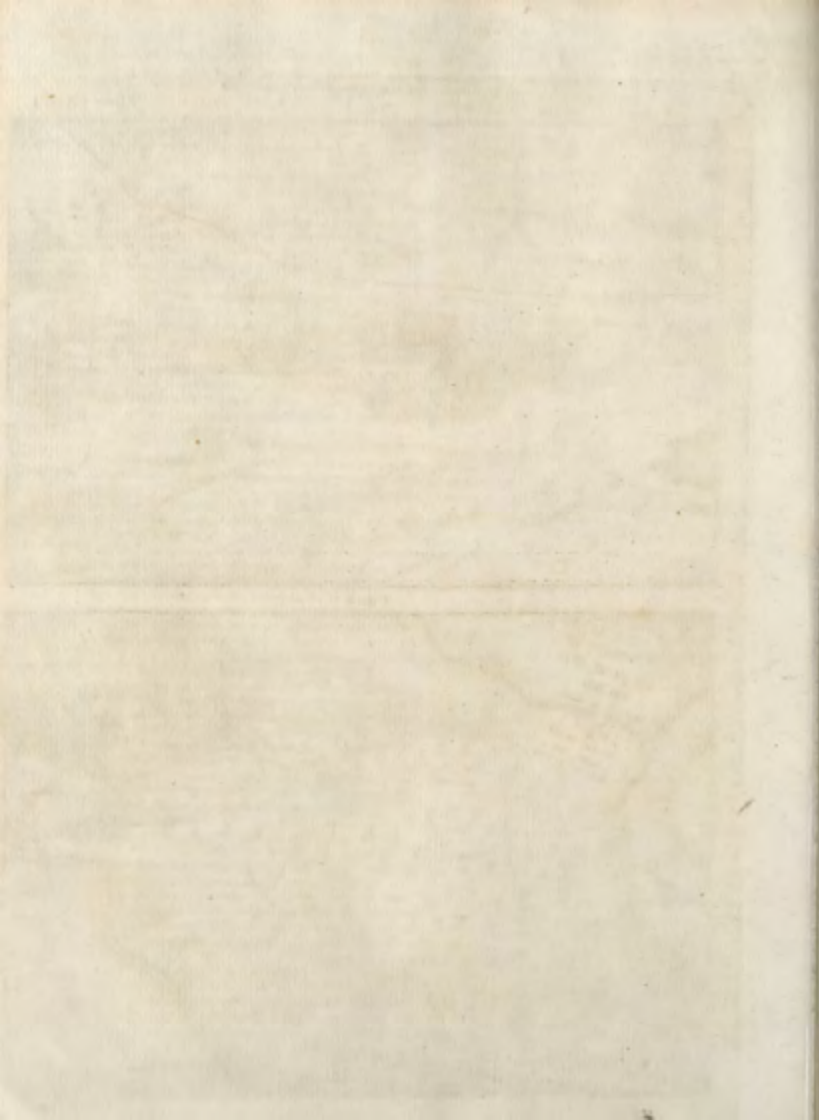
To conceal from the enemy, and favour the departure of your infantry, you should cause your cavalry to advance, and pretend as if they were going to attack the enemy A, (fig. 2.) your party forming into two divisions B and C, each drawn up in two lines, the second double the first, and disposed as in the plan.

The



Fig. 2.





The division C is to retire first 100 or 200 paces, and then fronting the enemy divide into two wings, leaving an interval for the passage of the division B, who, in retiring, must leave a rear-guard at 50 paces, which must be divided into several parties D, to scamper about the enemy's front; and in case they appear desirous to attack you, your small parties must keep a constant fire, particularly on the sides that advance the most; and continue this manœuvre till they have joined the division C, which should immediately detach some small parties of the best mounted to serve for a rear-guard, and to harrahs the enemy, till the division B is drawn up 100 paces in the rear, and divided into wings, leaving an interval for the division C to pass through in its turn; and continue to manœuvre it in this manner, till you draw the enemy's cavalry under the fire of your infantry.

When the force of the enemy consists of cavalry alone, your infantry (marked in the plan by dotted right angles) should retire jointly with the cavalry, at least if the country does not expose you to be surrounded by some covered place; because in that case your infantry should go and occupy that place, and form an ambuscade.

The rest of the infantry should place themselves in the second line of each division. If the enemy approaches the first line too near, they should fall lightly back upon the two wings of the second, opening the centre quickly for the infantry to fire upon the enemy in platoons, at the same time that your cavalry detach several small parties to advance briskly to prevent the enemy's forming, who were thrown into confusion by the fire of the infantry. The division which retires will force its march, and go to a greater or less distance according to the pursuit of the enemy. The sustaining division must fall back afterwards till it has passed between the wings of the second division, who must then make the manœuvre of the first, continuing it alternately till the enemy desists from the pursuit.

To facilitate the retreat of the infantry, and gain some way on the enemy, many have been of opinion that they ought to transport them in waggons. But when the enemy is at our heels, the time is very ill employed in collecting carriages and harnessing them: those moments are too precious; and should be employed in causing the infantry to move off quickly, by which they will not be exposed to a train of waggons taken in haste, which may soon break, or be put out of order, and may stop the whole line; which not only retards the infantry, but likewise the cavalry, when they find the route they were to have taken blocked up with broken carriages.

The case is different when the enemy is at some distance, or that you have already got some way before him; then, if a waggon breaks, it may be thrown immediately out of the road, and each horse of the carriage may carry two soldiers, or be distributed to other carriages. If many are broke, a part of the men should run on foot for some time till they are tired, and then they may change with some of the stoutest, who may afterwards change with others, according to necessity or the possibility of the case.

When there happens to be a wood in your rear, you need not enter it if the enemy follows you close, and is prevented by your strength: it is better to coast

along it by the route marked G, for fear of his coming round you; but if you cannot avoid crossing it, the division C should pass quickly, and at getting out face to the two flanks of the wood. The division B is to remain at the entrance of it, till they judge that the division C is sufficiently advanced, and then fall back, leaving the infantry for a rear-guard during the whole passage through the wood; at which time the whole should resume their first disposition.

In all desiles, and passages of bridges, the same manœuvre should be used as for woods: but the first division having passed, they should form facing the enemy; and the infantry likewise draw up on the other side, upon the edge of the river.

When the country through which you are to retire happens to be mountainous, the division which falls back should guard the heights by small detached parties, or, if possible, guard them themselves.

A body of cavalry retreating without infantry, ought to form in three lines at 200 paces behind one another; the two last extending their front, that they may appear more numerous, and draw up on the two sides out of the road. The first line being attacked, the second is to sustain it, the third to wait the retreat of the first, and to sustain the second, and continue to do so alternately.

If the enemy seem to quit the pursuit, the whole corps must resume the order of an ordinary march; with this precaution, that the rear-guard be reinforced, and the advanced guard weakened.

As to the retreat of a small detachment of cavalry, such as go to reconnoitre the enemy, to discover their march, to carry off some officer, or for some other commission, as they are not numerous enough to skirmish and retreat by rule, they have but two ways to choose; either to fly, or break through the enemy. They ought to determine for the last, when their retreat is cut off on all sides, so that they have no other way to escape but by cutting their way through the enemy sword in hand: but flight is always less hazardous when it is practicable.

If the officer is certain of the fidelity of his men, and their attachment to him; and sees that they cannot get out of sight of the enemy, but are ready to fall into their hands; he ought to try one means still, which has been known frequently to succeed. He should disperse his party by two and two, by the favour of the first covered place, where they may be at liberty to take so many different routes. It is evident that two men may wind from right to left, and escape more easily than a party of 12 or 20, who cannot move so freely.

Mr Jeney made use of such an expedient successfully in Italy, when the Spaniards having advice of his detachment having slipped to the rear of their army, they cut off his retreat on all sides. The whole party being dispersed, he took two hussars with him, and was followed so close, that every instant he thought he must be taken; however, he saved himself by crossing a marshy pond. The enemy ran to turn him, but he got so far before them, that they could not take him. He got safe to his post, and in three days the whole detachment met without the loss of a man; which will prove, that in such a situation we need not despair, and that in extreme necessity the passage of a river or morass ought not to be declined.

PART IV. OF SIEGES.

SECT. I. Of Attack.

§ 1. *Maxims or principles to be observed in the attack of places.*

1. **T**HE approaches ought to be made, without being seen from the town, either directly, obliquely, or in flank.

2. No more works should be made than are necessary for approaching the place without being seen; that is, the besiegers ought to carry on their approaches the shortest way possible, consistent with being covered against the enemy's fire.

3. All the parts of the trenches should mutually support each other, and those which are farthest advanced ought not to be distant from those which are to defend them, above 120 or 130 fathoms, that is above musket-shot.

4. The parallels or places of arms the most distant from the town, ought to have a greater extent than those which are nearest, that the besiegers may be able to take the enemy in flank, should they resolve to attack the nearest parallels.

5. The trench should be opened or begun as near as possible to the place, without exposing the troops too much, in order to accelerate and diminish the operations of the siege.

There is no such thing as giving any exact rule in regard to the distance which ought to be observed upon opening the trenches. On level ground, this distance may be 800 or 900 fathoms; but if there should be a hollow way in the neighbourhood of the place, the besiegers are to take advantage of it, and open the trenches nearer. In general, they are to regulate themselves upon this head according to the nature of the ground, more or less favourable to the opening of the trenches.—We shall suppose, in the present work, that the opening ought to be made within 800 fathoms of the covert-way; the first parallel within 300 fathoms, the second within 150, and the third at the foot of the glacis.

6. Care should be taken to join the attacks; that is, they ought to have communications, to the end that they may be able to support each other.

7. Never to advance a work, unless it be well supported; and for this reason, in the interval between the second and third place of arms, the besiegers should make, on both sides of the trenches, smaller places of arms, extending 40 or 50 fathoms in length, parallel to the others, and constructed in the same manner, which will serve to lodge the soldiers in, who are to protect the works designed to reach the third place of arms.

8. Observe to place the batteries of cannon in the continuations of the faces of the pieces attacked, in order to silence their fire; and to the end that the approaches being protected, may advance with greater safety and expedition.

9. For this reason the besiegers should always embrace the whole front attacked, in order to have as much space as is requisite to plant the batteries on the produced faces of the works attacked.

10. Do not begin the attack with works that lie close to one another, or with reentrant angles, which would expose the attack to the cross-fire of the enemy.

§ 2. Of investing.

THE first operation of a siege is investing. The body of troops investing a town ought at least to be as strong again as the garrison; they are to divide themselves into several parties, in order to take possession of all the avenues leading to the place. By day they should keep themselves out of the reach of cannon-shot; but as soon as it is dusk they must approach much nearer, the better to be able to support each other, and to strengthen the town.

The investing is generally made by cavalry; but when the country is cut with ravines or hollow ways, or when there are woods in the neighbourhood of the place, then there must be likewise a body of infantry to guard all the avenues, and even to stop up, by a kind of retrenchments, such as might be the easiest to penetrate.

A few days after the investing, the army arrives, and is disposed round the town, according to the ground taken up by the line of circumvallation, and assigned by the engineer who has the direction of the siege. As soon as the place is invested, they begin to trace the line of circumvallation, and afterwards they set about its construction.

§ 3. To trace out the line of circumvallation.

BEFORE a general begins the attack of a place, he must endeavour to have as exact a plan of it as possible, by which he forms a design of the circumvallation and the attacks. The plan is rectified after the investing as much as the vicinity of the enemy will permit; and thereby he may correct the design traced at first, as far as there may be occasion for correction. It is upon such a plan, so rectified, that we suppose a general to proceed. We shall therefore begin with explaining or tracing the operations of the siege on paper; after which we shall give the manner of transferring them to the ground. We shall exhibit the progress of these operations from the investing to the taking of the place, in the order they are really executed. The line of circumvallation being a fortification intended against the enemy from without, who should attempt to succour the town, its defences ought to be directed against that enemy; that is, they ought to be opposite to the town; and the besieging army should, as we have already observed, be encamped behind that line, that is, between it and the town. The camp should be, as much as possible, without the reach of cannon-shot; therefore, as the line of circumvallation should be at a greater distance from the place than the camp, the reason is still stronger for its being also out of the reach of the cannon-shot; which, whether fired horizontally, or at an angle of 10 or 12 degrees, may be reckoned about 1200 fathoms. As the rear of the camp should not be incommoded by the cannon, this part ought to be above 1200 fathoms distant from the place; and we shall suppose that the distance ought to be

WAR.

Attack of Fortified Places.

Plan of the Gabion. Elevation of the Gabion. Gabion. Sand Bag. Empty Sand Bag.

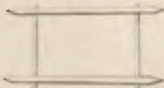
Fascine.



Manner of laying the Sand Bags on the parapet of the Works of Arms. to serve for a shelter in firing.



Blind.



Cheveau de frise.



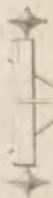
Chamblier filled with Fascines.

Empty Chamblier.

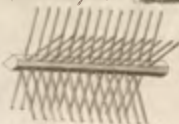


Sand Bag.

Empty Sand Bag.

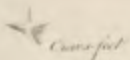
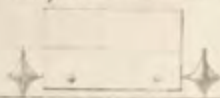


Plan of the Mantlet.



Profile of the Mantlet.

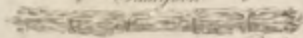
View of the Mantlet towards the Enemy.



Cross-fet



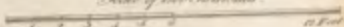
Fascine



Wick used in signs.

Fork used in signs.

Scale of two fathoms.



Part of a Line of Circumvallation?

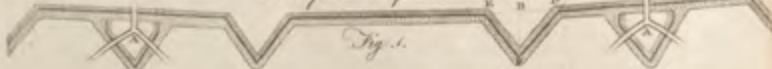


Fig. 1.



Section or Profile of a Line of Circumvallation.

Fig. 2.



A. Bell, sculpt.



be fixed at 1400 fathoms from the covert-way. The depth of the camp may be estimated at about 30 fathoms. From the front of the line of circumvallation there should be a space of 120 fathoms, to draw up the army in battalia behind the circumvallation; which space added to 30 fathoms, supposed for the depth of the camp, gives 150 fathoms; and this, added to the distance from the covert-way to the rear of the camp, gives 1550 fathoms for the distance from the circumvallation to the covert-way.

This being laid down, if the place be a regular octagon, fortified according to M. Vauban's first method *, the radius thereof will be 234 fathoms. This distance being added to the 1550 fathoms, then we shall have 1784. Or we may make it a round number by adding 16 fathoms, which are here of no manner of consequence; and we shall have 1800 fathoms for the distance from the centre of the place to the line of circumvallation.

The radius of the circumvallation being thus settled, from the centre of the place, with the distance of 1800 fathoms, you are to describe the circumference of a circle round the place. The diameter being 3600 fathoms, the circumference will then take 11314; then take the distance of 120 fathoms, which you are to carry to the circumference above described. This distance will be in this example 93 times, and something over, which differs very little from 120 fathoms; so that you may look upon the polygon of this circumvallation as a polygon of 94 sides, of 120 fathoms each.

The polygon of the circumvallation being traced, take on each of the extremities of its sides the lines BD and BE, each of 15 fathoms; and from the points D and E, taken for the centre and distance of 25 fathoms, describe two arcs which cut one another at the point F; from whence draw the lines FD, FE, for the faces of the redans of the line of circumvallation: thus it is we call the salient parts EFD of this line, which serve to flank it.

Perform the same operation on every side of the circumvallation, and then you will have its principal line traced.

The parapet within must be six or eight feet deep; and without make a ditch parallel to all its parts, three or four fathoms in breadth. The parapet of the circumvallation will be seven feet and a half high, and the depth of the ditch equal to the height of the parapet.

We have represented only part of the circumvallation in this figure; we should have had occasion for a very large plate to represent it entire, and in its just proportions.

To make the profile of the circumvallation, let AB be the line level with the country, and CD the scale of the profile. Let A be the side of the town, and B that of the country; take AE, of six feet; from the point E, raise the perpendicular EF, of three feet, and draw the line AF, which will be the talus of the banquette.

Draw FG parallel to AB, three feet from F to G, and the line FG will be the breadth of the banquette. On the point G raise the perpendicular GH, upon the line FG, four feet and a half.

Draw from the point H, HK, parallel to AB.

Make HK seven feet and a half, HI a foot and a half, draw GI, which will be the inside of the parapet of circumvallation.

Draw from the point K, on the line AB, the perpendicular KM; take KL a foot and a half, and draw IL, which will be the upper part of the parapet of the line of circumvallation. Take MN five feet, and from the point N draw the perpendicular NO, and set off seven feet and a half from N to O. Draw OR parallel to AB, three fathoms or 18 feet from O to R; produce the line LN to P, and LP will be the scarp, or the outside of the parapet of the line of circumvallation. From the point R raise RS, perpendicular to OR, or parallel to ON. Make QR equal to OP, and draw QS, which produce beyond S three feet to V; then take SX six feet, and draw VX, and the profile of the circumvallation will be completed.

This kind of glacis, VX, will serve to raise the enemy, and to expose them more to the fire of the line, should they attempt to make themselves masters of it, and to cover the parapet of the circumvallation, in the same manner almost as the glacis of a place covers the top of the rampart.

The dimensions above given may vary a little without inconvenience; but it would be to no manner of use to make the lines stronger; only you may reduce the ditch to ten or twelve feet in breadth at the top, and five or six feet in depth. A ditch of less breadth and depth, besides it is not allowing ground enough to form a good parapet, would have the inconvenience of being too easy to pass over by the enemy.

The lines may be fraised; which is done when they are to last for some time, and the neighbouring country furnishes wood enough for the purpose.

Sometimes a fore-ditch is dug before the lines, 12 or 15 feet in breadth at the top, and six or seven feet deep; it is made about 12 or 15 fathoms from the ditch of the line. The design of it is to stop the enemy when they attempt to attack the lines, and to make them lose both time and men in passing over it. As it is exposed to the fire of the lines, the time the enemy must necessarily spend in crossing will of course occasion their losing a great many men; and besides, the passage itself may throw them into such disorder, as shall prevent their attacking so advantageously as they would otherwise do, were it not for this obstruction.

Notwithstanding these advantages, M. Vauban disapproved of this fore-ditch, from a notion that if the enemy can get there, they are covered against the fire of the circumvallation: and he condemns it expressly in his Memoirs. But, with due deference to this great man, it seems that the engineers have not been all of his opinion upon this matter; and though it be true that the fore-ditch serves as a cover to the enemy when they are in it, yet it retards their march, and keeps them longer exposed to the fire of the lines. Accordingly fore-ditches have been made to lines on different occasions, since the death of marshal Vauban, particularly at Philippsburg. Between this fore-ditch and the ditch of circumvallation, at the siege of Philippsburg, in order to strengthen the defence of the circumvallation, there were likewise dug wells, which were ranged chequerwise, of about nine feet diameter at the mouth, and six or seven feet deep.

They

They were situated near to each other, to prevent the enemy from passing easily through the intervening spaces. The ground they occupied would have been extremely difficult for the enemy to pass; they would have retarded his march; and the fire of the lines, which entirely commanded the passage, would, without doubt, have killed a great many men. The Spaniards practised something of this kind at the siege of Arras in 1654. Before the circumvallation, they dug a number of holes two feet diameter, and a foot and a half deep; in which they fastened stakes that were capable of greatly obstructing the passage of the cavalry. See Plate CCCIII.

A line of circumvallation requires a strong army to defend it. We have found the circumference of the line which we have been now tracing, namely, of 94 sides, each of 120 fathoms, to be 11280 fathoms; out of this number the gorges of the redans are to be deducted, but then their faces are to be added. The gorges have 30 fathoms; and the two faces which have 50, give an overplus of 20 fathoms on each redan; that is, to the number above mentioned of 11280 fathoms, add as many times 20 as there are redans, in order to have the entire circumference of the circumvallation. This circumference has 95 redans; therefore we must add 94 times 20, or 1880, which will make 13160 fathoms for the whole circumference. This number being divided by 2282 (which is the number of fathoms contained in a French league) gives about five leagues and a half. Now it is clear, that so great an extent of ground requires a very numerous army to guard it. We may make a calculation pretty near, by supposing that every soldier drawn up in a line occupies a space of three feet, that is, half a fathom; that the soldiers are four deep; and that the army is drawn up in two lines, which will give eight ranks of soldiers. Each rank containing 26320 soldiers, the circumference of the circumvallation being 13160 fathoms, the eight ranks will therefore make 210560 men.

To these we should likewise add about 12000 or 15000 men for the works of the attack, which would form an army of about 225000 men. And as it is not customary, at least in Europe, to send such strong armies into the field, from thence it follows that the circumvallations, and the lines in general, when they are of a very great extent, are extremely difficult to guard. And indeed the most celebrated generals have been divided in their opinions upon this subject. They all agree that there are certain cases in which they may be of some advantage, especially when they are of a narrower compass, and the design of them is to stop up the entrance of a country of a small extent; but if they are very large, it is extremely difficult to defend them when attacked by a skilful enemy.

It was heretofore the custom to add great outworks to the lines, such as horn and crown works, tenailles, &c. All the circumvallations of the towns that were besieged during the wars between Spain and Holland, under the princes of Orange, were remarkable for this sort of works. These have been since laid aside, because we find that even a line, with its simple redans, is very difficult to guard; and such a number of outworks does but increase its circumference. The modern lines have only a few small half-moons A, before the

gates of the circumvallation, placed like those of the towns, against the middle of the curtains; the entrance is shut up by wooden barriers, and sometimes by chevaux-de-frize, and other contrivances, which will hinder the passage from being easily forced.

The lines having very little elevation, stand in no need of battions to be flanked in all their parts, like those in the circuit of a town. Redans, which are of more simple and expeditious construction, are sufficient. The angle they make with the curtain is always very obtuse, to the end that the soldier being placed on the face of the redan, may be the better able to defend its approach. It is customary, indeed, to make battions in those parts, where the lines form such angles as could not be sufficiently defended by redans. Yet, whenever it may be judged necessary, the line of circumvallation may be fortified with battions. The greatest part of the lines at the siege of Philippsburg was flanked in this manner, as may be seen in Plate CCCIII. The battions increase the circumference of the circumvallation; and probably the reason why they were used at the siege of Philippsburg, was because the circumvallation was of a very small extent.

At the point of the redans, batteries are erected to fire the cannon a barbette over the parapet; and the same is practised wherever the cannon are placed on the line of circumvallation.

A computation is generally made of the time requisite for making the lines, which is very necessary, in order to determine what day the trenches may be opened; this being seldom done till the line of circumvallation is completed. Such a line as that we have been speaking of is, according to marshal Vauban, a work of nine or ten days. When the ditch is narrower, and not so deep, it is made with greater expedition.

The calculation of the time requisite for constructing the lines, is made by measuring the excavation of the ground, of which they are to be formed, by the fathom; or, which amounts to the same, by measuring by the fathom a space of six feet of the length of the line, and computing the time a man will take up in doing it. As the like space is given to each of the workmen, the line is made nearly within the time that one single workman would be about the space assigned him.

Experience shows us, that a workman, in digging of earth of ordinary consistence, may, in a day's labour, dig about the third of a cubic fathom, that is, he may dig such a cube in three days; which will serve to determine pretty nearly the time of the construction of the lines, relatively to their assigned dimensions.

From what we have been saying, it follows, that when we know the circumference of the lines, we know likewise the number of workmen to be employed therein, reckoning one man to each fathom in length.

The workmen employed in the construction of lines are generally peasants, who are ordered for this purpose from the neighbourhood, and who, according to M. Vauban, should have a double allowance of bread given them, that is, one ration more than is allowed to the common soldier. It is not usual to give them any thing else.

When there is no possibility of getting peasants to work on the lines, then the troops are to do it: no part

of Sieges. part of the army is exempt from this duty ; horse and foot must serve alike.

Hitherto we have supposed that the circumvallation was regular ; but even were it irregular, the construction of it would differ very little from that which we have just now given.

A general ought to possess himself of all places from whence the lines may be commanded, when it is possible to do it without carrying the circumvallation to too great a distance ; and that he should take all advantages arising from the nature of the ground, as precipices, eminences, rivers, brooks, morasses, and, generally speaking, whatever is capable of rendering the camp of difficult access. If there are any woods or bushes within its inclosure, it will be right to cover it in those parts by felling the trees, and therewith making a proper fence.

The tracing of the lines admits of no manner of difficulty, if you have a good map of the adjacent country ; since you have only to bring the several parts of the line nearly within 1800 fathoms of the centre of the place, and to take care that there shall be about 120 fathoms from the point of one redan to another.

Nor is there any difficulty in transferring this line to the ground ; the operation is too easy to those who know a little of practical geometry, to lose any time in explaining it here.

§ 4. Of the Park of Artillery.

THE park of artillery is the place which contains the cannon, bombs, powder, and in general all military implements and machines, that have any relation to the artillery.

This park should be placed where there is least danger of being insulted by the enemy, It ought to be without the reach of cannon-shot, and inclosed within a particular spot, which should be fortified also by a line, consisting of a ditch and a parapet, flanked with redans in the same manner as the circumvallation. Nothing should be neglected that is capable of securing it either from the attacks of the enemy, or from any other possible danger.

There are several parks used in a siege ; the great one, which is simply called the park, and is that of which we have been speaking, serves as a general magazine for all the artillery. The little parks are more within reach of the enemy's attacks, and contain the stores and ammunition necessary for daily use ; for which reason they are supplied every day. They are distributed in places where they may be as safe as possible ; and there are as many in number as there are attacks.

§ 5. Of the Line of Countervallation.

THE intent of this line is to secure the besiegers against any attempt from the garrison. It is never made but when the garrison is numerous enough to disturb the besieging army.

It is constructed in the rear of the camp in the same manner, and pursuant to the same rules, as the circumvallation. The whole difference is, that as it is made to oppose a far less considerable body of troops than that which may attack the circumvallation, the parapet need not be so thick, neither need the ditch be so wide nor so deep. The thickness of the parapet may be

only six feet, and the ditch no more than eight feet wide at the top, and five deep. The redans are constructed in the same manner as in the circumvallation ; and a view of the figure * will sufficiently point out whatever relates to this line.

§ 6. Of the Trenches and Parallels.

WHILE the line of circumvallation is finishing, all the materials necessary for the construction of the trenches are got ready, and the engineer, who has the direction of the siege, examines on the spot the most proper place for the attacks, and the figure they ought to have ; and of these he makes a particular plan.

In regard to this subject, there are a great many things to observe. We have supposed that the place is regularly fortified, and on level ground ; so that here it is indifferent on which side the attack is begun. It is sufficient to explain the rules that are to be there observed ; and afterwards to apply them to irregular towns, and to uneven grounds. Let C (fig. 2.) be the place besieged, and A and B the bastions attacked. Begin with indefinitely producing towards the field the capitals of these two bastions ; in like manner produce the capital of the half-moon opposite the curtain between these two bastions ; set off 800 fathoms from the salient angles D and E of the covert-way to F and G. This done, take DH, and EI of 300 fathoms ; and from the centre C, with the radius CH or CI, describe an arc, which produce beyond the points H and I ; and on this arc HI construct the first parallel. Then on the same lines, DF, EG, take the points M and N 140 fathoms distant from the points H and I ; and through these points, describe from the centre C another arc, on which the second parallel is constructed. This second arc will cut the produced capital of the half-moon, in the point L, which is to be observed, in order to begin from hence a trench, which shall extend to the salient angle of the covert-way before this half-moon. Lastly, through the points O and P, the distance of 20 or 25 fathoms from the angles D and E, describe from the centre C, a third arc, on which the third parallel is constructed.

Terminate the first parallel by producing the faces *ab*, *ab* of the half-moons 1 and 2, collateral to the bastions A and B ; but extend the parallel 15 or 20 fathoms beyond the intersection of this prolongation. The second parallel will be less extended than the first, by about 30 fathoms on each side ; and the third also less extended than the second, by about 30 fathoms on each side.

This being done, you have a sketch of the trenches, and the places of arms. The business now is to trace the trenches, or approaches, without being seen or enfiladed.

Take a long ruler, and lay it on the point G, so that it shall make, with the produced capital EG of the bastion B, an angle EGS, whose side GS being produced, shall meet no part of the covert-way, and shall be distant about 10 or 12 fathoms from the angles to which it approaches nearest, and this in order that the trench towards the side GS may not be enfiladed from any part of the covert-way.

Take GS of an arbitrary extent, as of 200 or 220 fathoms, and put the ruler on the point S, so that it

shall make, with GS, an angle GST, the producing of which on the side ST, shall not fall on any part of the covert-way, and it will be 10 or 12 fathoms distant from the most salient parts. Terminate this side in T, and there make also a new angle STI, whose side TI should terminate at the point I, where it meets the first parallel. Perform the like operation on FH, and it will give you the outline of the trenches as far as the first parallel.

At this part of the trenches you may make a greater number of turnings; you may likewise carry it in a direct line to the first parallel. The most important article is, to take care not to let it be enfiladed from any part of the covert-way; and the fewer angles and turnings it makes, the quicker it is constructed, which in transferring it to the ground is worthy of great attention. Mind also, that its extremity, I, does not fall far from the point where the produced capital of the bastion meets the first parallel.

By the same method trace the trenches between the first and second parallel, as may be seen in the figure; but as this part is nearer the place than the former, in order to avoid being raked, it must have a greater number of angles. All its sides ought to cut the prolongment of the capital of the bastion B, as appears by the figure. In like manner trace the trenches between the second and third place of arms, by making as frequent turnings on the produced capital of the bastion B, as shall be necessary, in order to its desiling from the covert-way. By the same method trace the trenches on the capital of the bastion A; trace also a trench on the produced capital of the half-moon, between the second and third parallel, to reach the flank-angle of its covert-way.

When the garrison happens to be strong and enterprising, it will be proper, between the second and third parallel, to make parts of trenches U, U, &c. parallel to the places of arms; they are to be 30 or 40 fathoms long, and to communicate with the trench, as may be seen in the figure. These parts of the parallels are what we have distinguished by the name of *half parallels*, or *places of arms*. Now to trace the whole trenches and the places of arms, of which we have been only giving a sketch or outline, you are, at the distance of 12 feet, to draw parallel to the line we have been tracing, which expresses the trenches, and in like manner to that which expresseth the parallels or places of arms.

At every angle of the trenches observe to produce the part of the trenches in those places, so that this prolongation shall cover that part of the trenches which it terminates.

This will be illustrated by an example.

Let ABCDEFGMQ be a part of the trenches, and let AB be one of the sides opposite to the enemy; produce AB, so that BE shall be five or six fathoms; and in EG, take also five or six fathoms from I to L, which will give the end of the trench BELI, the use of which is to cover the *boyau* or branch IOMG, whereby the enemy will not know the place where it falls into the trench AB, and to make room for withdrawing those who are in this part of the trenches, and that the passage may be free at all the angles. In like manner produce the side GM, from M to N, and the side IC, from O to P, and you will have the end of the trench MNOP, which will cover the branch

DCOQ. Do the same at all the angles of the trench.

The parapet of the trench being made to cover it, the parapet ought to change sides alternately. If, for instance, AE, in the preceding figure, is towards the place, it is evident that the side GN will be towards it also, and likewise the side CD; and therefore the parapet of the trench is successively constructed from the right side to the left, and from the left to the right. In the plans of attacks, the side of the parapet of the trench, as also that of the parallels, are distinguished by a stronger line than any of the rest; but the latter admits of no difficulty, because we may easily conceive, that being parallel to the place, its parapet must necessarily be on the side that faces it. Care has been likewise taken to express, as we have already mentioned, in the figure, the parapet of the branches, by a stronger line than the other lines of the attacks. The side of the trench opposite to the parapet, is called the *reverse of the trench*.

What we have been mentioning is sufficient to trace the trenches upon the plan of a regular place on even ground. In order to give all that can be said relating to this subject on paper, there remains only to add a word or two of their depth, and of their parapet.

The trenches are generally no more than three feet deep; and their parapet, beginning from the bottom of the trench, is six feet and a half high, or thereabouts. The parallels have a parapet like the trench, and of the same height; but as they are intended for firing over, they are made with a kind of banquette, as may be seen Plate CCCV, fig. 3. to raise the soldier, to the end that he may fire over the parapet. On the parapet of the places of arms, are put baskets, fascines, or sandbags, ranged in such a manner that the troops may be able to fire without being too much seen by the enemy. The third parallel, or place of arms, is generally wider than the rest. Sometimes the inside of its parapet is likewise made with steps or banquettes, to the end that the soldiers may conveniently pass over it in case of an attack. The fourth figure of the same plate shews the profile thereof.

There will never be any great difficulty in tracing the attacks, even of an irregular town, and upon uneven ground, from an exact plan, by observing the method we have made use of to make its parts desile properly.

But the difficulty is to transfer the works from the plan to the field, and to direct the attacks of an irregular fortification on irregular ground. By irregular ground we understand that which does not permit an army to extend itself on every side; which is cut by morasses, or subject to be laid under water by the town; or, in a word, which has only some parts fit for continuing the trenches. Here it is that the knowledge of an able and experienced engineer is requisite, in order to obviate the inconveniences of such a spot; a thing that can be done but imperfectly upon paper. Yet to convey some idea of the manner of proceeding, we shall here transfer the above traced attacks to the ground; but to such ground as hath been already mentioned, equally accessible in every part. Before it is done, we must from all the angles of the branches of the trench, upon the plan, draw perpendiculars to the produced capitals; observing the distance of each

of Sieges. of these perpendiculars and their length. It is evident, that if the capitals were marked on the ground, and it was possible to perform the operations there with any convenience, the trench might be traced with all ease; because by stretching a cord successively from the extremity of one perpendicular to another, you would have the first trace, or the zig-zag, of the trench: but nothing can be traced on the ground; for the operation is to be performed by night, in order to conceal the knowledge of it from the enemy, who will be very little disposed to let the besiegers carry on such an operation unmolested. The following is a method that may be made use of.

The engineer may walk about in the day-time, at a sufficient distance from the place to be without the reach of musket-shot. It is not usual to fire cannon against a single man, because the shot is very uncertain, especially against a person who does not stand still for any time; therefore, without any great danger, he may only keep himself out of musket-shot. It is easy to discover the flanked angle of the bastions against which he wants to direct the attacks, and the salient angle of the covert-way opposite to them: which gives two points, and these the direction or the prolongation of the capitals of those bastions. Consequently he has only to plant some pickets on the direction of these points, in order to have the prolongation of the capitals of the bastions. These pickets can only be put out of the reach of musket-shot; but by day-light he may observe something of the ground lying in the direction of these pickets, and he may afterwards reconnoitre it in the evening, in order to place pickets there also.

In this manner he may have the prolongation of the capitals pretty exact.

In order to conduct the trench by these capitals, the following method has been pointed out by marshal Vauban.

Examine upon the plan of the attacks what distance there is from the beginning of the trench to the first perpendicular; measure this perpendicular and the side or part of the branch corresponding to it; take cords of equal length with these lines, and fasten the extremities of the two cords, one representing the length of the line of direction, and the other that of the branch which makes an angle with it, to a picket at the point of the produced capital where the trench begins, and make two men walk, each of them holding one end of these cords, viz. one in a direct line towards the place, and the other also advancing towards the place and walking along-side of the former. When the first comes to the farthest distance betwixt the opening of the trench and the first perpendicular, he must plant a picket on this point, to which he is to fasten the cord which expresses the perpendicular. He must take the other end of this perpendicular, and afterwards turn off to the right or to the left, according to the side where the perpendicular ought to be, till the part of the cord expressing the perpendicular is well stretched, and joined to that end of the cord of the trench carried by the other man: at their meeting they are to plant a picket, by means of which the triangle, thus transferred to the ground, will be like that which was taken upon the plan; and this part will be traced on the ground in the same manner as on the plan.

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You may have as many cords as there are windings or turnings in the trench, and you may trace every part of them in the manner above laid down, at least in the beginning, and when the trench is yet at a distance from the place.

Let the trenches be traced upon the plan, (fig. 2.) in the manner already shown, and let C be the place against which you are to direct the attacks, transferring the plan to the ground: let BG be likewise equal to the line of direction of the plan; you are to plant along this line a sufficient number of pickets, with burning matches tied to them, in order to discover them the more easily.

To begin the tracing of the trenches, tie to the picket G a cord of the length GS, and to the same picket another cord of the length GX: let there be two men, and each take an end of these two cords, and let them walk, the one at a venture towards S, and the other directly to X towards the place along the line of direction BG; and having reached the end of his cord, let him fasten it with a picket, after having drawn it very straight; and to this picket let him tie one of the ends of the cord, which is to mark the perpendicular XS. Let him take the other end, and walk towards S till his cord XS is stretched very tight, and then let him join the man who holds the end of the cord GS, and let them fasten a picket in S, where both the cords join. Let them afterwards take away the cord XS, the perpendicular which is of no use, and the cord GS which remains will mark the real tracing of the trenches. In order to have the line ST, you come to the picket X; to which you tie a cord of the length of XY, and another to the picket S of the length of ST. Let two men, as before, take each an end of these two cords, and let them walk, the first who holds the end of the cord XY, directly towards Y, and the other who holds the end of the cord ST, obliquely towards T: he who holds the cord XY, having reached Y at the end of his cord, shall place a picket there; to which let him tie the end of the cord of the perpendicular YT, and let him walk towards T, holding the end of this cord, till he meets or joins the man who holds the end of the cord ST; and at the point T of their meeting, let them place a picket, to which let them tie the end T of the cord ST. After this take away the cord of the perpendicular, and thus continue the same operation as long as you please, or are able, in order to trace all the other turnings or windings of the trenches.

This whole operation supposeth that you know exactly the distance of the point G, the extremity of the line of direction to the top E of the salient angle of the covert-way. To find this distance, many ways may be learnt from trigonometry; but you may make use of the following, which is pointed out by marshal Vauban, and is the most simple.

Let A (fig. 5.) be the vertex of the salient angle of the covert-way, and AB the line of direction of the trench whose length you want to take. At the point B, draw BC perpendicular to AB, to which give what measure you please, as 80 or 100 fathoms, and at the point C, draw CD perpendicular to BC; divide BC into several equal parts, as four, six, or eight, and place pickets in each of these divisions. Walk along CD, and look out for a point on this line,

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which shall be in the direction of A, and of one of the pickets of BC. Suppose that BC is divided into four parts, and that G, which is the picket of the third division, is in the direction of the point E of the line DC, and at the vertex A of the salient angle of the covert-way, you have the two similar triangles BGA, GCE. Therefore, as BG, the base of the former, is three times GC, the base of the second, it follows that CE is the third of AB, and that thrice CE will give the length AB. If GC was only the fourth part of BG, CE would be only the fourth part of AB, &c.

When once you have found out by this, or such other methods as you may make use of, the length of the line of direction EG, (Plate CCCIV. fig. 2.) you will be always able to know the distance that remains to the salient angle of the covert-way, and to the points I, N, P, through which the parallels or places of arms are to pass. These points being determined, it would be an easy matter from geometry to find out a method of describing the parallels that are to pass through them, if their situation admitted the engineers to perform the operation quietly by day-light; but they are to be traced in the dark, and under the fire of the place; so that there is no other way to trace them than by approximation, that is, to move as nearly parallel to the circuit of the place as you can by your judgment; and to plant pickets, with cords tied to them at proper intervals, the whole length of the line. But you can trace with cords only the first parallel; for the others are too near the place to be able to perform this operation: you are therefore to proceed in tracing them almost in the same manner, as we shall observe when speaking of the sap, to which they belong, and which are carried on by that method.

§ 7. *Observations on the properest part for making the attacks.*

WHILE the lines are perfecting, the necessary materials are to be got ready for the construction and operations of the attacks. The materials consist of fascines, pickets three feet long and about an inch or two in diameter, gabions, and pickets for gabions. There must likewise be a provision of the several instruments or tools necessary for these operations.

The engineer, who has the direction of the siege, will likewise make use of this time to examine into the parts most convenient for carrying on the attacks, and where they will be most simple and expeditious. There are few fortresses in Europe of which plans are not to be had; but as it is presumed that the enemy hath increased the fortifications of a town which is threatened with a siege, care should be taken to get intelligence thereof from some skilful person that has been in the place, and made all the observations possible in regard to the works lately raised, without giving any suspicions of his intentions. The danger of such an undertaking is very well known, so that the person employed cannot be too cautious in keeping himself concealed.

While the circumvallation is making, the engineers may at a distance, or, as we have already observed, out of musket-shot, examine some part of the outworks; and afterwards, from the report of the person sent into the place, and from what they know themselves, they may settle with the general the properest

and fittest place for carrying on the attacks. On this occasion there are many things to be observed, as well with regard to the ground as to the fortifications; but in a work of this nature, it is sufficient to consider the points of most importance.

First of all, the nature of the ground about the place must be well observed, Whether there are any ditches or hollow ways, that may serve as a cover to guards of horse and foot against the cannon of the place; whether there are any parts that command the town, and may serve for the erecting of batteries; and whether the ground is fit for the works. The most favourable circumstance is to find a soil easy to dig; then the works advance with ease and less loss, because the soldier is soon under cover, and the cannon does not do half the mischief as in stony places, where it makes the shivers fly about, which wound a great many men; and besides, instead of sinking as in a good soil, it makes a number of rebounds, which greatly obstruct the progress of the works. If the ground about the place is a pure rock, or a morass, then the operations are still more difficult; besides, there will be occasion for a vast quantity of fascines, sand-bags, wool-packs, &c. and the workmen are in much greater danger.

The rivers which run through the town, or in the neighbourhood, do likewise deserve consideration; for they separate the attacks, and it may happen by some stoppage of the water, or other accident, that the bridges of communication being broke down, the separation of the attacks will expose the army of the besiegers to be defeated, by which means the place may be relieved. It is proper also to inquire, whether those rivers are not subject to inundations, which if they were to happen during the siege, and to break in upon the attacks, would oblige the besiegers to abandon the trenches, and to raise the siege. In a word, whether the town can command any quantity of water so as to make an inundation round the place, and to lay the ground appointed for the attacks under water. All these points, and a great many others which we do not mention, deserve the most serious attention. On the choosing a proper ground for the attacks the success of the siege generally depends; for which reason the engineers and the generals, who are particularly concerned in this choice, spare no pains to obviate every inconvenience that the besieged may make use of to retard the progress of the works. All that the enemy can do ought to be foreseen, in order to prevent or remedy it effectually.

After choosing the properest ground for the attacks, a general is to consider the front which is least fortified and least covered with outworks. All other things being the same, it is evident, that the fewer outworks there are, the easier will be the attack. But if the place is situated in a morass, or upon an eminence, then he is straitened by the ground; for let the outworks of the accessible side of the place be what they will, it must necessarily be attacked on that side. If the town is situated on the bank of a great river, as Mezieres, Namur, Thionville, Strasbourg, Philippsburg, &c. which occupy only one side of it, and maintain the other by little forts; then it is most advantageous to attack that side next the river above or below, flanking the right or left of the trench with the bank of the river, and carrying another trench on

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the opposite bank, with an intent to take possession of those works, and to occupy a proper situation for placing reverse batteries opposite the grand attacks. In a word, the whole choice of the attacks consists in finding out the properest ground, and the weakest side; but as it is to be presumed that the enemy are acquainted with the nature of the ground about the place, and therefore have taken care to fortify more exactly those parts which are most favourable to an attack, the besiegers should not hesitate to make their approaches on that side; where, by the situation of the ground, they may gain, what the increase of the fortifications might otherwise make them lose.

But in regard to places surrounded with morasses, it is to be observed, that some of those which are looked upon as inaccessible, may happen to be otherwise; and that an exact knowledge of their situation will greatly facilitate the taking of the place, by carrying on the approaches on that side which there is reason to think is less fortified, as the enemy judged it more difficult to attack.

§ 8. Of opening the trenches.

EVERY thing being ready for opening the trenches, the ground pitched upon, the attacks settled and drawn upon a plan, and stores or magazines of all the materials necessary on the occasion being within reach of the place where the pioneers propose to work; the general having also settled the round of duty for the guard of the trenches, both of horse and foot, as likewise the number of horse for bringing the fascines, with the number of pioneers and troops to support them; and the chief director of the engineers having acquainted the rest of the corps with his plan of attack, and the manner they are to act; in a word, every thing being ready for execution, the troops designed for the service of the first night being prepared and drawn up in battalia at the place of rendezvous; and the pioneers provided with fascines, pickets, shovels, and pick-axes; in the dusk of the evening they all begin to advance, every soldier being obliged to carry a fascine, together with his arms, in order to reach the place designed for opening the trenches. The guard of horse march at the same time to their assigned posts, to the right and left of the attacks, ready to support the troops for the guard of the trenches in case of any fall from the enemy. All this is to be done with the greatest silence possible, and nothing should be neglected to conceal the design from the enemy.

The pioneers are, according to marshal Vauban, divided into brigades of 50 men each, commanded by a captain, a lieutenant, and two sergeants. They advance four or six abreast, near the place where the trenches are to be opened; after which the rest of the troops that are to support them, being come up, the engineers charged with the tracing of the trenches, and who are to place the pioneers, make them come forward where the opening is to commence, while the battalions that support them are drawn up to the right and left in the places assigned them, where they unload their fascines, and silently wait for further orders. In the mean while the engineers trace the branches of the trenches, as we have already observed; the director places the first cord (fig. 2.) from G to S, or

traces the line GS, and the other engineers afterwards trace the other branches from S to T, and from T to I. The same is done on the other side of the attack. The tracing of these two parts is done at the same time; they likewise begin to trace the first parallel this very day, and the work is advanced as fast as possible.

As much work is undertaken as the pioneers can be expected to perform this first night: and in proportion as the tracing goes on, the engineers place the pioneers, making them file off one by one, each carrying his fascine under the right arm if the place is on the right, or under the left if it is on the left, to the end that by the position of their fascines, which they lay on the ground along the tracing, and on the same side as they carry them, they may be enabled to distinguish the side of the place, that is, the side towards which they ought to throw up the ground in order to cover the trench from the fire of the town. As fast as they are placed, they are ordered silence, and made to lie down with their face on the fascines, and not to begin to work till commanded. The whole operation begins at the same time, that they may advance equally. When every thing is ready, and the pioneers are all placed along the tracing which is purposed to be made this first night, orders are again given for them to work; and then they all set about it with all the diligence possible till day-light, that they may be covered against the fire of the place, which is still very dangerous, in the morning, considering that the trench has not had time as yet to be rendered so perfect as it ought. The troops that are to support the pioneers, are put under cover on the back of that part of the trench which is finished; that is, on the border of the trench opposite to that on which its parapet is raised; they are made to lie on their faces; after which the pioneers, who have been upon duty in the night, begin to file off, and others fill up their places.

It is very difficult this first day to render the trench as complete as it should be; but no pains are spared to make it as complete as possible.

As the design cannot be now concealed from the enemy, the guard mounts the next day with drum beating about noon; and care is taken to continue the work of the trenches the second night, in the same manner as the first, that is, by placing the pioneers uncovered, because they are at such a distance from the town, that the fire is not yet dangerous enough to require their being placed otherwise: the work goes on quicker in this manner; but it must necessarily be altered as soon as the workmen come within musket-shot of the place.

If the whole compass of the first parallel has not been undertaken the first night, it is to be done the second; and the branches of the trenches are still carried on, though with less vivacity and progress than the first.

The first night is the best adapted for advancing the works of the trenches, because of the distance from the place, which is too great to apprehend any danger from the enemy's fire. Sometimes it happens so, that the enemy is not apprised of these works; especially when all the necessary precautions have been taken to conceal them, and in that case the business is done in a manner without loss or danger. It is of importance to advance them with quick expedition, that they may be fit to receive the troops, who are to support the pioneers,

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in order to cover them against the fire of the place: and as the first parallel is designed for this purpose, therefore it cannot be perfected too soon.

This line is made with a view to protect the advanced works, which become more difficult in proportion as they draw near the place; and it is but prudent not to run the risk of their being destroyed by the enemy; for by being too hasty a contrary effect would follow. The grand rule is, not to advance faster than you are able to maintain your ground.

According to marshal Vauban, the first place of arms, though begun the first night, has need of a second and a third, before it can be completely finished and in condition to hold the troops that are to guard the trenches; but the works for perfecting this line will not hinder the besiegers from advancing to the second parallel, which ought not to be begun till the fourth night. It is to be observed, that the guard who mount the trenches are changed every day; they mount about noon, and they are to be as strong as shall be requisite for opposing the sallies which the garrison of the place may make against the workmen. They are generally two-thirds of the garrison, because the enemy may fall upon the trenches with that number, reserving the other third to guard the town. But as it is possible that the besieged may think proper to fall forth with their whole force, and fall upon the workmen, together with the troops that support them; therefore, in order to guard against every accident of that sort, the troops in the trenches ought to be nearly equal to those of the place, especially in small towns, where a few are sufficient to guard the posts, or where the burghers are so well attached to the prince, that the commandant may depend upon their fidelity in guarding the town; because in that case he may make a general effort with his whole garrison against the troops in the trenches.

We have observed, that the second night the pioneers may still be placed uncovered; but the third it would be very dangerous to do it, because of the enemy's fire being too near. When the engineers are of this opinion, they take care not to expose the men any longer uncovered, and then the works are carried on by sap.

§ 9. Of the sap.

Let ABC be the part of the trenches advanced to A, so near the town as to render it impossible, without evident danger, to work any longer at the approaches, unless the men have some cover against the fire of the place: and let the branch AD be traced by the engineer, not with a cord, as at the opening of the trenches, but with some pickets, which he has taken care to place in the direction this branch ought to have, to serve as a guide to the workmen. A cut is made in the parapet BA of the trenches; and then the men designed to work by sap, who are therefore called sappers, will move forward through the opening A, successively eight in number. The first is to roll before him a mantlet, to cover him against musket-shot. He advances as far as is necessary to place a gabion on the line AD; and this gabion being let on its base, in the proper situation, with the pickets uppermost, the sapper makes a little trench behind, about six inches distant from the gabion, of a foot and a half in depth, and as many in breadth, and he empties the earth of

this ditch into the gabion. This done, he places a second gabion near the first, in the same manner, and always under the cover of his mantlet; in like manner he makes a ditch behind, the earth of which serves to fill his gabion. Thus he places a certain number, till he grows tired of the operation.

The second sapper, who immediately follows him, widens the ditch made by the former by six inches, on the opposite side to where the gabions are placed, and makes it half a foot deeper. The earth he digs up serves to fill the gabions of the first sapper. The third sapper widens the ditch of the two first likewise half a foot, and he deepens it in the same proportion.

At length the fourth enlarges it also in the same proportion, in breadth and depth; and then the trench is three feet wide, and the same in depth, which is as much as it ought to be. The earth dug up on this occasion is sufficient, not only to fill the gabions placed by the sappers, but likewise to make a parapet of the rest, which is thrown up, and is strong enough to resist musket-shot. The third and fourth sapper lay the fascines over the gabions, with their hooks, or otherwise; then they press them down, so that the stakes of the gabions shall keep them firm. As the sappers are ranged by brigades of eight each, while the first four are working at the sap, in the manner above described, the other four furnish them with gabions, fascines, and whatever other things they want. But when the first four are tired, the four last take their places, and work in the same manner; after which they are relieved by the first, and so alternately, till each has performed his part at the head of the sap.

When the first gabions are placed, and the sap is not as yet perfected, the part in which the gabions touch one another being less solid than the rest, their joints are filled up by sand-bags, which are taken away when the work is completed, or those interfaces are filled up with small fascines called *sap-sagots*.

This is the nature of the sap; a work so much the more considerable, as it is performed by day as well as night. Several saps are carried on at the same time; and there is one to both sides of each of the attacks for the second and third parallel. There are likewise saps to each of the advanced parts, and to the half-places of arms or parallels.

We have supposed that the first sapper covered himself with a mantlet; this was the custom formerly, and an excellent custom; but now it is more usual to have a stuffed gabion. He rolls this gabion before him, and uses it in the same manner as he would the mantlet. Though care be taken to give a stuffed gabion to the directors of the saps, yet it happens sometimes that the sappers will not make use of them: for as the weight of this gabion renders it sometimes troublesome to roll, they choose to do without it; and are satisfied with rolling several gabions before them, near one another, and with working behind them. These gabions are indeed of little defence, but are sufficient to conceal them from the enemy, who cannot tell the gabion behind which the first sapper is. But as the preservation of these men is of great importance, they ought to be obliged to work behind the stuffed gabion: for the same reason, the first sappers should have a cuirass, and even a head-piece, musket-proof.

There are three sorts of sap; the limple, viz. that which

Of Sieges. which we have been describing, the double, and the flying sap.

The simple sap, or the sap without any other appellation, is made on one side, or, which is the same thing, has only one parapet.

The double sap has a parapet on each side, and is carried on wherever its two sides are seen from the place.

The flying sap is that in which they do not give themselves the trouble of filling the gabions with earth; it is made where the workmen are not much exposed, and in order to accelerate the approach.

The foregoing account, with the assistance of the figures relative to this subject, is sufficient to give a very exact idea of whatever relates to the sap; we have only to observe, that as soon as the men have brought this work to its proper perfection, the pioneers are ordered forward, and these make it the same width as the other parts of the trenches; upon which it changes its name of sap to that of trench. It is called a trench, if it serves as a way to the town; and a place of arms, if it be parallel to it, and designed to lodge troops.—See Plate CCCV. fig. 7, 8. and CCCVI. fig. 1, 2. See also the upper compartment of Plate CCCII. for figures of the different instruments used in this and other operations of a siege.

§ 10. Of batteries.

CANNON is made use of at a siege for two different purposes; the first to drive away the enemy from their defences, and the second to dismount their guns.

To produce these two effects, the batteries should not be above the mean reach of cannon shot from the place; that is, above 300 fathoms. Therefore there is no possibility of constructing them till the first parallel is formed; and as the distance of this first parallel from the place is generally 300 fathoms, the batteries must be on this line, or beyond it, nearer the town.

In order to judge where they may be placed most conveniently, we are to consider that this must be where they are able to discover or see into a greater part of the enemy's defences. Now this can be no where but on the produced faces of the works attacked. In this situation they discover the whole length of the faces of those works, which they could not do in any other position; therefore we may lay it down as a general rule, always to place the batteries, when the ground will permit, on the produced faces of the works attacked, as we have mentioned in the maxims of attack.

Let Z be the centre of the place attacked, and the trenches, as well as the parallels, completed. To find a proper position for erecting batteries, produce the faces AD, AC, BE, BF of the two bastions attacked, till their prolongation cuts the first parallel. Produce also the two faces OM and OL, of the half-moon MOL of the front attacked, and the faces HG and IK of the two collateral half-moons 1 and 2, to the first parallel, and erect batteries on these produced faces, as you see in P, Q, R, S, T, U, X, and Y.

They are advanced beyond the first parallel 40 or 50 fathoms; and are parted from the trenches, to the end that they may be used with greater ease and convenience, and less trouble to the workmen.

The construction of batteries belongs to the officers of the artillery, who consult with the engineer that

has the direction of the siege, about their situation, and the number of guns.

§ 11. Of sallies.

THAT we might not interrupt the making of the trenches, we conducted them to the foot of the glacis, without taking notice of sallies; that is, attacks which the garrison may make against the trenches, with a view of ruining or retarding the works. As it is not to be presumed that the enemy will suffer themselves to be straitened in the town without using some endeavours to prolong the siege, and as sallies seem to be one of the principal means they can employ, it is proper to point out the conduct to be observed, not only for preventing their effects, but likewise for rendering them disadvantageous to the enemy.

The intent of sallies is to destroy a part of the trenches, to get to some battery in order to nail up the cannon, or to surprise part of the guard in the trenches. When there happens to be a strong garrison, they likewise make sallies without any particular view: but a sensible governor will avoid all such; and we are to suppose that he acts always with one settled design, which is to retard the taking of the place; otherwise he would wantonly expose the garrison, and be the cause of knocking men on the head, without any sort of necessity.

Sallies can be attended with no success, unless they are made at a time when unexpected; by falling then upon the workmen, they are scattered, and obliged to fly. They in running away must needs occasion confusion and disorder among the troops that are to support them; and it requires some time before they can be brought again to order, and made to charge the enemy. In the mean while the latter avail themselves of the opportunity to fill up the trenches, and to do all the mischief possible: but when the troops are upon their guard against every design of the enemy, if the latter stir out of the place, they are suffered to advance; and care is taken to cut off their retreat, by means of the cavalry and the picket, in case they should advance too far into the field: otherwise they are fired at from the places of arms, and other works within reach; and then they are briskly attacked by the grenadiers and the troops upon duty in the trenches. Care, however, must be taken not to pursue them too far, for fear of the fire of the place, which never fails to be extremely sharp when the enemy have got back to the covert-way.

In proportion as the works advance towards the town, sallies become more dangerous to the besiegers, because the enemy may fall upon the trenches more readily; for which reason, double care should be taken to straiten them more closely, and to prevent their falling out with impunity. As the works carried on beyond the second parallel are more exposed than the rest, because of their proximity to the covert-way, no part should be advanced without being well supported. Hence, as we have already taken notice, half-places of arms are formed, in order to support the head of the trenches, till they reach the third place of arms; which must be set about with the greatest care and expedition possible. When this is done in the manner it ought, there will hardly be any farther danger from the sallies.

Sallica

Sallies are seldom made in the day-time but by a presumptuous enemy, who imagine they may safely attack and defy the troops on duty in the trenches: but they are easily repulsed, unless the besiegers are so weak, as not to be able to furnish a sufficient guard for the trenches; in which case they ought not to continue the siege, lest they run a risk of being at length entirely defeated.

A garrison may likewise be in a condition to insult or attack the trenches, after having received a strong reinforcement; and then it is in the option of the general either to continue or to raise the siege. If it appears that his army suffers too much by continuing, he ought to raise it: but here we suppose that he has all the superiority of troops necessary for avoiding such a step, which, independently of the expences incurred in preparing for the siege, and the number of men slain in the different operations, is generally attended with very troublesome and disagreeable consequences.

At the opening of the trenches, and when the besiegers are at a good distance from the place, there is little occasion to be afraid of any sallies in the day; for there would be full time enough to prepare to receive them before they reached the works. If the enemy are disposed then to issue forth, they will do it by night; but it will be an easy matter to get intelligence of any attempt they should make, by ordering parties of 10 or 12 men, headed by a serjeant, to range in the night between the trenches and the town.

These men may lie on their faces as near the place as possible; remaining in profound silence till they hear or perceive some motion in the covert-way; then they should send one of their own body immediately to acquaint the lieutenant-general who that day commands the trenches, and the rest should continue there as long as they can be concealed, to see which way the enemy direct their course. This caution is not only simple and easy, but sufficient to guard the besiegers against surprise, and to enable them to give a warm reception to the enemy.

When the works are advanced pretty near to the place, for instance, to the third parallel, if the enemy should then sally out and fall upon the workmen, the latter must be ordered to retire quickly to the back of the third place of arms, and let the guard fire briskly upon them, without minding the overturning of a dozen or two of gabions; for the galling fire of the small arms, to which the enemy are exposed during this expedition, will make them pay dearly for what little disorder they occasion.

While they are taken up in this business, the besiegers must fall upon them vigorously, and drive them back into the town; taking care, however, not to follow them too far, for fear of being exposed to the whole fire of the place, as soon as the enemy is got back to the covert-way. The mischief they have done is quickly repaired: Marshal Vauban says that one hour is enough for this purpose; and if the fire of the besiegers has been well served, it does more harm to the besieged, than that they can have done to the trenches.

§ 12. *Of the Lodgments on the Glacis, and the taking of the Covert-way.*

We left the works at the foot of the glacis, and at

the third parallel; our business is now to make a lodgment there, and to go on with them till we have driven the enemy from the covert-way.

Our being then so near the covert-way, renders it impossible to desile from it; but in order to prevent the effect of enfilading, it is necessary to make the trenches much deeper in the glacis; the fire of the covert-way being very near, cannot plunge into those deep trenches, which renders it less dangerous to abide there than it would otherwise be were it not for this precaution: or they are made with traverses much in the same manner as in the covert-way, by which means the enfilading will be prevented in part, though not entirely.

And here we are to observe, that the enfilades are far less dangerous when near than at a distance; because it is easier to guard against them by means of traverses. When near, the violence of the fire makes the ball describe a line sensibly direct; so that it grazes the top of the parapet of one traverse, it will plunge into the next. But in distant enfilades, the balls being at the end of their reach, and having spent their force, they describe lines sensibly different from direct; so that in spite of the traverses and their height, they fall into the part of the trench between the traverses. This is a remark made by Mr Vauban.

In regard to the figure of the lodgment on the glacis, it varies according to the different circumstances or position of the works by which it is defended. The common way is to make several short turnings or zig-zags upon the ridge of the glacis, in the direction of the salient angle of the covert-way, and continued to this angle; or you begin with making two or three short turnings towards the foot of the glacis, from whence you ascend afterwards by a direct trench, or sap, in the following manner.

Two sappers roll each a mantle, or stuffed gabion, before them on the ridge of the glacis; each making a sap, one on one side of the ridge, and the other on the other. The ditch is dug deeper than usual, in order to cover them the better against the fire of the place. This work, which advances on both sides at the same time, and both sides covered, each with a parapet, is what we called a *double sap*. In the middle they make traverses three fathoms thick, and of the same breadth as the trench. On each side small passages are made like those over against the traverse of the covert-way, to the end that the communication thereof be not interrupted.

These traverses are constructed so near to each other, as to be a sufficient cover, by their elevation and distance, against the fire of the place. In order to guard against the effect of the grenades, upon coming within their reach, that is, within 14 or 15 fathoms of the covert-way, care then is taken to cover this trench with blinds, or, which is the same thing, to cover the upper part of it.

The first and second figures of Plate CCCVII. will show this direct trench. The first exhibits the plan, and the second the profile, which passes over one of the traverses.

All this being done, and the third parallel finished in the manner we supposed, they advance from this parallel upon the glacis to each of the salient angles of the covert-way of the front attacked, and they begin with

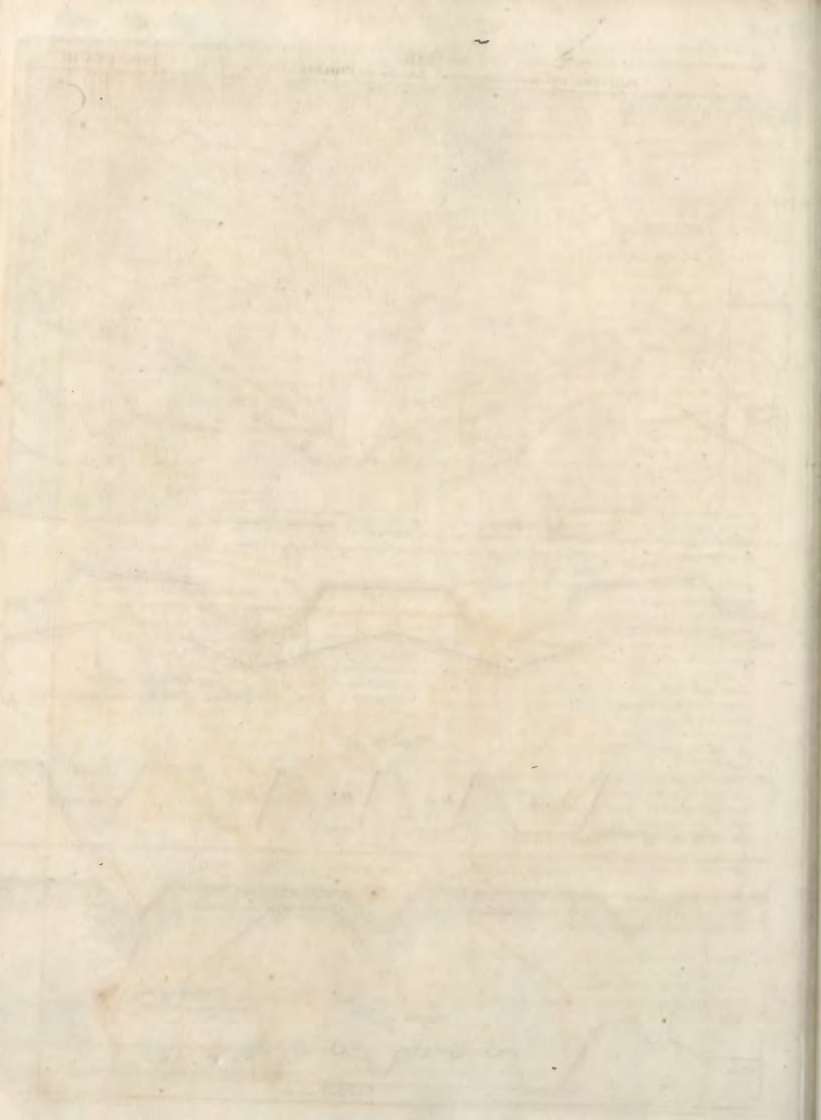


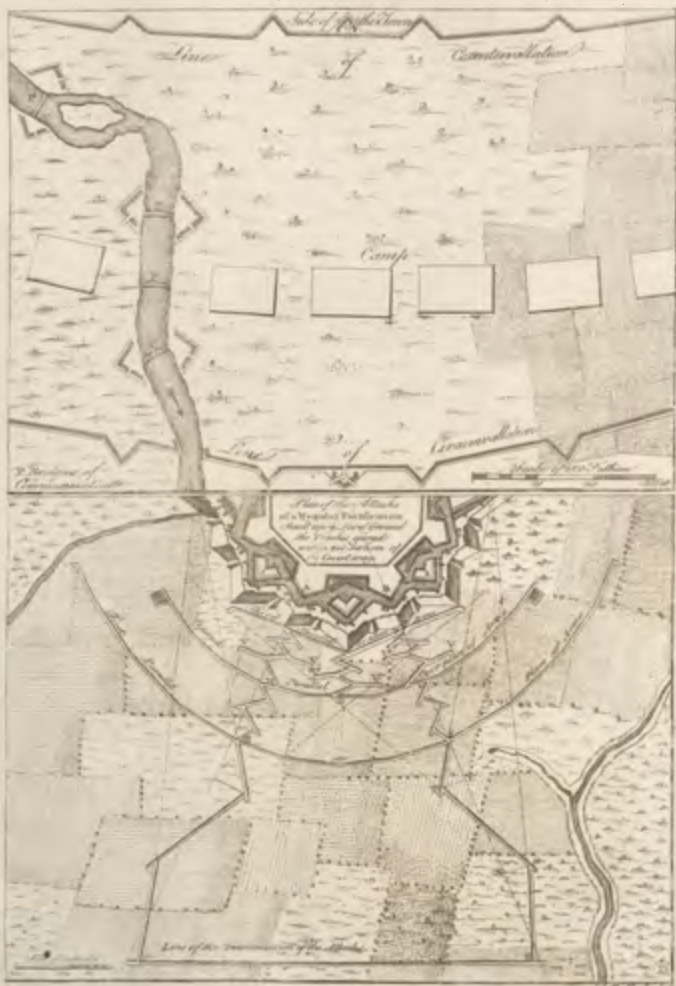
Plan of part of the circumvallation of Philadelphia in 1738.

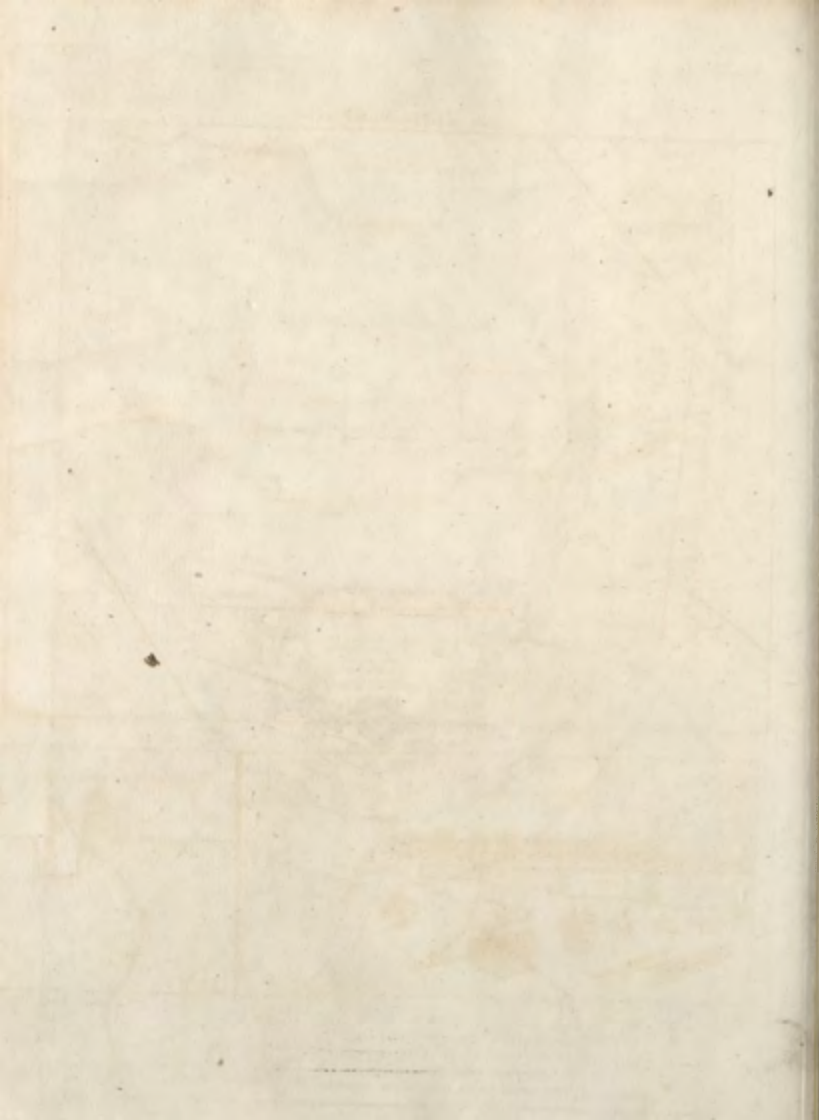


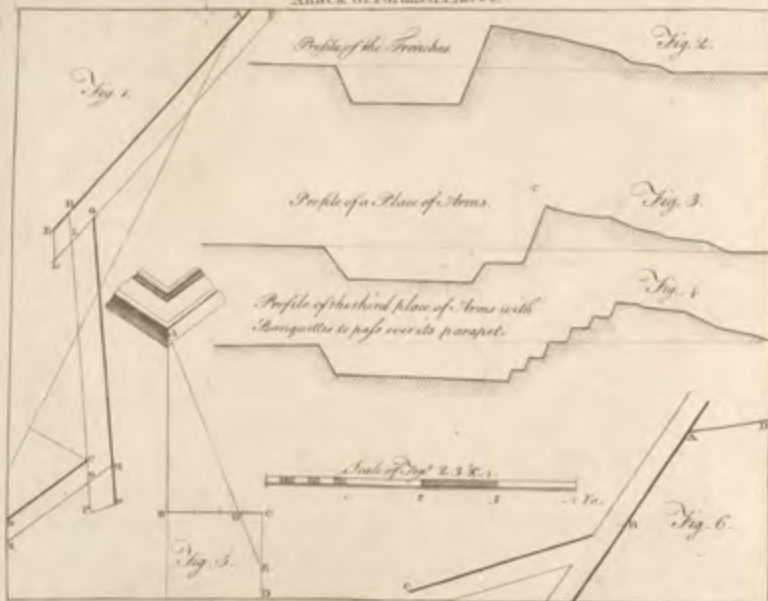
Plan of part of a line of circumvallation of 1738.

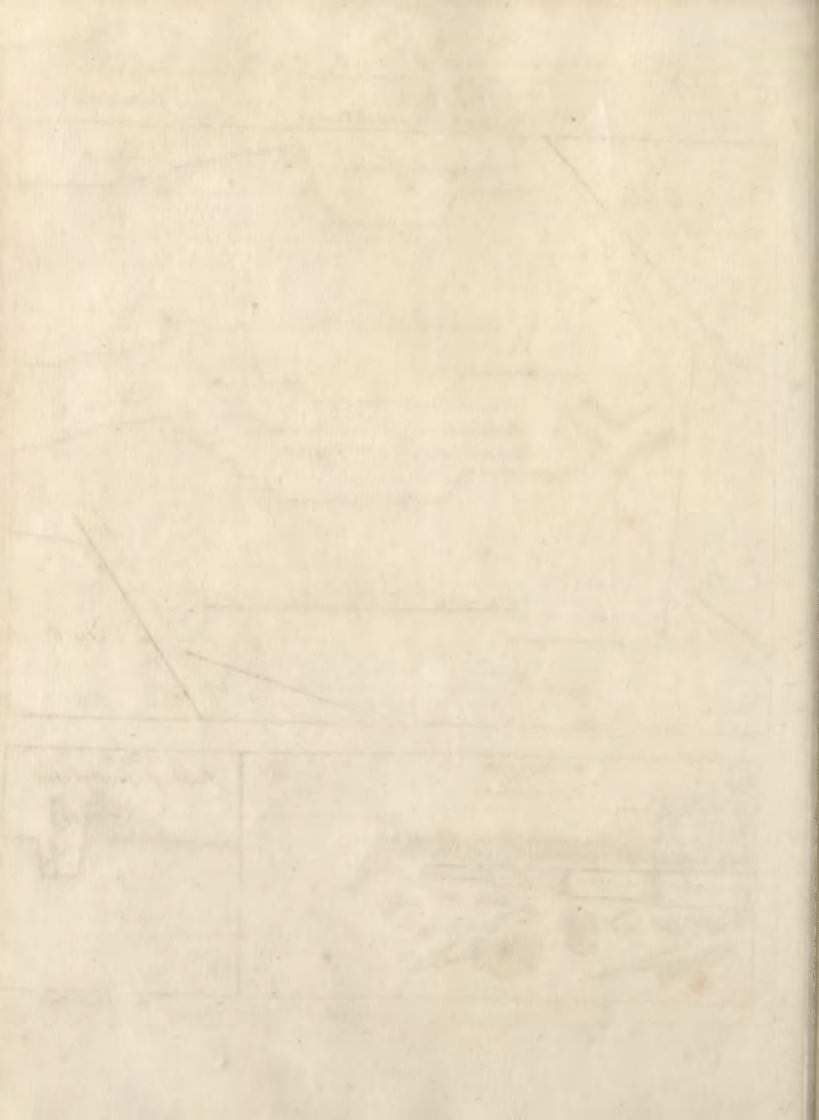












of Sieges. with making two or three short turnings, as marked on Plate CCCVII. fig. 6. along the ridge of the glacis, so as to occupy about one-third thereof. These are to be made as deep as is necessary, to be a shelter against the fire of the covert-way; afterwards they may proceed directly along the ridge of the glacis, by a deep ditch, to the salient angle of the covert-way. M. Vauban observes, that if we follow directly the ridge of the glacis, this trench is made without much danger. For the palisade which is placed at the salient angle of the covert-way, and the other two next it, do not present directly to the ridge, but only opposite to the faces; where at the most there is only room for one or two fusileers to see the head of the trenches, and who are easily silenced by the fire of the third parallel, which ought to be well served, and likewise by that of the ricochet.

Upon coming to the middle, or two-thirds of the glacis, two new saps are made, *b b*, *ibid.* which embrace both sides of the covert-way, to which they are almost parallel. Their length is 18 or 20 fathoms, and about five in breadth. They are covered at the end with crochets and winding traverses, which prevent the fire of the covert-way from enfilading them easily.

The parapet of these saps is raised about eight or nine feet above the glacis; and by means of gabions, three banquettes are made, as may be seen, Plate CCCVIII. fig. 5. The soldier placed on the upper banquette is thereby raised high enough to plunge into the covert-way, as appears from the same figure. When this work, which Marshal Vauban calls the *cavalier of the trench*, is once finished, it is very difficult for the enemy to remain any where in the covert-way; for they would be too much exposed to the fire of the soldiers placed on these cavaliers. But these places of arms or cavaliers cannot be made without being protected by the ricochet batteries, which enfilade the covert-way.

There is also another method of driving the enemy from the covert-way, which is by using the ricochet bombs. The confusion and mischief they occasion in this part of the fortifications, plainly shows there is no possibility for the enemy to maintain themselves there, so long as this method is practised; as we have observed in the above-mentioned treatise.

These cavaliers being once finished, it is easy to carry on the direct trench, as far as the salient angle of the covert-way, and to establish at the point of this angle and on the head of the glacis a small lodgment bounded by a circular arc; whence the enemy may be entirely driven from the salient place of arms of the covert-way. Afterwards this lodgment may be widened on branches of the covert-way, by digging into the upper part of the glacis, at the distance of three fathoms from the inner side of the covert-way; to the end that this thickness may serve as a parapet to the lodgment, and screen it from the cannon.

The operation we have been describing, to reach from the third parallel to the salient angle of the covert-way, is formed at the same time against all the salient angles of the front attacked: hence the enemy is obliged to abandon them almost all at the same time; and the lodgment on the glacis is afterwards advanced on both sides of these angles, towards the re-entering

places of arms of the covert-way.

As it is impossible to make this lodgment defile from the works of the place, there is no other way to guard against the enemy's fire than by many traverses. The 5th figure of Plate CCCVII. shows in great, the plan of part of this lodgment with its traverses; which are made with chandeliers and gabions. If the enemy, notwithstanding the cannon and bomb-batteries à *ricochet*, and the fire of the cavaliers of the trenches, should obstinately continue in the re-entering places of arms of the covert-way; in order to compel them to remove, batteries for throwing of stones are raised over against those places of arms: and with this view, as soon as the lodgment of the glacis is brought within one-half or two-thirds of the branches of the covert-way, on both sides of the re-entering angle, a sap is carried on opposite to the place of arms; and on this sap batteries for throwing stones are erected, as may be seen in *c c*, Plate CCCVII. fig. 6. These batteries being finished and ready to play, they discharge a shower of stones into the place of arms (fig. 6.), which will not suffer the enemy to maintain themselves there any longer. The lodgment continues to advance; and as soon as the enemy is driven from the place of arms, it is continued all round the faces thereof; and a lodgment is likewise made there, which must communicate with that of its faces, and should extend almost circularly along its demi-gorges. This lodgment being properly finished, will hinder the enemy from venturing to return to the covert-way; and of course will secure the possession of it to the besiegers. These lodgments are made with gabions and fascines; the gabions are filled with earth, fascines are put over them, and the whole is covered with earth; they sink into the glacis as deep as is requisite to be covered against the fire of the place.

In the whole of this account we have not made use of mines; because we were willing that the description of the works, which are carried on from the third parallel, in order to become masters of the covert-way, should be as plain possible. This omission we shall now supply, by making mention of the principal difficulties occasioned by mines, in endeavouring to drive the enemy from the covert-way.

Without mines the enemy would find it very difficult to retard the works we have been describing; because the ricochet batteries must gall them excessively, and break up their defences, so as to deprive them of all shelter: but they may have some resource left in works under ground, where their miners can proceed with more safety; while those of the besiegers, not having the same knowledge of the ground, can only grope in the dark; so that it is altogether a mere chance if they find out the enemy's galleries, and succeed so as to destroy them. If information is received that the glacis is countermined, there can be no manner of doubt but the enemy will avail themselves of their countermines, to carry branches forward into the field; and then to avoid, as much as possible, the mischief that may be done by those subterraneous fires, in the third parallel shafts or pits are sunk eighteen or twenty feet deep, if the ground will permit, in order to get below the galleries of the besieged: and from thence galleries are carried on towards the covert-way, to meet with those of the ene-

my, boring the earth with a long iron needle or augre, to find them out. If they are found underneath, an opening is made down into them, and shells are thrown in, to drive away the enemy and to ruin their gallery. If, on the contrary, they are to be found above them, a small mine must be sprung to break them: but if none of the enemy's galleries can be found, in that case branches must be carried to the right and left; at the end of which are made small chambers, to shake the neighbouring ground, which can hardly misdestroy the galleries and chambers of the besieged.

Notwithstanding all the care that can be taken in the like case, it is not to be presumed that the mines of the besieged under the glacis should be rendered absolutely ineffectual; but as soon as any of them are sprung, workmen are immediately sent to make a lodgment in the pits. In some grounds, the mines of the besieged may be spoiled, by letting in a brook or rivulet into the galleries; for which purpose you have only to dig pits in the neighbourhood, and let the water run in. The expedient was made use of at the siege of Turin in 1706, whereby a great many mines of the besieged were rendered useless.

The enemy should have mines placed, to hinder the lodgment on the head of the glacis, within four or five fathoms of the palisades of the covert-way; to the end that in springing them the palisades may not be hurt, and that they may be under the lodgment which the besiegers make there.

When they have sprung their mines, they make lodgments in them; the besiegers likewise on their part spring mines, with a view to destroy the palisades. In short, nothing is neglected on either side that can help to destroy one another. The besieged do not give up an inch of ground without disputing it manfully; and the besiegers employ every method in their power to oblige the enemy to yield as soon as possible, and with as little loss of men as may be.

Nothing can be said but what is very general on this sort of contests. They depend on the situation of the ground, and upon the capacity and understanding of those who attack, and those who defend the place.

Before we made mention of mines, we supposed, when treating of the lodgment on the top of the glacis, that the fire of the cavaliers of the trenches, together with the cannon and ricochet bomb-batteries, had obliged the enemy to quit the covert-way; but if notwithstanding these fires, they should obstinately continue in the places of arms and behind the traverses, the way to drive them entirely from thence, and to make the lodgment we have been speaking of upon the glacis, is as follows.

Whether the enemy has sprung a mine near the salient angle of the covert-way, or whether the besieged have blown up some of the palisades near it, as soon as the mine is sprung, workmen must be sent to the excavation; where they are to cover themselves with all possible expedition, and afterwards to extend their lodgment in the covert-way on both sides of its salient angle.

The double trench, or the double sap on the ridge of the glacis, must be made to communicate with this lodgment, in order to be able to sustain it if there should be occasion, and to communicate with it more safely. Particular care must be taken to cover the

extremities of it, that is, to make traverses every where, in order to be sheltered from the fire of the other parts of the covert-way, where the enemy still maintains themselves.

When this lodgment is extended to the first traverses of the covert-way, if the enemy keep their ground behind it, as there can be but few under cover there, considering the space they have to occupy, a company of grenadiers must make a brisk attack to drive them away: this done, some of those grenadiers should endeavour to find out in the part abandoned by the enemy the entrance into the mine, and the faucillon; and upon finding it, as there is great probability that they will, they are to cut it off, and thereby render the mine useless. Workmen may be likewise sent into the passage round the traverse, and there make a small lodgment, which will be the safest that can be contrived when the enemy is so very near. After this an entrance is to be dug in the covert-way opposite those traverses, and continued towards the bank of the ditch, under cover of the traverse; then a sap is to be made from each of the extremities of this passage, that is, near the border of the counterescarp; which are to be carried along the rounding of the counterescarp towards the middle, where they are to meet. This lodgment must be made very deep, that it may be no hindrance to that on the head of the glacis; and it is to be managed so as to leave between it and the border of the ditch a breadth of earth, sufficient to resist the cannon of the flanks and the curtain. This lodgment must be also covered with blinds, to prevent the effect of the grenades; and it is of great use towards an opening into the ditch.

During the whole time that the besiegers are working upon this lodgment in the interior part of the covert-way, they are to continue the lodgment on the top of the glacis, as far as the re-entering places of arms; from whence the enemy may be driven by ordering a few companies of grenadiers to attack them, supposing they should be so obstinate as to continue there, notwithstanding the fire of the ricochet batteries, and of the shells and stones. As soon as the enemy have entirely withdrawn themselves, a lodgment must be made there, as we have already mentioned.

§ 13. Attack of the covert-way, sword in hand.

THERE is another method of driving the enemy out of the covert-way, more expeditious indeed, but at the same time more bloody, more precarious, and infinitely less skillful. This consists in making a sudden attack on the whole front of the covert-way, in driving the enemy from thence by main force, and afterwards making good a lodgment.

There may be circumstances that shall absolutely require this method of attacking the covert-way; as when there is no possibility of erecting ricochet batteries to fire at its branches, nor at the faces of the works in the front of the attack; or when it is presumed that the enemy are not in a condition to withstand an attack of this sort; or, in fine, when it is thought expedient to run any hazard in order to be masters of the covert-way a few days sooner: on such occasions it is usual to take this method of attacking it, which is conducted thus.

When the resolution is taken to attack the covert-way

Sieges.
Plate
CCCV.
fig. 4.

way sword in hand*, the third parallel should be made to advance as near as possible to the glacis; and the more forward it is brought, the safer the attack. All along this parallel banquettes are to be made, step-fashion, to the top of its parapet, that the troops designed for the attack may pass over it with ease. At the back of this line, and in the very line itself, a great quantity of materials, as tools, gabions, fascines, sand-bags, &c. must be got ready, that nothing may be wanting to make the lodgment with all expedition, after driving the enemy out of the covert-way. A strong party of grenadiers is ordered, and placed along the third parallel, four or six deep, and the workmen behind them on the back of this parallel with their tools, gabions, fascines, &c. Care, moreover, is taken, that all the other parts of the trenches be well furnished with troops to support the grenadiers, if there should be occasion; and to fire at the enemy's defences wherever they appear: the grenadiers must also be provided with hatchets, to cut down the palisades of the covert-way.

The guns and mortars must be ordered to be ready to support the attack with their whole fire.

A signal is to be agreed on for all the troops that are to commence the attack, to move at the same time, and to fall upon the enemy.

This signal is to consist in firing a certain number of cannon, or a certain number of bombs, and at the last cannon-shot, or at the last bomb, the troops are to move.

The signal being given, all the troops of the third parallel are to move at the same time, and to pass quickly over the parapet of the parallel, and to march directly to the covert-way; which they enter either through the Sally-ports or passages made by the guns, or else the grenadiers cut down the palisades with their hatchets. As soon as they have entered, they charge the enemy vigorously; and when they have obliged them to abandon some of the angles, the engineers set the workmen about making a lodgment on the ridge of the glacis, opposite to that part of the covert-way which the enemy have abandoned, and within three fathoms of the inside of it. This lodgment, as I have observed, is made with gabions, which workmen lay on the glacis on the side of one another. The joints are covered with sand-bags, or with sap-faggots. These gabions are filled with earth and covered with fascines; and a-top of all you are to throw earth taken out of the glacis, by digging and widening the lodgment; and of this a parapet is raised to screen the troops as quick as possible from the direct fire of the place, and traverses are to be made every where to prevent the enfilades, as may be seen in Plate CCCVII. fig. 5. While this is doing, the batteries of the trenches are to fire incessantly upon the defences of the place, in order to disturb the enemy, and to abate as much as possible the briskness of their fire upon the workmen and the lodgment.

When the troops employed in the attack have driven the enemy from the covert-way, or from their places of arms; for it often happens, that at the first attack there can be no more than one or two lodgments made in the salient angles; when this is done, I say, the troops retire behind the lodgment, where they kneel down till it is in a condition to cover them. Some-

times it shall happen that the enemy, who was supposed to have been driven from the covert-way, will return to the charge, and oblige the besiegers to renew the attack, by overthrowing the lodgment and falling upon the troops unawares. This attack may be renewed several times, and vigorously disputed, when there happens to be a strong garrison. In this case the besiegers must exert their bravery, and resolutely encounter every obstacle raised by the enemy.

When the besieged find they cannot hold out any longer, they will let fire to their mines and retire; upon which workmen are sent to make a lodgment in their excavation, as we have already observed when speaking of this attack by the sap. In short, the besiegers are to struggle against every difficulty with all their might; and if they happen to be repulsed at the first attack, they are to begin it again the next day or the day after, and they are to use more precaution than the first time for securing their success.

Before this attack is begun, the besiegers must make a brisk cannonading against the covert-way, in order to break down the palisades, and to demolish the ridge of the glacis, so as to render it easier for the troops to force their way and to make a lodgment upon it. When this is done, the necessary time is to be given for the pieces to cool, that is about an hour, and the attack is to begin in the manner above mentioned; during which the artillery is to play incessantly.

It must be allowed that this manner of attacking is very bloody: for the besiegers must move almost the whole breadth of the glacis uncovered and exposed to the whole fire of the place. They are obliged to attack the enemy concealed behind the palisades, which they are to cut down with hatchets before they can come at them. They are to fight for a long while to an evident disadvantage; and when by dint of valour they have driven away the enemy, they find themselves exposed to the whole fire of the ramparts, which on that occasion is served with more vivacity than usual. They are likewise exposed to the mines which the enemy blow up, with a view to disconcert the lodgment; and to throw the troops into disorder and confusion, which renders it easier for the besieged to return to the charge, and harrahs them anew. But the former method, of which we have above treated, is far from being so precarious and bloody. According to M. Vauban, we ought ever to prefer it when in our power; and to make use of the latter, only when we are obliged to it for essential reasons.

Night is the best time for this attack, because the besiegers are less seen from the place, and of course the fire of the besieged is less dangerous; yet there are generals who undertake it by day. There is nothing settled in regard to this article; they are at liberty to act as they judge most proper, according to the circumstances of time and place.

§ 14. Of the batteries on the covert-way.

When the enemy are entirely driven out of the covert-way, the next thing to be done is erecting batteries, in order to ruin the defences of the place, and to make a breach.

As it is necessary for the besiegers to make themselves masters of the half-moon C (Plate CCCVII.

fig. 6.) before they can come to the body of the place, which is flanked or defended by part of the faces of the bastions A and B opposite to its ditch; they must begin with erecting batteries on the covert-way opposite those parts. They are marked on the plan *e, e*. Batteries must be also erected to make a breach in the half-moon. But before they are erected, it will be proper to consider what part of the face of the half-moon is to be attacked; or, which is the same thing, at what part the half-moon is to be entered. It must not be at its flanked angle, because an opening towards the point would not afford a sufficient space to make a lodgment able to withstand the enemy, and moreover the troops would be seen in their passage by the two faces of the bastions by which its flanked angle is defended. The most favourable passage is towards the third part of its face, reckoning from its flanked angle; because by battering at the same time the two faces near this part, the whole point of the half-moon may be destroyed, and a large opening made there easier than any where else. Thus the batteries for making a breach in the half-moon C, will be placed in *d* and *d'*, and will occupy almost the third part of each of the faces of the half-moon from its flanked angle. These batteries are each to consist of four or five pieces of cannon.

When the faces of the bastions A and B are well enfiladed by the ricochet batteries, there will be no occasion for the batteries *e* and *e'*; for those which are to batter the half-moon in breach will be sufficient; and after it is taken, if there is any necessity for ruining the faces of the bastions A and B, you may make use of the batteries *d* and *d'*, by placing them in *e, e'*. Batteries must also be erected to ruin the flanks of the demi-bastions in the front of the attack. It is evident that they cannot be placed but in *i, i'*, on the covert-way opposite to them. They ought also to contain as great a number of guns as the space of ground will permit.

For the same reason that batteries have been erected to make a breach in the half-moon, opposite the third part of the face joining to its flanked angle, those also are to be erected which are to make a breach in the bastions; they are marked *k, k'*, and are each of seven or eight pieces of cannon. Batteries are likewise erected to ruin the flanks of the demi-bastions bordering upon those of the front attacked, in order to favour the passage over the ditch which is made on the side, upon a supposition that the bastion is entered at both faces, as we suppose in this example. The attacking both faces of the bastion renders the taking of it more certain and easy; but, generally speaking, it is looked upon as sufficient to make only a breach in the face of earth of the demi-bastions towards the front attacked.

Besides all these batteries, others are erected in the re-entering places of arms of the covert-way, as in *l*, and in *l'*; they serve to batter the tennaille when there is one, the curtain, and the faces of the bastions, &c. Sometimes they are of mortars for throwing of stones.

All these batteries should have 24 pounders; sometimes larger pieces are used, especially when there is any work of extraordinary strength and solidity to be demolished.

They are all to be placed on the parapet of the

covert-way; and the outside of their epaulement is to graze the inside of the covert-way. It is in order to have room enough for this epaulement, that the lodgment is made on the ridge of the glacis at the distance of three fathoms from the inside of the covert-way.

The only essential thing to be observed in these batteries, is to open their embrasures, so that they shall perfectly discover every part of the place they are to batter, and have a sufficient sloping from the back to the fore-part, to fire as low as the bottom of the revettements, which they are intended to destroy. It is also proper to prevent the enemy's blowing them up with mines: for this end it will be requisite to dig wells deep enough round the batteries, so as to be sure of being lower than the enemy, and to make small galleries round the batteries, in order to discover the branches the enemy have underneath to blow them up.

As the construction of this sort of batteries is very dangerous, being absolutely to be made under the fire of the rampart of the place, they are sometimes masked; that is, before the part where they are erected, sand-bags or some other materials are placed, with a view to shelter the workmen from the enemy.

In order to batter in breach, all the guns should fire together, and towards the same part. They should fire as low as they can, and continue to batter the same part, till the earth of the rampart behind the revettement begins to fall, which is a sign that the revettement is entirely destroyed. This united firing, repeated in this manner against the same place, is productive of a much better effect than if the guns were to be fired one after the other; for not only a greater quantity of the wall is shaken at the same time, but, moreover, the shaking is far more considerable.

§ 15. *Of the descent, and passage over the ditch of the half-moon.*

WHILE the batteries on the covert-way are erecting, preparations are made for the descent and passage over the ditch of the half-moon.

The ditches are either dry, or filled with water, which may be either stagnated, or running; and even into dry ditches the enemy may let in water, only opening the sluices by which it is withheld.

Each of these sorts of ditches requires a different manner of passing. We shall enter here into such particulars as are most necessary for giving a right idea of the method of proceeding.

First of all, if the ditch be dry, and very deep, as from 25 to 30 feet, the descent may be made by one or several subterraneous galleries, passing under the covert-way, and terminating at the bottom of the ditch: the entrance is to begin about the middle of the glacis. These galleries are made like those of miners, and the earth is supported by boards and timber frames. They are directed in such a manner, that the opening in the ditch shall be opposite to that part of the breach where the passage is intended.

As this gallery is made sloping, the business is to have some rule for directing the slope, so as to prevent its being too small or too great: too small, if it terminated above the bottom of the ditch; and too great, if it terminated below it.

The following is a most simple way to find it out.

First

first of all, it is requisite to take the depth of the ditch; which is done by letting fall a plummet, with a string tied to it, from the border of the covert-way to the bottom of the ditch. It is requisite also to know the distance from the entrance of the gallery to the border of the covert-way, which may be easily measured thus: Suppose the depth of the ditch is 30 feet, and that the distance from the entrance of the gallery to the border of the ditch is 90 feet, then by advancing six feet towards the counterfarp, the slope must sink two; that is, there must be always the same proportion between the length of the passage made to approach the counterfarp and the depth of the slope, as between the distance from the entrance of the gallery to the border of the counterfarp and the depth of the ditch: so that if the distance from the entrance of the gallery to the border of the counterfarp is four times as much as the depth of the ditch; then for every four feet advanced horizontally towards the ditch, there must be one sunk perpendicularly, &c. When the ditch is not deep, as of 12 or 15 feet deep, instead of a gallery under ground, the descent is made by a sap only, which cuts the parapet of the covert-way, and sinks therein as deep as is necessary for the descent to terminate at the bottom of the ditch. This sap must begin at the lodgment on the ridge of the glacis; it is secured on both sides with blinds, to support the earth, and it must have a good epaulement on the side exposed to the place. Above it is covered with fascines and with earth, to avoid the shell-stones and grenades that may be thrown in by the enemy. Upon advancing to the foot of the counterfarp, an entrance is made into the ditch.

The enemy will use all their endeavours to hinder this entrance, and to ruin the gallery, chiefly by making small sallies to drive away those who are employed in constructing it: but they must yield at length to numbers. The passage is continued with sapping, to gain the foot of the breach, and by raising an epaulement of fascines, barrels, or old casks, gabions, &c. towards the face of the bastion opposite the passage.

There are generally two or three descents made for the same passage of the ditch, near enough to support each other for greater safety.

It is in the passage of the ditch that the enemy has the advantage in making use of various artifices to retard it. In these they are chiefly assisted by their miners, who blow up the saps by means of small mines, and fall out at the same time, neglecting nothing that can delay the progress of the work. They may likewise order 12 soldiers to fall at once upon the head of the sap: this number is sufficient to drive away the sappers, and to do some damage to that work. A few companies of grenadiers should be placed near at hand, to attack these men as soon as they appear; and the cannon must be kept continually firing against every part, from whence the enemy may possibly fall out. As the batteries of the covert-way command all their communications, they may destroy them, or at least render them very dangerous.

In order to protect the sap at the bottom of the ditch, the besiegers may likewise make use of a kind of small galleries behind the counterfarp, near the place where the entrance is effected; and they may

pierce some loop-holes, from whence the enemy may be fired at, and a check put to their sallies, at least by day: and in regard to night, the besieged ought to be more circumspect than by day, since they can neither see the dispositions, nor the troops that are ordered into the ditch to support the sappers; so that they can only raise a false alarm, without doing any great mischief. Yet we must observe, that this passage can be made only so far as it is protected by the battery placed on the ridge of the parapet of the covert-way opposite the ditch: for as the cannon of this battery keeps continually playing against the defences of this ditch, they must ruin them of course, and destroy their parapet, so that the enemy shall no longer be able to keep any cannon there; the consequence of which will be, that the besiegers have only to force themselves from musket-shot, which is an easy matter.

The passage of the ditch is made on each side of the faces of the half-moon, as may be seen in *m, m*, fig. 6. Plate CCCVII.

If the ditch is full of standing water, and the surface of it be raised to three, four, or five feet, below the upper border of the counterfarp, the descent will be easier; because as the steps are to have but a very small slope, they may begin nearer the border of the ditch, as in the lodgment on the ridge of the glacis, and be directed in such a manner as to terminate at the surface of the water. They are to be covered on the side exposed to the place, and strongly secured with blinds, placed within five or six feet of each other. Blinds are likewise to be laid over the descent, which is to be covered with fascines, and these with earth, to prevent the enemy from setting them on fire.

In order to pass this ditch, a bridge must be made with fascines; for which end, after breaking the counterfarp, a number of men, sufficient to occupy the whole length of the descent, are ranged at the distance of two feet from each other: these men must be covered by the parapet, and are to forward the fascines from hand to hand, from the head of the passage to the opening into the ditch. The sapper in this part (for all these works relate to the sappers) will throw them into the ditch, in order to make an epaulement or covering on that side of the town which looks towards the passage.

As soon as he has flung in a sufficient number of fascines to shelter himself, and to advance a few paces into the ditch, he must throw a great number of them into the passage, in order to fill the ditch up entirely in that part. They are laid different ways, and ranged in different beds, which are covered with earth, in order to make them sink to the bottom. All these different beds of fascines must be fixed with long stakes, that they may keep closer together; and as the work advances, the parapet must be pushed forward, otherwise it would be impossible to effect the passage without the utmost danger.

When the passage is commanded, or fired into from the opposite parapet of the place, or from any other part, the foremost men must be covered with a great heap of fascines, or by some other contrivance; but whatever cover it be, in that case the passage of the ditch is extremely difficult and dangerous.

After what has been said concerning the passage of dry

Of Sieges. dry ditches, and those which are full of standing water, it remains to take notice of those which are full of running water, and those that are dry but may be filled at any time with water. These forts of ditches are extremely difficult to pass, unless the current can be turned and made to take a different course from that which carries it to the town ditches, or unless the besiegers can contrive to break down the sluices which keep up the water referred by the enemy for filling the ditch.

A great deal might be said, were we to enter into the whole detail of the works necessary for passing these forts of ditches; we shall only touch upon the subject.

Supposing the ditches to be filled with running water, or with a river, the channel of which can be diverted no other way, which is called *draining the ditch*, it will be requisite then, generally speaking, to throw into the ditch a large quantity of fascines, loaded with earth and stones, fastened together with long stakes: thus the passage is to be pushed on, till the ditch is contracted to the breadth of 20 or 30 feet; and then small beams may be laid across, to join the bridge of fascines to the rubbish of the breach. The filling up, and consequently the passage of the ditch, may be also forwarded, by ordering the miners to advance to the rubbish, and to spring a mine, in order to blow up part of the revetement of the work into the ditch.

Should the enemy happen to have reservoirs of water which they may open, and thereby destroy the lodgments in the ditch when they are no longer to make a stand there, the besiegers must endeavour during the siege to destroy the sluices, that is, the stone-work or timber that serves to keep up the water. This may be done by throwing a great number of bombs towards that part where the sluices are known to be situated; if they should be broke down by that means, then the water will have a free current; and after it has run off, the passage of the ditch must be attempted in the same manner as if it was standing water; if there remains only a very small current, a passage must be left to drain it, as was mentioned before.

This whole operation is very tedious, difficult, and dangerous; nay, it is impossible to be done at all without being protected by a very brisk firing, not only from all the cannon of the covert-way and the ricochet batteries, but moreover from the lodgments on the glacis and those on the covert-way.

Whatever has been said concerning the passage over the ditch, is general, as well in regard to the ditch before the out-works, as that before the body of the place.

We supposed the ditches had a revetement; but if it was otherwise, the passage would be easier. The descent might be made along the slope of its counter-scarp, and the ditch might be afterwards passed over in the manner already mentioned.

In this whole detail, we have made no mention of cunettes, a kind of small ditch, three or four fathoms in breadth, always filled with water, which is sometimes made in the middle of the great ditch: the reason of our being silent upon this article is, because it can hardly increase the difficulty of passing the ditch.

As soon as the besiegers reach the border of the cunette, they throw in fascines to fill it, as into a ditch full of water; being but narrow, it is the more easily filled up. The difficulty of the passage is increased only when there are caponiers in the ditch to command and enfilade it: then to make the passage of the cunette, the enemy must absolutely be driven from those caponiers. This may be done by showers of shells and stones thrown from the lodgments on the covert-way.

Plates CCCVIII. and CCCIX. will illustrate all that we have been saying upon this head, concerning the descent and passage over the ditch.

Plate CCCVIII. fig. 1. exhibits the plan of the descent under ground, and that of its opening into the dry ditch. Fig. 2. represents the profile of that descent; the opening of which is made at the lower part of the ditch. Fig. 3. is a perspective view of the opening of this descent, seen from the bottom of the glacis: and fig. 4. shows in perspective the opening of the same descent, seen from the top of the breach.

Plate CCCIX. fig. 1. is the plan of the passage over a wet ditch in the open air; that is to say, the gallery of which is an open sap. A is the opening of it. You see in B, towards its opening, the blinds that are laid on its upper part, to support the fascines with which it is covered. On these blinds, at first, is laid a bed of fascines, ranged according to the length of the gallery: over this first bed is laid a second, wherein the fascines are ranged according to the breadth of the gallery, as you see in B and C. D is the epaulement of fascines, which covers the passage against the fire of the place, by which it is flanked. E is part of the bridge of fascines; and F is an elevation also of fascines, intended to cover the head of the work, and to secure it from the immediate fire of the place. Fig. 2. represents the profile of this descent into the ditch. Fig. 3. gives its opening seen in perspective from the country; and fig. 4. its opening into the ditch, also in perspective, as it appears from the top of the breach.

§ 16. *Of the attack of the ravelin, or half-moon.*

THE passage over the ditch before the half moon being effected on both sides, and a breach made 14 or 15 fathoms wide, preparations are made for the assault. For this purpose a large quantity of materials is collected from all the neighbouring lodgments. Endeavours are used to render the breach practicable, by making the slope easy. The cannon continue playing, in order to throw down the parts of the revetement that may be yet standing. Very good use may be also made of shells fired point blank; for they are easily buried in the breach, the earth of which has been already broke up and shaken by the cannon; and as they burst upon that earth, they produce the effect, as it were, of small mines. Howitzers may likewise be used with success on these occasions.

In order to render the breach more practicable, some miners, or a serjeant with a few grenadiers, are sent to level it with hooks. The fire from the lodgments and batteries will hinder the enemy from appearing on their defences; or if they should, they must do it with great circumspection, which renders their fire less dangerous.

If the enemy have made any galleries along the face of the half moon, and opposite the breaches, the miners may go and discover them, in order to stop them up, or to cut off the match, or to drive away the enemy; if they cannot find them, they spring several small mines; which being often repeated, must needs occasion some disorders in the galleries and mines belonging to the besieged. Every thing being ready for making a lodgment in the half-moon, that is, for taking possession of the breach; the materials being at hand, in order to be removed thither with ease and expedition; the batteries and lodgments of the covert-way being in a condition to fire away briskly; a signal is agreed upon with the officers that command those batteries and lodgments, to give them notice to fire, and to leave off whenever it is thought proper. This signal is generally a flag raised in the former case, and lowered in the latter. All this being settled, and the breach, as we observed, made practicable, two or three sappers are sent to the extremity of the breach next to the place, there being generally a kind of small cover or cavity in this part; there they begin a lodgment for themselves, and for some more, who are sent after them; when there is room to receive them, they make them mount, and insensibly extend the lodgment upon the top of the breach; and thus they proceed till they make a lodgment towards the point, which is generally called a *magpye's nest*. While these sappers are at work, the fire of the batteries and the lodgments ceases; but when the enemy attempts to attack the workmen in order to destroy their lodgments, they must retire as quick as possible; and then the colours being raised, the batteries fire upon them with the utmost vivacity, to oblige them to quit the upper part of the breach.

Upon this the colours are lowered, the fire ceases, the sappers return to repair the mischief that was done to their lodgment, and try to enlarge and strengthen it. If the enemy should return, they must retire again in the same manner; and the batteries, as likewise the troops in the lodgments, must renew their fire to drive them from the breach; after which the fire once more ceases, and the sappers return to their work.

This way of proceeding must be continued till the lodgment is in a state of defence; that is, till it can hold a number of troops sufficient to awe the enemy, and to withstand any attack that may happen to be made against it. The besieged, before they entirely quit the half-moon, will spring what mines they have ready there. As soon as this is done, the besiegers should directly lodge themselves in the excavations made by those mines, or at least some defence should be made there, to hold a few sappers, and to forward the lodgments of the inside of the work.

The lodgment of the point is made in the form of a small arc, the concavity of which is turned towards the place. From each of its extremities a lodgment is carried along the faces of the half-moon, on the platform of its rampart, at the foot of its parapet. This lodgment is sunk deep in the earth of the rampart, to the end that the soldiers may be the better covered against the fire of the place; there must be also traverses to secure it from the enfilades, as was done in regard to the lodgment on the glacis. Within side the half-moon lodgments are also made, which

traverse the whole breadth thereof, as may be seen in the half-moon C, Plate CCCVII. fig. 6. They serve to command the communication between the tennaille and the place; of course to render that communication more difficult, and to hold a sufficient number of troops to resist the enemy, should they have any design to return and repossess themselves of the half-moon.

Though the half-moon should happen not to have a revetement, but only to be fraised and palisaded, still the attack ought to be carried on just in the same manner as if there was a revetement; that is to say, the batteries should be disposed in the manner as above laid down; and in regard to the breach, the business then would be only to destroy the fraise, the palisades, and the hedge of the berm (if there should be one opposite the part where the besiegers want to enter the half-moon), and afterwards to take possession of it, and make lodgments, as in half-moons that have revetements.

What we have been observing, in regard to the attack of the half-moon, is only when the besiegers intend to take it by the sap, or with pick-axe and spade: But sometimes they go about it in a more expeditious manner: for when the breach is made so as the troops may mount to enter the half-moon, they advance boldly to the assault, just as in the attack of the covert-way sword in hand, and endeavour to come up with the enemy, and to drive them entirely out of the work. This attack is very dangerous, and may cost a great many men, when there happens to be a brave garrison, who will not easily yield their ground. But there are frequent cases, in which it may be thought prudent to adopt this measure, in order to accelerate a few days the taking the half-moon. As soon as the besiegers are masters of the upper part of the breach, they make a lodgment there in a hurry with gabions and fascines; and while it is making, as also while they charge the enemy, and oblige them to abandon the upper part of the breach, some soldiers are sent to discover the mines, which the besieged are supposed to have made within the inside of the rampart of the half-moon, and to cut off the faucisson. If they cannot find them, they must advance with great circumspection, and take care not to keep all together, that the mine may have less effect. Oftentimes the enemy will suffer the besiegers to carry on their lodgment without making any great opposition, because it cannot be effected without a considerable loss of men, the sappers and the troops being absolutely exposed, during this operation, to the whole fire of the place, which is well served, and by its proximity becomes extremely dangerous: but when the lodgment is advanced, the enemy spring their mines, and return afterwards to the half-moon, in order to retake it amidst the confusion which those subterraneous fires must unavoidably occasion among the troops in the lodgment; in that case, it will be requisite to renew the charge most vigorously with fresh troops, which should be at hand to support those of the half-moon, to place themselves in the excavations made by the mines, to render the lodgment sufficiently strong, and to secure it with a proper number of soldiers, so as to be able to withstand any further attempt of the enemy.

This work can hardly be disputed in this manner, except when the half-moon has a reduit, as it affords

a shelter or retreat to the garrison, and enables them more easily to fall upon the half-moon. For if there should be no reduit, and the enemy are driven out of the half-moon, they can scarce attempt to return, especially if the communication between the place and the half-moon is discovered by the batteries and lodgments of the covert-way: because, if the ditch is filled with water, this communication can hardly be made but with boats, which may be easily seen from the lodgments of the covert way, and may be overset by the cannon of the batteries; and if the ditch be dry, and there happens to be a caponnier, the communication, though more safe, is not without danger, by reason of the fire that may plunge into it from the lodgments of the covert-way; so that it will be extremely difficult for the enemy to advance quick enough to repossess themselves of the half-moon; besides, they want room to assemble in a large body, and fall all at once upon the lodgments of that work.

There is only one case in which they may do it; that is, when in the angle of the gorge of the half-moon they have made a space, nearly as large as the places of arms in the covert-way. This space cannot be seen from the covert-way, nor from its lodgments; and as there are generally steps to ascend from the bottom of the ditch to the half-moon, the enemy might take advantage thereof to try to enter it; but if the besiegers are upon their guard, they will find it easy to repulse them, even with loss; because in that case the enemy have the advantage of situation against them, and are obliged to attack without cover, while the besiegers are sheltered by the lodgment.

The best time for attacking the half-moon sword in hand is by night, for the enemy's fire is not so sure then as by day.

§ 17. *Attack of the reduit.*

WHEN the several lodgments of the half-moon are effected, the enemy will scarce be able to stay any longer in the reduit, especially as the communication between it and the body of the place must become extremely difficult, and is likely to be more so, if the ditch is filled with water, and the bridge of communication between it and the town is demolished by the batteries on the ridge of the glacis: in this case the troops in the reduit will hardly be able to avoid surrendering themselves prisoners of war, as was the case of those who were in the reduit of the half-moon at the siege of Ath in 1697.

To avoid this inconvenience, the enemy generally think proper to abandon the reduit, as it no longer serves to dispute the lodgments of the half-moon, or to afford a retreat to the troops that defend it, when they find themselves incapable of resisting any longer the attacks of the besiegers against this work.

Reduits, generally speaking, consist of a single wall, with loop-holes: but when they happen to have a rampart and a parapet like the half-moon, after taking the latter, the same method almost must be observed in attacking the former; they may be battered in breach, by placing the cannon on the ridge of the glacis of the salient angle of the covert-way, opposite the half-moon to which the reduit belongs. The descent and passage over the ditch is to be made there, just as in the half-moon; and, in short, a lodgment

is effected, either by means of sappers, who are to carry on their work under the protection of the batteries of the covert-way, and its lodgments, or by attacking it sword in hand, as was mentioned in regard to the half-moon.

If the enemy have contrived places of arms at the bottom of the dry ditch of the half-moon *C*, which, as it is well known, do consist only of an elevation of ground that traverses the breadth of the ditch towards the extremity of the faces of the half-moon, in the part opposite to its flanked angle, and which for this reason are sometimes called by no other name than traverses; care must be taken to oblige them to retire from thence, either by the fire of the lodgment on the ridge of the glacis, or by enfilading and firing into them from some lodgments made in the places of arms of the covert-way.

§ 18. *The attack of the bastions.*

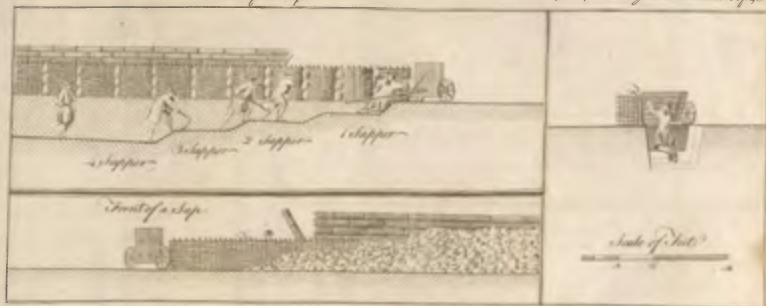
WHILE the besiegers endeavour to possess themselves of the half-moon, they work the same time at the descents into the ditch, which are made nearly towards the third part of the faces, reckoning from the flanked angle of the bastion. A descent may be effected at each face of the two bastions in the front of the attack, as in *n, n*, Plate CCCVII. fig. 6. or, according to the more general custom, only opposite the faces in the front attacked. The manner of proceeding is much the same as in the descent and passage over the ditch of the half-moon, whether it be dry or wet; that is, if it be dry, a sap is carried into the ditch, from the opening of the descent to the foot of the breach, and strongly covered towards the opposite flank. If the ditch be full of water, it is passed over on a bridge of fascines, constructed in the same manner as in the passage over the ditch of the half-moon.

The batteries erected on the ridge of the glacis for making a breach in the face of the bastions, must fire against that part of the faces where the breach is to be effected, and fire all together, as was mentioned in the article of the attack of the half-moon: and when they have made a breach sufficient to attempt the attack in front, some of the guns must be kept to batter the upper part of the breach, and some must be removed to the back of the platform, and disposed in such a manner as to be able to annoy the enemy, whenever they present themselves towards the upper part of the breach. All this is done during the descent and passage over the ditch. Mines are also made use of to widen, and sometimes even to make the breach.

To fix the miner to the wall when the ditch is dry, a lodgment is made near the opening of the descent, to protect him from thence against the sallies of the besieged. Then the wall is broke with cannon, as near as possible to the bottom of the ditch, in order to get under the galleries, which the besieged may have built within-side the bastion. An opening of five or six feet may be made with the cannon, to lodge the miner that removes the rubbish, and makes room for one or two of his comrades, who are to assist him to get rid of the earth in the gallery. When the ditch is dry, and the ground will admit of it, the miner sometimes gets under it by a subterraneous gallery, which leads him to the foot of the wall: but if the ditch be filled with water, it is not always the custom

*Fig. 1.
Back of a sloop.*

*Fig. 2.
Profile representing the excavation of a sloop.*



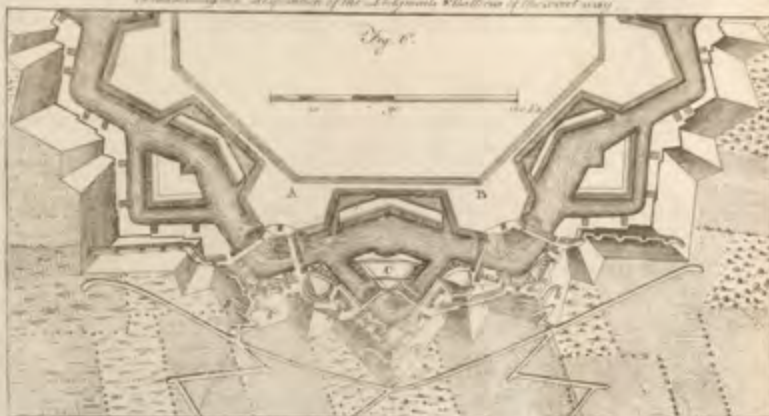
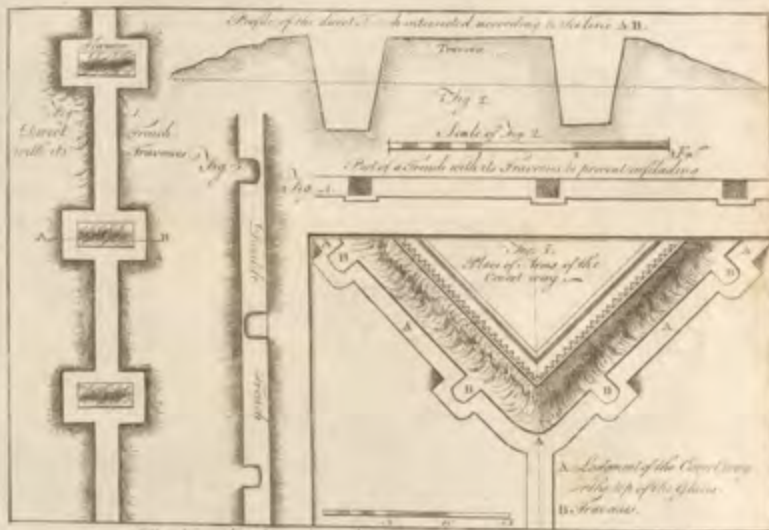
*Fig. 3.
Plan showing the disposition of the Batteries.*



A. Bell, Sculp.^t



Attack of Fortified Places.





WAR.
Attack of Fortified Places.

Plate, CC C VIII.

Fig. 1.



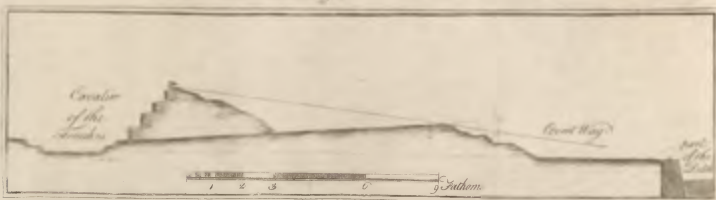
Fig. 2.



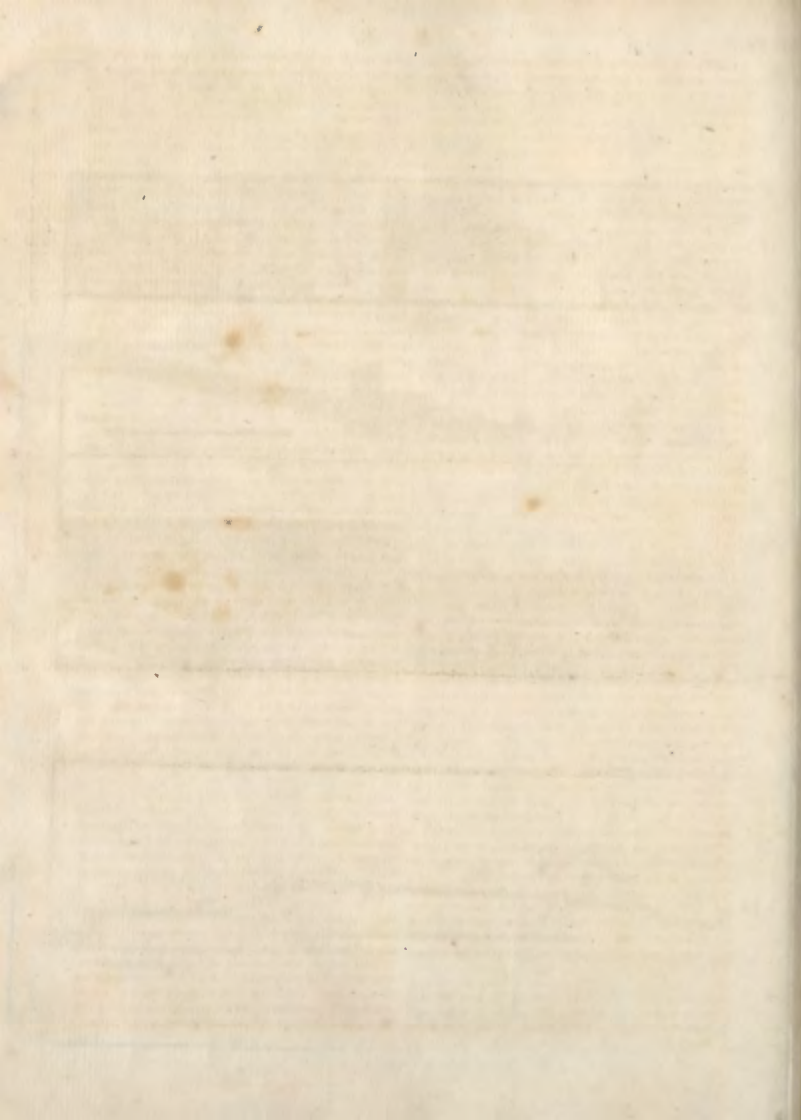
Fig. 2. Perspective view of the bastion & its ditch, and the plan of the other side.



Fig. 5.



A. Bellisleul.



to wait for the completing of the passage over the ditch, before the miner is fixed to the face of the bastion. The wall is pierced with cannon, in the manner before mentioned; but a little above the surface of the water, to the end that the miner may not be incommoded in this gallery; and he is sent over in a little boat, to place himself in the hole. The miners relieve one another every two hours, to carry on their work with more speed; that is, to complete and finish their mine. At the same time the enemy will use various artifices to obstruct them.

When the miner has pierced the wall, he makes behind it, on both sides of him, two small galleries, from 12 to 14 feet, at the end of which he places, on both sides the galleries, two mines, namely, one within the breadth of the wall, and the other sunk 15 feet under the rampart. A common train is given to these four chambers, which taking fire at one and the same time, will produce a very large and spacious breach.

When there are countermine under the rampart, and along its revetment, care must be taken to seize them, and to drive the miners from thence. For this purpose M. Goulon proposes to spring two fougasses near them, in order to burst them; when this is done, he is for entering it with 10 or 12 grenadiers, and as many foldiers, commanded by two sergeants; part of these grenadiers should have each four grenades, and the rest should carry four or five small bombs, of which three only should be charged, the other two with fuses only. The two sergeants should begin with attacking the countermine sword and pistol in hand, and the grenadiers should follow them. If the besieged do not appear to defend their countermine, a lodgment is quickly made with sand-bags. This lodgment consists of no more than a good traverse, which entirely stops up the gallery of the countermine, towards the side from whence the enemy may come. If they attempt to oppose this operation, the grenadiers should throw their three loaded shells, and retire quickly with their comrades, to prevent being hurt by the effect of those shells; for the smoke they make in bursting, together with the splinters, must unavoidably oblige the enemy to quit the gallery for some time: but as soon as they have produced their effect, the sergeant and the grenadiers, with their comrades, must immediately return, and work as hard as possible upon their traverse, in order to stop up the gallery. If the besieged still persist in interrupting this work, the grenadiers must throw the two shells with fuses only, which will oblige the enemy to retire quickly; and as no harm is to be apprehended from them, which is more than the besieged can tell, the besiegers continue to finish the traverse. Even openings or loop-holes are made, in order to fire upon the enemy, in case they should appear again in the part of the gallery opposite the traverse.

When there is no gallery or countermine behind the walls, or when there is one which cannot easily be come at, the miner should leave no means untried to discover it; and at the same time he ought to use the utmost precaution to prevent being surprised himself by the enemy's miners, who will attempt to smother him in the gallery, and to destroy his works: therefore the business of a miner requires great art and cunning to avoid the snare of the enemy. "A miner," says M. de Vauban in his Memoirs, "ought to listen

Vol. X.

"frequently to discover whether there are any at work under him. He ought to found with his augre towards the place he hears the noise come from; but the enemy often make a noise on one side, while they are at work on the other." If their miner draws too near, a small mine must be made to rattle him in the gallery; which may be effected thus: A hole of five or six inches diameter, and six or seven deep, is made on that side the gallery where the enemy is heard; a cartridge of the same size, and containing about 10 or 12 pounds of powder, is put into it: the hole or opening towards the gallery is stopped close with a strong tampon, which is immediately applied to the cartridge, and supported by strong planks well buttressed: this powder is set on fire by a fusee, which passes through a hole made in the tampon, and communicates with the powder in the cartridge. If the gallery of the enemy's miner is within four or five feet of this powder, it will undoubtedly burst, and the miner will be either killed, or obliged by the smoke to retire.

Another way of bursting the gallery of the besieged, when it is at no great distance, is to put several shells on the side where the enemy's miner is at work, and to range them in such a manner that they shall have their effect. When the miners are at work in search of one another, they have great iron borers, with which they pierce the interval betwixt them, to find, as near as they can, their distance from one another. The miner must be very vigilant, and as soon as the borer is withdrawn he should clap a pistol into the hole, which, when well directed, and fired by a man of resolution, seldom fails, as M. Vauban affirms, to kill the miner. The first shot ought to be followed by three or four more; then the hole should be cleaned with the borer, to prevent the enemy from stopping it up on their side: and this is a matter of importance; for it will hinder their miner from continuing his work in that spot, and oblige him entirely to abandon it. These and many other stratagems, which may be seen in the Memoirs of M. Vauban, plainly show that the business of a miner requires not only address and cunning, but likewise great courage and resolution, to guard against and remove the several obstacles that may be thrown in his way, with a view to prevent the progress of the works committed to his direction: he may easily guard against them when he is undermost; but if it be otherwise, his situation is extremely bad. In order to know for certainty whether they are at work under the gallery, the miner generally makes use of a drum with something upon it, and then the flaking of the earth must occasion a kind of trembling, which will discover that they are at work underneath. Sometimes he listens with his ear to the ground; but the fluttering of the drum is the surest way.

While the miner is working upon the construction of his gallery, the besiegers must be employed in demolishing all the works of the enemy, and disabling them from defending or repairing the breach. With this view a continual fire is made against the breaches, which will hinder the besieged from showing themselves in that part, and from advancing to see the works which may be made in the ditch or at the foot of the breaches. If there is a tennelle before the curtain,

batteries are placed in the re-entering places of arms of the covert-way of the half-moon, which plunge into the tenaille, and hinder the enemy from making use of it to disturb the passage over the ditch. And in order to silence them further, another battery of mortars may be erected, in the most advanced lodgment of the gorge of the half-moon; which battery being well served, will render it too dangerous and inconvenient for the besieged to abide there, so as to have the attention requisite for obstructing the passage over the ditch.

But sometimes the enemy will make oblique embrasures in the curtain; and from thence they fire on the lodgments of the covert-way, so as greatly to incommodate both those lodgments, and the opening of the descent into the ditch. The Imperialists, at the last siege of Philipsburg, had made such embrasures in the two curtains of the attack, which would have destroyed a great many men, had the besiegers been obliged to erect batteries on their counter-scarp, and to make the passage over the town ditch. The way to prevent the effect of those batteries, is to endeavour to destroy them with shells; and, when the ground will permit, to enfilade the curtain with ricochet firing. Four or five pieces may be also placed on the upper part of the flanked angle of the half-moon; in which position they can fire directly upon the curtain, and plunge into the tenaille and the postern, by which the enemy keep a communication with the ditch when it is dry. In short, all methods are tried that experience and genius can contrive, to gain a superiority over the enemy's fire, so as entirely to silence it, or at least to hinder them from showing themselves at any of their defences, without being exposed to the fire of the batteries and lodgments.

Let us at present suppose that the passages over the ditches are finished, so as to be fit to walk over; that the cannon or the mines have made the breaches sufficiently wide for the assault; that the ascent is made smooth, and that the besiegers can easily mount to the top of the breach; then they may lodge themselves there, by following either of the two methods mentioned in the article of the half-moon: namely, by sending a few sappers, who, under the protection of the fire of the batteries and the lodgments of the covert-way, shall begin to lodge themselves there; or by ordering a body of troops to take possession of it sword in hand; or, which is the same thing, by attacking the bastion.

If the enemy have made no retranchments in the inside of the bastion, they will hardly venture to stand an assault, as this would only expose the place to be carried sword in hand, themselves to be taken prisoners of war, and the town to be plundered. Therefore every thing being ready for the assault, they will beat the chamade, that is, they will desire to surrender on certain terms.

When a resolution is taken to attack the bastions while the mines are making and charging, a considerable heap of materials is laid up in the lodgments nearest the breaches, that they may be handed readily for the construction of the lodgment, as soon as the enemy is driven away. Every thing being prepared to set fire to the mines, all the grenadiers of the army are ordered to march to the assault; and they are to

be supported by a sufficient number of detachments, that the enemy may not be able to make a stand.

These troops being ready, the mines are sprung; and as soon as the dust is a little laid, the grenadiers, commanded to march and to mount foremost, move on to the foot of the breach; and when they get there, they mount immediately with their bayonets fixed, and are followed by the rest of the troops that are to support them. The enemy will not fail to make use of their mines, if they have any left; and will likewise throw all kinds of combustibles, to make the besiegers pay as dear as possible for the ground which the besieged will be obliged to yield in the upper part of the breach; for yield at length they must, and the superior numbers of the besiegers must surmount every obstacle. If the latter are so fortunate as to repel the first attack, they will not be able to do the same by a second, or a third; in short, they must at length determine to retire behind their retranchments. As soon as they are beaten away, and have abandoned the upper part of the breach, the besiegers must set about making a lodgment; which will consist at first of a kind of arc of a circle, the convexity whereof is turned towards the enemy, if there is a breach in the faces of the two bastions, otherwise it will only be made on the upper part of the breach. The breaches are to be all stormed at the same time; by which means the resistance of the enemy will be divided. This whole time the batteries and lodgments are to fire with all the vivacity possible against the several defences of the enemy, and against every place they are in and that can be fired against, without annoying the troops that are storming the breaches.

The lodgment on the breach being made, the sappers are carried on to the right and left towards the centre of the bastion, and disposed in the manner as in Plate CCCIX. fig. 5. bastion A. Cannon are brought upon the breach to batter the inner retranchment, the ditch is passed over here also, and a lodgment is made upon the breach in the manner mentioned in regard to the bastions.

If behind this first retranchment there was a second, the enemy, after being forced to quit the former, retires to the latter to capitulate. The consequence then would be, to attack them as in the former; and at length they must be forced to surrender. It is very rare to see a defence carried so far as we have here supposed; but it was incumbent upon us to make this supposition, in order to give an idea of what was proper to be done, should the enemy resolve to defend the place to the last extremity.

In attacking the inner retranchments, besides cannon there must be bombs and stone mortars. The bombs do a great deal of mischief, because the enemy are obliged to keep close together in those retranchments, which are always very small; and for this reason the stone mortars are of excellent use, because of the shower of stones which they throw into those works, and which kill and wound a multitude of men.

§ 20. *Attack of a place covered with fore-ditches, lunettes, and other outworks, &c.*

In order to give a more simple idea of the operations of a siege, we have explained and applied them to a place that had no other outworks than half-moons and



Fig. 5.



and a covert way: but a greater number of works will make no alteration in the principles here established: to take, and keep possession of those works, the besiegers have only to follow the same rules; which we shall show in a few words.

Let us suppose a place surrounded by a fore-ditch, and a second covert-way, strengthened with lunettes, and suppose the front by which it may be attacked is covered with a horn or crown work, &c.

First of all the trenches are to be opened as usual, in order to come to the foot of the glacis of the second covert-way; the ricochet batteries are to be placed on the produced faces of the works attacked, and of their defences; the faces of the lunettes of the front attacked ought to be enfiladed by the ricochet batteries.

The second covert-way is taken in the same manner as the common covert-way; and then, if the fore-ditch is full of water, a good lodgment is to be secured along this ditch, and batteries are to be erected to make a breach in the lunettes, if the enemy do not think proper to quit them. It is very difficult for them to maintain themselves in those works, when their communication is seen; and they can hardly avoid being seen, when a lodgment is made all along the fore-ditch. Be that as it may, supposing that they are lined with stone-work, or only with turf, that they are fraied and palisaded, and that the enemy are obstinate in their defence, a breach may be made in them, by placing some cannon opposite the middle of the faces, and the ditch may be passed over by filling it with fascines or some other materials. As it is a great deal smaller than that before the body of the place, it is much easier to pass.

When the besiegers have made themselves masters of the lunettes which cover the front attacked, they begin to think of passing the fore-ditch. This is a very difficult task, because it is performed under the grazing fire of the covert-way; but this fire ought to be checked by the ricochet batteries, which should plunge into the covert-way on every side. This ditch is crossed near the salient angles of the glacis. It is always to be understood, however, that there is no possibility of crossing any ditch without a good epaulement of fascines, to cover the passage on the side which is seen by the place, or by the works that defend it.

When the lodgment is entirely finished on the covert-way, then the other attacks are carried on in the manner before explained.

There are places which, without any fore-ditch, have lunettes opposite to the salient and re-entering angles of the glacis, which are also enveloped by a second covert-way: sometimes they are vaulted and bomb-proof, as at Luxemburg; and sometimes they have only a ditch, a parapet, and a covert-way.

Those which are vaulted and bomb-proof are very difficult to take; because the ricochet-firing and the bombs can do them no mischief. In that case they must either be turned, or be taken by mines.

A work is said to be turned, when the besiegers get between that work and the place, and so cut off their communication. Sometimes the lunettes have communications under ground, and then there is hardly any other way of driving out the enemy but by mines.

This is tedious work; but there is no remedy for it.

The lunettes and the ditch are always defended by branches of the covert-way, with which they have also a communication, like those of the lunettes, A, A, Plate CCCX. fig. 1.

This plate, which represents part of Landau and its attacks in 1713, may serve to give an idea of the manner in which a work is turned. The advanced lunette B, as well as the work C, called a *tenaille*, are turned; that is, the trenches cut off the communication between them and the place.

When this communication cannot be cut off, there will be often a necessity for attacking the lunette and the covert-way at the same time; and the reason is, because though the enemy should be obliged to abandon the lunette, yet so long as they are masters of the covert-way, they have it in their power to return and retake it. Therefore, the sure way of keeping possession of it is to drive the besieged out of the covert-way, at the same time that they are forced to quit the lunette.

The garrison may avail themselves greatly of mines for the defence of these small outworks, so as to oblige the besiegers to pay very dear for their acquisition, and be a long while in making it. But they must pursue the same methods as the besieged; they must dig deep into the earth, they must endeavour to destroy the enemy's mines, to blow up their galleries, and to make themselves masters of the lower ground. This is an essential point, without which the enemy may blow up and destroy the lodgments several times. The celebrated M. de Valiere, in a Dissertation on Mines, at the end of the third volume of M. Folard's Commentary on Polybius, shows that in a ground 25 or 30 feet deep, the enemy may be blown up 20 times. Therefore it is impossible to be too cautious in endeavouring to get under the gallery of the besieged, in order to prevent the mischief they may do by their great number of mines.

In the neighbourhood of some places there are a sort of small half-moons, called *redoubts*. When they are distant from the place, the enemy cannot maintain themselves there without exposing their troops to be taken prisoners of war; but when they are covered and defended as they ought to be, and judiciously situated, they are an object worth attention. Endeavours ought to be used to cut off the communication between them and the place, and to oblige the enemy to abandon them by throwing in shells; it may even be proper to insult them and drive them out sword in hand, provided they are not so near the place as to receive powerful succours and able to withstand the attack. It is a matter of consequence to get rid of these small outworks as soon as possible, because they may be of great hindrance to the progress of the attacks, by having a view of the trenches from the flanks, and enfilading them, &c.

In some sieges, when the garrison are obstinate in their defence, small outworks are made at the foot of the salient and re-entering angles of the glacis; these consist only of a parapet raised at the foot of the glacis upon these angles, each side of which has about 10 or 12 fathoms. These small works are called *arrows*. They may be seen in A, A, A, Plate CCCX. fig. 2. They communicate with the covert-way by a passage pierced on the ridge of the glacis, and palisaded on

both sides. At the entrance of this passage is constructed a traverse B, generally called the *tambour*, which hinders the besiegers from being masters of the arrow, or discovering the inside of the place of arms belonging to the covert-way.

To prevent the effect of these arrows, the best method is to ply them well with ricochet batteries, and with shells thrown in also à *ricochet*. Stone mortars may be likewise made use of, to annoy the enemy in their arrows; for as these works are but small, the stone mortars produce a very good effect. We have already taken notice of almost all the works the besiegers may meet with beyond the covert-way; there remains, therefore, only to see the manner of conducting the attacks of the other outworks most commonly used in fortified towns.

§ 21. Attack of a Horn-work.

A HORN-work is nothing more than the front of a fortification, which projects into the field, and is joined to the place by two long sides. It is placed opposite to the curtains, and sometimes also to the bastions. The besiegers should endeavour, as much as possible, to avoid attacking the side covered by these works, because they are very difficult to take, and of course will greatly lengthen out the siege. But supposing there is an absolute necessity for attacking a place on the side covered by a horn-work opposite the bastion, and that this horn-work has an half-moon opposite to its curtain: The trenches and parallels are to be made in the usual manner; the same method is to be used in regard to the ricochet batteries, which will also enfilade the branches of the horn-work. The taking of the covert-way of the half-moon, and of the half bastions of the horn-work, is carried on in the same manner as the attack of the half-moon, and the two bastions of the body of the place. There remains, therefore, only to show how the lodgments are to be made in this work. We will suppose that there are two retranchments within, as in Plate CCCIX. fig. 5.

When the lodgments towards the point of the half bastions are finished, some guns are to be planted there, in order to batter the face of the opposite bastion; and they are to be placed overagainst the lodgments of the flanked angles of the half-bastions. These lodgments are to be extended on both sides towards the curtain, along which saps are carried on; as also towards the orillon of the half-bastions, if they are made with orillons: this will form a kind of small parallel, the fire of which will help to cover the lodgments in front, in case the enemy should make any sallies to destroy them. In large fortifications, such as horn and crown works, the lodgments ought to be carried on with the greatest circumspection, in order to be able to support them against every attack of the enemy.

As all these lodgments are commanded by the bastion, it will be requisite to dig the saps sufficiently deep, so as to be secure against their fire; and likewise to make traverses near enough to each other for the same effect.

If the bastion can be battered in breach from the rampart of the half-bastions of the horn-work, the besiegers will for this purpose make use of batteries erected on these half-bastions; and for the same end they

will also plant a battery of six or eight guns towards the middle of the curtain. Should it be impossible to sink sufficiently into these, so as to batter the lower part of the revetment of the bastion, still they might be usefully employed in playing against the enemy's defences, and driving them out of their retranchments. When the lodgments are well secured within, it will be extremely difficult for the enemy to continue in the retranchments, without running the risk of being made prisoners of war; because the communication between them and the place will become too difficult. They might indeed, by means of a bridge level with the water, retire into the collateral half-moons: but at the same time that the besiegers endeavour to make themselves masters of the horn-work, they will also strive to get possession of these half-moons; the taking of which must inevitably follow that of this work.

As soon as the enemy are entirely driven out of the horn-work, the besiegers must possess themselves of it by carrying on lodgments which shall occupy its whole extent; and if there be any occasion to erect batteries within, in order to batter the bastion in breach, they are to be erected along its counterescarp, as may be seen in z, (*ibid.*)

Sometimes it shall happen, that the ground of the inside of the horn-work will not permit lodgments to be extended there, as they are ranged in this figure, because it may be too wet and marshy, or else of too narrow a circumference. In that case there is no carrying on the lodgments but along the parapet of the front of this work, and along its branches, if the breadth of the platform of the rampart of these branches will permit. It must be made to defile by frequent zig-zags or turnings; but if it be too narrow, the only way for the besiegers is to sink very deep, in order to defile from the fire of the place, and to cover themselves by traverses made very near one another.

Explanation of Plate CCCIX. fig. 5.

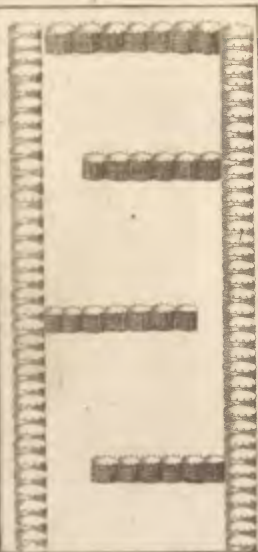
a, Cavaliers of the trenches. b, Batteries of stone mortars. c, Batteries to breach the half-moon before the horn-work. d, Batteries against the defences of this half-moon. e, Passages over the ditch before this half-moon. f, Lodgments in it. g, Batteries against the flanks of the horn-work. h, Batteries to breach the half-bastions of the horn-work. i, Batteries against its curtain. l, Lodgments in the half-bastions and in the horn-work. m, Passages over the ditch before the retranchments in the horn-work. n, Lodgments in these retranchments. o, Batteries against the defences of the collateral half-moons. p, Batteries to breach these half-moons. q, Passages over the ditch before these works. r, Lodgments in the same. s, Batteries to breach the reduits of the half-moons. t, Passages over the ditch before the reduits. u, Lodgments in the reduits. x, Bridge of fascines, or a road to carry the cannon to the horn-work. y, Batteries against the defences of the bastion A. z, Batteries to breach this bastion. B, Passages over its ditch. C, Lodgments in the bastion A. D, Lodgments on the border of the ditch before the retranchment of the bastion A. E, Passages over the ditch before this retranchment.

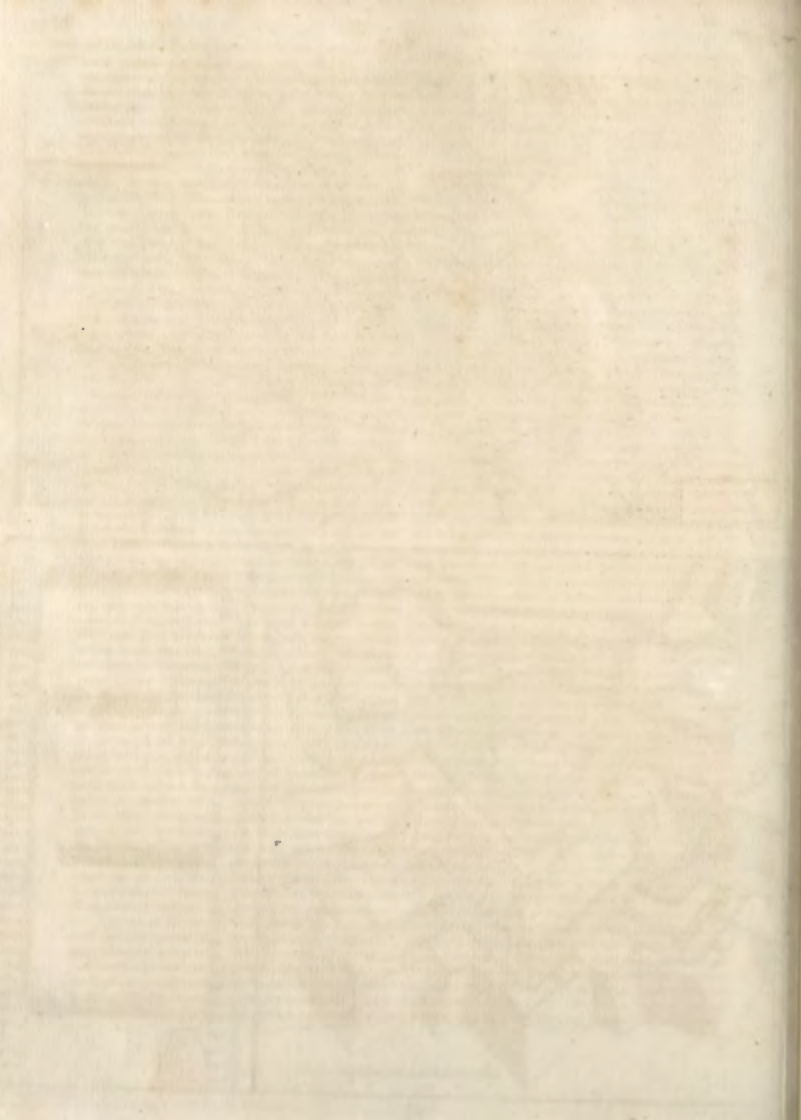
Plate CCCXI, represents the plan of the lodgments made



Fig. 2

Fig. 3





Of Sieges. made in the horn and crown work of Philipsburg in 1734.

A great deal more might be said, in regard to all these articles; but for the particulars, we refer the reader to the Memoirs of M. de Vauban, which display the whole extent of genius of that great man, and show how capable he was of finding out expedients, for surmounting all obstacles, arising either from soil, situation, or different manners of fortifying.

§ 26. *To prevent succours from being thrown into a town besieged.*

Nor to interrupt the thread of the usual operations of a siege, we have supposed that the general had taken every necessary measure to guard against all the attempts of the enemy, and to secure success by the great superiority of his forces. Sometimes, however, it may happen, that an enemy who was looked upon as too weak to relieve the place, shall prepare to attack the army of the besiegers, either in consequence of drawing out most of the troops from the neighbouring garrisons, which are least exposed, or of having been reinforced from some other part. In such case, there are two ways to follow. The first is, to wait for the enemy in the lines, and to hinder them from breaking through; the second, to leave part of the army in the lines, in order to carry on the siege, and to oppose any sallies of the garrison; with the other to go and meet the enemy, and fight them out of the lines.

Both these ways are supported by the opinion of different generals; but the latter seems to have the most general approbation.

The inconvenience of waiting for the enemy in the lines, is the uncertainty on which side he intends to direct the attack; for which reason the besiegers are obliged to be equally strong in all their posts; and when the line is very extensive, the troops are at too great a distance from one another, to make any considerable resistance on the side where the enemy forms his attack. Most lines of circumvallation, that were ever attacked, have been forced; so that both reason and experience seem to establish it as a maxim, that it is preferable to go and meet the enemy, and not to let him come within reach of the lines.

Without pretending, however, to determine so important a matter, it seems, that when a line is not very extensive, it may be defended to an advantage. And, first of all, it is beyond all doubt, that if the troops behind the line know how to avail themselves of the several circumstances in their favour, their situation is in many respects preferable to that of the assailants. The latter are exposed to the fire of the line for a very considerable time before they can come up to the border of the ditch. This ditch must be filled up; and all the while they are exposed to the same fire, which must kill a great many of their men, and throw their troops into some confusion. And when they break into the line, they can make but a very narrow front; for which reason, they may be charged both in front and flank by the troops within; who, if they do their duty, must drive them into the ditch. For, suppose the first line of the defendants infantry next the ditch should be obliged to give way, the horse that are behind them may and ought to fall upon the enemy's foot that have pierced through the line; and as the

latter cannot force their way but in some confusion, the former may easily drive them out again. Notwithstanding such evident advantages in entrenchments, experience, says the Chevalier Folard, plainly shows, that troops are less brave and resolute behind an entrenchment than in an open field. For they place their whole confidence in this defence; so that when the enemy, to avoid being exposed too long to the fire of the line, jumps boldly into the ditch, and endeavours to mount the entrenchment, the soldier begins to lose his confidence, but loses it entirely as soon as he sees that the enemy breaks through the line. "He looks upon the evil, (says this author), as past relief, when there is nothing easier than to remedy it, by forcing the enemy back again, and tumbling them into the ditch. For, not to mention that they cannot pierce through in good order, they have spent their whole fire. Yet (continues the same author), nothing of all this is done; the enemy enter pell-mell, and form their ranks while the others retire; the terror spreads along the line, they all betake themselves to flight and disperse, without knowing in what manner the enemy forced their way." Upon the whole, we may conclude, that if the troops are sensible of the many advantages of a good line, and are determined to defend it; if the several parts are likewise well supported, and all the necessary precautions have been taken to prevent being surprised; it will be extremely difficult for the enemy to force it.

Thus, at the siege of Philipsburg, in 1734, prince Eugene reconnoitred the lines of circumvallation, and found them so well disposed, that he never once attacked them. They formed a kind of irregular semi-circle round the place, of which the Rhine might be considered as the diameter. They were defended by a kind of fore-ditch, and by wells between this fore-ditch and the place, as may be seen in Plate CCCIII. If the prince had attempted to pass over this ditch and these wells, they would have lost a great number of men by the fire of the lines. The wells were so near to one another, that there was no possibility of passing between them: they must have been filled up, as well as the fore-ditch, with fascines; which would have been too tedious and dangerous an enterprise.

In such a situation, therefore, the besiegers may wait quietly in their lines; but if they should be of so great an extent, as not to admit of being equally guarded, then it seems to be the safest way to draw out the troops, and meet the enemy, as marshal Tallard did Landau, in 1703. After he had defeated the army which was marching to the relief of the place, he returned and finished the siege. The duke of Vendome acted just in the same manner at the siege of Barcelona, in 1697. Having had intelligence that the marquis of Veleco, viceroy of Catalonia, was preparing to attack him, he went out to meet that general, gained a complete victory, and returned afterwards before the place, which was obliged to capitulate.

At the same time, we must allow that the safest way to conduct a siege, is to have a good army of observation advantageously posted, so that the enemy shall not be able to oblige them to fight, without exposing themselves to a very great risk; and thereby to cover the siege, and be near enough to receive succours from.

from the troops employed before the town, should the enemy come to a resolution of giving battle.

If the enemy do not think proper to attack the besieging army, they may probably try to throw in some small succours of troops and ammunition into the town. The way to prevent them is to make the circumvallation very exact, and not to leave an opening in it, under any pretext whatsoever.

The enemy may likewise attempt the raising of the siege, by making themselves masters of the spot, or place, from whence the besiegers draw their provisions and ammunition. But before a general lays siege to a town, he should take all the necessary precautions, for securing his magazines, and covering his convoys, and guarding the several posts through which the enemy might march to attack him.

Another expedient the enemy may think of for raising the siege, is to attack some place of importance, which the besiegers have an interest in preserving; in order to engage them to march to its assistance, and to abandon the siege they have in hand. But this expedient ought to have been foreseen, and should not cause the raising of the siege. It is natural for a general, before he thinks of laying siege to a place, to begin with taking all the precautions which prudence and military skill can suggest, for preserving his own country, and covering it against any attack of the enemy. They cannot but think of indemnifying themselves, if possible, for the loss of any place you take from them, by taking some of yours; therefore, as every attempt of theirs must naturally be foreseen, a general should guard against it. However, should the enemy find means to engage in an enterprise of importance, and which requires an immediate relief, if a general thinks there is not time sufficient to take the place he has laid siege to, and at the same time to oppose the enemy's designs, in that case he may raise the siege; but for so doing, there should be very cogent reasons. When king William laid siege to Namur, in 1695, marshal Villeroi, in order to divert him from his purpose, sat down before Brussels, thinking he should oblige that prince to march to its relief, and abandon his enterprise against Namur; but king William chose rather to suffer that city to be bombarded, than to relinquish a very important conquest, in which he was in a manner sure of succeeding.

§ 27. *Of the raising a siege.*

SUPPOSE that, by some one circumstance of those related in the preceding article, or through some other cause, a general finds himself reduced to the necessity of abandoning the siege; in that case, if he apprehends being incommoded by the garrison in his retreat, he ought carefully to conceal his design from them. First of all, the guns and mortars are to be drawn off betimes from their batteries: then the implements are carefully collected, and put into the waggons; and if he intends to steal away unknown to the enemy, all the artillery and baggage must set out at the beginning of the night, the trenches and the places of arms being still filled with troops, who are to continue firing, in order to deceive the enemy; and when the baggage is pretty far removed from the place, all the troops are to follow, while the fires in the camp are left burning as usual. The whole is to

be escorted by horse or foot, according to the country in which the retreat is made, whether through open plains or inclosures. Sometimes it may happen, that a general shall be forced to retire in a hurry, without being able to take all his baggage with him; in such case, whatever he is obliged to leave, must be previously burnt and spoiled, that it may be of no use to the enemy, &c.

When an army is in no danger of being pursued by the garrison in its retreat, the artillery and baggage are sent off by day, and the troops march after them.

SECT. II. *Of Defence.*

§ 1. *Of the troops and ammunition with which a fortified town ought to be provided.*

As the goodness of the works, when a place is well provided with troops, ammunition, and provisions, is what enables it to hold out against the attack of an enemy; so the want of any one of these three articles will not permit all the advantage to be reaped that was proposed in fortifying a town. Men are properly the soul of a defence, and without them the best fortifications in the world are not able to make any great resistance against the enemy.

Therefore we must first of all lay down as a maxim, that a governor cannot make a good defence, unless he hath the number of troops necessary for defending the several posts, and obliging the enemy to pay dear for them. Immense sums are expended in fortifying a place, in order to stop a strong army with a small force; but what resistance can the place make without exerting a brisk fire; and what will those heaps of walls avail, if they are not defended? The garrison of a town besieged ought to have a reasonable stock of provisions, in order to support themselves under the fatigue of military duty; they ought also to have powder, arms, and generally every thing that is requisite to annoy the enemy, and to stop the progress of their operations.

It is not very easy to settle the number of troops necessary to defend a town; the nature of the ground on which the place is situated, and the number of outworks, ought to determine the strength of the garrison. M. Vauban in his Memoirs, reckons, that in a place regularly fortified with good bastions, half-moons, and covert-ways, we should allow 500 or 600 men to each bastion: That if the town has horn-works, 600 men may be likewise assigned to each of those; and in proportion for the other outworks, according to the relation which their defence may require to that of the horn-work. In regard to the horse which they may want on this occasion, he supposes it a tenth part of the infantry.

This being premised, suppose a place has six bastions, there must be a garrison of six times six hundred foot, which makes 3600, and the tenth part of that number in horse, which makes 360. Hence a sufficient garrison for such a place will be 3960 men.

In order to compute, as near as possible, the quantity of ammunition and provisions that may be requisite for such a garrison, we must calculate how many days they will be able to maintain a siege. The following are M. Vauban's remarks on this subject.

Sieges.	For the investing the place and the tracing the lines	Days.
	For the opening of the trenches to the attack of the covert-way	4
	For the attack and taking of the covert-way, and making lodgments in it	9
	For the descent and passage over the ditch before the half-moon	4
	For fixing the miners, or for the batteries till the making of a reasonable breach	3
	For taking and securing the interior part of the half-moon	4
	For the passage over the great ditch before the two bastions, supposed to be begun before the taking of the half-moon	3
	For fixing the miners, or erecting batteries on the covert-way, to lay the place open and make a reasonable breach	4
	For the defence and support of the breach after the place is laid open	4
	For the mistakes which the enemy may happen to commit, and their neglect in their works	2

are seldom above two or three attacks at the most, the cannon belonging to those bastions that are not attacked, serve to strengthen the bastions attacked, and they are placed also in the outworks of the fronts attacked.

Among the cannon for the defence of the town there should be some of 24, of 16, of 12, of 8, and of 4 pounders, and even of 2 and 1. The latter are of very great service, because of their being so convenient to remove with ease, and with few men, from one place to another; for this disturbs the enemy, who find it difficult to destroy these small pieces. The largest serve to fire against their batteries and their works. The small ones are carried to the outworks, and to the covert-way, from whence they are fired *in barbette*. It is customary to make use of sea carriages for these small pieces.

Besides cannon, the town ought to be provided with a great number of wall guns, carabines, muskets, &c. We are to suppose that most of the ordinary arms will be broke in the service, and therefore care must be taken to provide new ones when wanted.

The number of mortars necessary may be estimated at two to every bastion. They must be of different bores, of 12 and 8 inches diameter. There ought also to be several stone-mortars.

The garrison of a place of six bastions, consisting, as we have already observed, of 3600 foot, are to be employed or distributed in the following manner.

We should, first of all, reckon about 600 soldiers wounded and sick, in the first 12 or 15 days of the siege, and for the service of the batteries, the removing of ammunition, &c. And then there will remain 3000 for the defence of the place.

These are to be divided into three equal bodies; one for the guard, the other for the bivouac under arms, ready to march on the first notice where wanted, and the third to rest.

The horse are also divided into three bodies like the foot; that for the guard is chiefly placed on the right and left of the attack; that for the bivouac is generally quartered by brigades, in different parts of the town, where they may be of service, either to keep the inhabitants in awe, or to be ready to act in sallies. In regard to the third corps, who are to rest, their horses must be saddled in the day; and the horse or dragoons must be ready to mount instantly, should there be any occasion for their assistance.

The guard of infantry and the bivouac ought to be under arms, at the several posts assigned them in the works of the place; and for the corps at rest, they must be ready to support the troops on guard, in case these should have need of their assistance.

The guard of foot of 1000 men, may be subdivided nearly into three equal bodies; two of which to defend the posts attacked, and the third the other posts not attacked. And in regard to the two first, they may be subdivided also into three equal bodies; two of which are to fire the first two hours of the night, the other is to relieve one of them at the end of that time, the next is relieved two hours after; and so on alternately, that there may be always two-thirds of this guard in action, and the other third at rest.

There is no occasion for so brisk a firing by day as by night; because the besieged are more capable of

Total of the defence 41
In this defence it is plain we suppose a town to be fortified only with half-moons and a covert-way; but if the half-moon had a reduit with a revettement and rampart, it might hold out four days longer.

If there were retrenchments in the bastions, they might retard the taking of the place five or six days.

If the ditch was strengthened with tenailles and caponiers, the passage over it might be protracted two or three days.

If there was a good horn-work, or some other like fortification properly strengthened with a half-moon, a covert-way, and retrenchments within the work, the taking of it would cost about 12 or 14 days.

If this work had tenailles, the passage over its ditch would be later by two or three days.

If there was a fore-ditch and a second covert-way, the progress of the attacks would still be less rapid, and we might reckon 10 or 12 days for the taking of this second covert-way and the passage over its ditch.

If there were redoubts near the place, they would still protract the taking of it for some days.

From this estimate, though not very exact, an idea may be formed of the duration of a siege: a point absolutely necessary for securing, at least, a sufficient quantity of ammunition during the time; we say at least, because it is always prudent, if possible, to have a greater quantity of ammunition than is supposed to be wanted.

When once the number of the garrison, together with the duration of the siege, is fixed, it is then very easy to calculate the quantity of powder and ammunition with which the place is to be provided. We shall give here an estimate, after mentioning a word or two in regard to the necessary quantity of cannon, mortars, &c. and the employment of the garrison.

It is judged, that to be well provided with cannon, eight pieces should be allowed to each bastion. Therefore in a place of six bastions there ought to be 48 pieces.

As a town is never attacked on all sides, and there

Of Sieges. seeing what the enemy are about, and of opposing their attempts; but in the night nothing but a strong cannonading can guard against their enterprises. By day the troops fire from between baskets, sand-bags, or gabions, placed on the upper part of the parapet, to the end that being under cover they may take better aim at the enemy.

To know the quantity of powder requisite for a siege of any determined length, it will be necessary to know the quantity expended each day.

According to M. Vauban, of whom we have borrowed this whole detail, a pound of powder of 16 ounces may contain from 30 to 40 charges for common muskets, including their priming. Each soldier may fire from 60 to 80, and even to 90 charges, during the guard of 24 hours; and the quantity of powder for each man may be fixed at two pounds at a medium, for some will use more and some less.

Pounds.

We have supposed, that out of the 1000 men for the guard, there were but two-thirds in the front attacked, that is 666; now, allowing two pounds for each man, it amounts to

1332

For the two thirds of the bivouac, or those under arms placed near the attack; that is, 666 men, at the rate of half a pound each

333

For the 334 men of the guard at the post not attacked, at the rate of a quarter of a pound each

84

For 120 horse guards, at the rate of a quarter of a pound each

30

For 300 cannon-shot for each guard, each shot upon a medium rated at five pounds

1500

Observe that this estimate may be made exactly, when once the number of the pieces that are to be placed in the front attacked is determined; allowing nine pounds of powder to each piece of 24, six to each of 16, five to each of 12, three to each of 8, and two to each of four. Or the charge of every gun may be determined by half or a third part of the weight of the ball.

For 300 shot for wall guns, at two ounces each

38

Total 3317

Which is the quantity of powder expended each day, without including that of mortars, bombs, mines, grenades, &c.

Now, suppose a place is able to hold out 41 days, the quantity of powder, as laid before, for these 41 days, will be

135997

Besides, for 1200 thirteen-inch shells thrown during the siege, at the rate of 16 pounds each charge

19200

For 3000 eight-inch shells and lesser, at six pounds each

18000

For 6000 shots, with stone-mortars, at a pound and a half each

9000

For 3600 grenades, at four ounces each

9000

For mines and saggasses

8000

Powder burnt in the breaches

4000

For combustibles

3500

Allowance for waste and accidents 30000 Of Sieges.

For the surrender; that is, the quantity which ought to remain at the surrender 12000

And as it is advisable rather to have a superfluity of powder than want, to the above quantity we may farther add

21303

And reckon for the whole 270000 as that which expresses the quantity of powder with which the town ought to be provided against a siege; and, according to M. Vauban, this quantity may even be augmented to 280000.

After having given the estimate of powder, it is easy to give that of the shot, by taking it at two pounds for each pound of powder.

A great many more things are requisite in a town besieged.

Provision being as necessary as ammunition, in order to know the quantity that is requisite during a siege, it will be proper to observe, that every soldier is put upon the footing of a ration of bread each day, weighing one pound and a half. An ammunition-loaf, consisting of two rations, weighs three pounds or 48 ounces; but to give it this weight after it is baked, experience informs us, that it ought to weigh 56 ounces in dough, that is, the baking diminishes four ounces the ration.

A sack of ordinary flour, weighing 200 pounds, makes a hundred and fourscore rations. If the garrison consists of 3960 men, horse and foot, they will consume so many rations a day; which in 41 days will make 162360 rations, that is 902 sacks of flour. But though the garrison diminishes daily, this quantity of bread is not sufficient, because the officers have a greater number of rations, according to their rank; and besides, it is necessary to have provisions for those that attend the troops, as servants, artificers, nurses, surgeons, &c.

There must be likewise a certain quantity of provisions in the place when it surrenders; therefore it would not be too much to have two thousand sacks of flour in such a town as we have supposed, that is, garrisoned only by 3960 men.

There must also be a sufficient quantity of meat for the soldiers and officers. It is usual to allow a live ox and two sheep to a battalion for three days; which will produce a pound and a half of meat to each soldier, that is, half a pound each day. The other two days they have half a pound of bacon or salt beef, or a quarter of a pound of cheese with vegetables. In regard to the officers, they have meat given to them in proportion to their ration of bread.

As the most perfect fortifications cannot hold out long without the necessary ammunitions, too much care cannot be taken in regard to this article.

"The ancients, says Mr Folard, were accustomed to lay in a great store of provisions, when a place was threatened with a siege; a store sufficient not only for three or four months, but for three or four years at least. This they were induced to do for two reasons; the fear of being blockaded; and the inviolable law of defending themselves to the last extremity. The moderns take less precaution in respect to provisions, as well as to every thing else; they think it sufficient to

lay in a flock for three or four months, in towns of the greatest strength and importance; which is very wrong. I grant, indeed, (continues Mr Folard), that the law of holding out to the very last extremity, is looked upon as chimerical at present, and entirely left to the ancients: but it should be considered, that an enemy well acquainted with the state of things, will measure the strength of the place by the quantity of provisions contained therein; and making a calculation of the loss of men in the attack, together with the expence of a long siege, they will choose, if they are wise (and certainly they will gain by it in the end), to take it rather by a blockade than by a siege in form: at least they will be sure of becoming masters of it in three or four months through want of provisions; whereas a siege may last that time, if the garrison are obstinate. Such a town as Lille in Flanders, and as Bergues, both of which are cut of the line of communication of our frontier, cannot be too well stocked with provisions. A wise and experienced minister will victual them at least for eighteen months, because they may be blockaded. It is much the same in regard to Strasbourg and to Landau. The latter was never victualled for more than three or four months: how imprudent, therefore, must it be to lay siege to it, when it may be taken by a blockade almost as soon as by a siege, which is attended moreover with an infinite loss of brave men, and a monstrous expence."

These reflections of M. Folard are very solid; but circumstances will not always permit a place to be so well provided as one could wish.

When a governor finds that the enemy threatens to lay siege to a town under his care, and that the place is in want of the chief things necessary for a vigorous defence, he is to exert all his abilities, in order to remedy this inconvenience as much as possible. The greatest want of all is that of provisions; he must therefore endeavour to get a supply, both from the country and from the people of the town; which is to be distributed among the garrison with the greatest economy. The useless mouths should be all sent out, and an inquiry ought to be made after those who are suspected of having hoarded any corn; and upon paying them for it, or upon giving them security of payment, they should be obliged to deliver it up for the subsistence of the garrison.

Hitherto we have made no mention of the inhabitants; yet they may be rendered serviceable in contributing to ease the garrison. The governor should make use of such workmen who exercise handicraft trades for every thing relating to their respective branches; and those who are not artificers, should watch the fire that may be kindled by the shells and red-hot bullets; they ought likewise to transport the materials to the places assigned them; and even to work at the different retrrenchments which the governor should think fit to order in the town, provided however that they be not too much exposed to the fire of the besiegers. The priests and religious people may be of some use, in administering to the sick and wounded, and on other occasions, where there is nothing inconsistent with their character. The nuns and the poor women may be employed in washing the soldiers linen, in making lint, &c. The governor ought to regulate matters so, that every one shall contribute, as much as in him

lies, to the defence of the place. An article of the greatest importance, in regard to the inhabitants, is to oblige them to lay in a flock of provisions for six months. The same conduct may be used with respect to the religious houses; and those that are able should be obliged to make still a greater provision, which will be a resource to the garrison when their own flock is exhausted.

§ 2. Necessary preparations for maintaining a siege.

WHEN a town is threatened with a siege, the governor ought not only to take care to have a plentiful stock of ammunition and provisions, but moreover he should use all the precautions requisite for retarding the enemy's approaches, and rendering them more difficult and dangerous.

He ought therefore to leave nothing in the neighbourhood that may serve to cover the enemy; he should clear the adjacent country of all houses that are within reach of cannon-shot, and fill up, if possible, the caverns or hollow ways that may be concealed, or build some redoubts and other works under the protection of the place, by which they may be enfiladed. He ought to cut down all the trees; in a word, he should prevent the enemy's having any cover within reach of the cannon of the place: he should see that the fortifications be all in a good condition, and that the covert-way be well palisaded; in fine, he should cause arrows to be built on the salient angles of the glacis. Retrenchments may also be made in the re-entering places of arms of the covert-way, by raising a parapet within them, and parallel to their faces, with a small ditch before it. In a word, the governor ought to use all expedients possible to protract his defence, and to incommode the enemy. Nor should the galleries for the mines be forgotten: on the contrary, they ought to be begun betimes, and carried out into the country as far as the ground will permit; and chambers should be made under all the angles of the glacis. If there are any houses within the rampart which may obstruct the defence, the governor ought to see them demolished; and nothing should be left, either within or without, which can any way be of service to the besiegers. If there are new raised troops, care should be taken to discipline them well. "When the duke of Guise arrived at Metz, he found twelve companies of foot, which, as M. de Salignac relates in his account of the siege of that city, being new raised troops, he endeavoured to discipline and train them up to war: for which purpose, he gave orders that those who were upon guard, should march regularly from their quarters to the market-place before his house, where they drew up in battalia, and went through their exercise; and that the mulqueeters might be better used to their business, he made them fire at a mark."

The governor should also see that the hospitals be in a good condition, that the sick and wounded be taken care of, nor think it beneath his character to visit them himself, and to let the soldiers see how greatly he has their preservation at heart. This is the surest way to gain their confidence and affection, and to engage them to do their utmost towards defending the place.

As it is now the custom to throw a great number of shells into a town besieged, it is necessary to have

vaulted places under ground bomb-proof, where part of the garrison not on duty may rest in safety. They are not so much wanted in large cities, where there are always different quarters secure from the enemy's shells: but a small town is in every part exposed to the bombs; so that some places under ground are absolutely necessary for the garrison to take their rest, and to prevent the troops from being continually incommoded.

These subterraneous caverns are generally made in the gorges of the bastions, and sometimes under the rampart behind the curtains.

Where there are none of those subterraneous places, it will be necessary, as soon as the town is invested, to erect defences to shelter the men from the bombs; these are made of strong pieces of timber, laid sloping against the parts the least exposed, and they may be covered with thick planks laid in the same manner. The large houses should also be shored, that is, all the floors, from top to bottom, should be supported with strong upright timbers, and the upper floor covered with large beams laid across one another, and these again with earth, fascines, dung, &c. When they are thus fitted up, they may serve either for the accommodation of the troops or for hospitals, &c. But what deserves a more special care, is the powder-magazines. They ought to be bomb-proof; but as there are very few that can resist the shock of a great number of shells, they should therefore be covered with seven or eight feet thick of earth, and a layer of fascines, dung, and strong planks laid over them, so as to form a kind of roof. But if it should happen, either from their situation or height, that this cannot be done, than a range of large trees, well fastened together, must be laid over them, so as to diminish the shock of the shells. The windows of the powder-magazines should have no prospect towards the besiegers; and to prevent all accidents, nobody should be permitted to go in or out of the doors, but when the fire of the enemy is slackened.

When there are no powder-magazines in a town, it is very difficult to preserve the powder during a siege; all that can be done, is to distribute it in different places, as in cellars and caves made under the ramparts, or in gardens, &c. and to cover these places well with thick planks, earth, fascines, &c.

The mischief done by shells, consists not only in demolishing the buildings on which they fall, but likewise in setting fire to most places they fall upon; and when they are followed by red-hot balls, it is very difficult to hinder the town from being burnt. In order to remedy this evil, timely precautions should be taken, and the inhabitants employed in extinguishing the fire.

First of all, a great number of casks, filled with water, should be placed in the streets; and the soldiers and inhabitants ought to be divided into companies, to prevent the spreading of the flames. It will be proper to divide these into small bodies, and to allot different quarters to each of them, for extinguishing any fire that may happen to particular houses. By these means each corps, or company, will become answerable, in some measure, for the houses entrusted to their care, and use the utmost endeavours to preserve them. The pavements must also be taken up, and dung laid

in the streets, to prevent further mischief from the bursting of the shells.

§ 3. *Of the defence from the investing to the attack of the covert-way.*

WHEN the place is invested, and the besiegers begin to work upon the line of circumvallation, the governor ought not at first to fire upon the enemy's troops with the largest cannon, but with his small pieces only, to the end that the enemy, imagining there are no other guns in the place, may pitch their camp in full security out of the reach of those pieces, though there are much larger in the town: or else they may be deceived by half-loading the large ones, by which means they will not reach so far as when they have their full charge. As the enemy ought to pitch their camp as near as possible to the place, provided they are out of reach of cannon-shot, they will think themselves at a sufficient distance; but as soon as they are encamped, the garrison are to give them a full volley with their great guns, which will oblige them to decamp once more, and make them lose time.

If the adjacent country is divided by rivers, and the quarters of the camp are separated, the governor should fall upon those which are near at hand; but this must be done with great caution and prudence, for fear of having his men cut off, and losing part of his garrison.

As it is of importance to the besieged to know on which side the enemy intend to open their trenches, every endeavour should be used to discover it. The magazines of materials may perhaps direct them in this particular; because it is to be presumed, that the besiegers will place them near the attack; and therefore, when this spot is once known, the besieged should watch every night the opening of the trenches, in order to be ready to fire briskly on the workmen, which will greatly retard their operations.

While the besiegers are constructing the lines, their engineers spare no pains to get an exact knowledge of the adjacent ground, and to reconnoitre the fortifications, that they may form the plan of attack, which they will be sure to make on the weakest side. To prevent this, M. Goulan proposes the following scheme.

As soon as the town is invested, the governor should send 200 or 300 men every night, to that side which he knows to be the weakest, with orders to lie upon their faces, in the form of a semi-circle, of which the palisades of the covert-way may be considered as its diameter. These men should be divided into small parties, of three or four men each, at the distance of 20 or 30 paces from one another, so as to occupy a large tract of ground. All these different parties ought to agree upon a signal, to give notice when any body passes by them, and they should remain there in silence till day, without stirring, unless somebody happens to pass by; in which case, the first that sees them should rise, and give the signal to the rest, who are to do the same; then all drawing close together, and advancing to the palisades, they will take those who passed, as it were in a net, without any possibility of relief from their escort, who cannot be numerous enough to rescue them from the hands of 200 or 300 men, protected by the fire of the covert way. If the men who advance to reconnoitre the place, instead of passing

passing through the intervals, should fall in with some of these parties, and endeavour to get off, they must be fired upon: thus the enemy may be easily hindered from reconnoitering, and thereby acquiring a knowledge of the ground, or the side most proper to be attacked.

From the time the place is invested, the besieged should send every night small parties, of eight or ten men, commanded by a serjeant, with orders to lie upon their faces, all round the border of the glacis, and to listen carefully to every thing that passes. Whatever care the besiegers may take to open the trenches in silence, still it will be very difficult for this operation to be made, without such a motion as must be heard or perceived from the neighbourhood of the glacis. These small parties may even advance a little further, observing silence, and taking care not to be surprised by the parties which the enemy also may send out on that side, to watch whether there are any troops of the garrison ready to fall upon the workmen.

When the side on which the enemy open their trenches is known, the great pieces of ordnance are mounted on the rampart of the town *en barbette*, and the small ones on the covert-way, from whence they are to fire briskly upon the trenches. And to point more exactly, fire-balls are thrown from the mortars, which will give light enough to discover the workmen. Just at this time, the besieged should make the greatest fire against the enemy, because it is then they are most uncovered, and consequently most exposed. As the besieged cannot have their batteries ready till the second or third day after the opening of the trenches, during that time the guns may continue to fire *en barbette*; but it will hardly be possible to fire in that manner when the enemy's batteries are once erected. Mortars should likewise be used for throwing shell on the workmen and those employed on the batteries; in short, the best use should be made of the artillery, before the enemy are in a condition to silence it.

It is customary to make two or three attacks in order to divide the attention of the garrison; and of these, generally speaking, there is only one real: they must therefore endeavour to find out this real attack, and to use the utmost diligence in making good retrenchments, as well in the outworks, which the enemy must take before they can come to the body of the place, as in the gorge of the bastion of the front attacked. But to render these retrenchments strong and firm, they should have been begun and even finished before the opening of the trenches. A governor, who has a proper knowledge of fortification, ought to judge on which side a town is most accessible, and to presume that here the enemy will commence their attack; consequently he ought to think of every method of defence, the best adapted to retard the approaches, and dispute every inch of ground.

The besieged should so dispose their artillery at the beginning of a siege, as to enfilade the branches, and to direct their fire against the head of the trenches or the saps. This must be their principal effort; for it is by continually firing upon them, that they may reasonably hope to retard the works.

When the enemy have erected their batteries, it is very difficult for the besieged to maintain theirs, especially if they are placed on the produced faces of the pieces attacked. For as the cannon are continually

firing *à ricochet* against these faces, and it being difficult to guard against this firing, it will be very dangerous for the soldiers to remain there: all that can be done is to make some traverses, in order to diminish their effect; which is difficult indeed to compass, because the shot falling upon the traverses will bound between them. The besieged must not pretend to fire at the batteries of the besiegers, in order to dismount them; as the latter are more numerous, they must of consequence gain a superiority over those of the garrison, who by their obliquity would render their guns useless the remainder of the siege, since they must certainly be dismounted by those of the enemy. It is therefore more advisable not to persist in firing always from the same place against the enemy's batteries. By ceasing to fire from that part where the besiegers know there was a battery, they may be induced to think they have destroyed it, which will prevent their continuing to fire against it, and be a means of preserving the battery for future service. But in order to give them trouble, smaller guns may be placed in the outworks, on the faces of the bastions, from whence the trenches and batteries of the besiegers can be discovered; and they must often change place to perplex the enemy, who will find it very difficult to dismount those moving pieces. The besieged however must endeavour to repair the parapets destroyed by the enemy, and to take proper measures for firing again from thence, as soon as the besiegers have shifted their guns.

It is also advisable that the batteries of the besieged should not fire in salvo's, or all at a time: for it is well known, that the besiegers place soldiers in the trenches, to observe, through small loop-holes made with sand-bags in the parapet of the trench, when the batteries of the town are fired, and to give notice to those who are at work in the trenches, which way the guns are pointed, that they may put themselves under cover. If the besieged have only six pieces on a battery, and they fire them all at a time, the enemy have some moments of security to look over the parapet and to examine the ground where they intend to work and to conduct the trenches: but when the garrison vary their manner of firing, they give more uneasiness to those who are at work in the trenches, who will not be so ready to look over the parapet; which is ever dangerous, but especially when the trenches are brought within musket-shot of the place; though it be necessary, in order to view the situation of the ground towards which the works are to be directed.

§ 4. Of sallies.

A GARRISON that keep within a place, without making sallies, are, as the chevalier de Ville says, like those who are not concerned when their neighbour's house is on fire, and will not stir to extinguish it till it has reached their own. And indeed, as the besiegers continually carry on their approaches towards the town, it is of the utmost importance to endeavour, in time, to stop their progress; to which end, the making of sallies is extremely conducive, especially when they are well conducted, otherwise they would rather accelerate than retard the taking of the place.

How great soever the advantage of sallies may be,

yet they cannot be made in all sorts of fortified places; they are proper only when a garrison is numerous. A small garrison, although well stocked with all the kinds of necessary ammunitions for making a defence, and for holding out, ought to be very careful how they venture to make a fall. But a numerous garrison, not so well provided, ought to fatigue the enemy as much as possible by frequent sallies. The same measure ought to be followed, when a town is but ill fortified; the garrison should not shut themselves up so as to be obliged to surrender, as it were, without making much resistance. It is best in those cases to harass the enemy continually, to keep them at a distance as long as possible, and to use every stratagem and endeavour that may retard their approaching the glacis, and the taking of the covert-way. Thus it was that the marquis of Uxelles, afterwards marshal of France, behaved at the siege of Mentz in 1689. He defended this large and ill fortified town upwards of two months, with the help of a very brave garrison; but was obliged to capitulate for want of powder and ammunition, though he was still master of the covert-way, and even in some measure of the glacis: for the enemy had only one lodgment on the ridge of it; and even this, says M. de Feuquieres, the marquis suffered them to make, in order to have a pretence for capitulating, and that the besiegers might not suspect he surrendered for want of powder. In 1702, Keyserworth, a place but indifferently fortified, was defended nevertheless by numerous sallies, which rendered it a very dear acquisition to the enemy. In the like cases, sallies ought not to be neglected; but they must be made with great art and skill, to expect any success from them; for it is on these occasions, says M. Vauban, that the vigour, diligence, and good conduct of the governor, ought to appear in their full lustre.

When the besiegers are at a distance from the place, sallies are very dangerous, because the enemy may cut them off from the town with their horse; but when they have made their second parallel, and advanced the branches of the trenches towards the third parallel at the foot of the glacis, then is the time for the garrison to fall. They may even venture, though with great caution, when the besiegers are at work upon the second parallel, and before it is entirely finished; but the most favourable opportunity of falling, is when the besiegers are come to the third parallel, and want to make a lodgment on the glacis. Then there is no danger of being cut off; and the enemy may be surprised the more easily, as the garrison have it in their power to fall upon them all at once, and to throw them into confusion, without giving them time to recover themselves.

Sallies may be either great or small; the former ought to be with 500 or 600 men at least, or proportioned to the guard in the trenches; the latter are only with 10, 15, or 20 men.

The intent of great sallies should be to destroy a considerable part of the works of the besiegers, in order to oblige them to begin again; to nail up their guns; to retake some post which had been abandoned; and lastly, to obstruct the enemy's works as much as possible, and thereby retard the taking of the place.

In regard to small sallies, they serve for no other

end than to interrupt the workmen at the head of the trenches, so as to frighten them, and oblige them to run away. As it requires some time to bring them back, and to make them return to their work, this will occasion delay, and retard the approaches.

The best time for great sallies, is two hours before day-light, the troops being then fatigued and sleepy; therefore more easy to surprise, and less capable of making a vigorous resistance. And when it has rained very hard in the night, so that the guard in the trenches may be unable to make use of their fire-arms, this is also a favourable circumstance: in short, no opportunity should be neglected to surprise the enemy; for sallies seldom prove advantageous any other way. The following is the order which M. Vauban proposes to be observed.

There should be a detachment of 90 men drawn up, 30 in front, and three deep; to which must be added a fourth rank of 30 grenadiers. The three first ranks of this detachment should be armed with cuirasses: each soldier should have a sword and pistol at his belt, and a partizan, or long iron fork with a hook, in his hand. This detachment is to be followed by another of 180 men, 30 in front, and six deep; the first rank of these is to be armed as the former, with cuirasses and long weapons, the rest as usual. The first rank in this detachment is to make up the rear in the retreat. After this second detachment 200 workmen are to follow with proper tools to destroy the enemy's works, and several of these with combustibles to burn what they cannot otherwise destroy. Some of them are to be provided with long nails of steel, and of different magnitude, to spike the cannon; there must be some of a very large size, because the touch-holes happen frequently to be so very wide, that common nails will not fill them up exactly.

Besides the two detachments and workmen above mentioned, another body of 300 or 400 men should be ordered to support them, and to follow them slowly as far as the head of the trenches; where, if they find that those who went before them have no need of assistance, they should halt to be ready to act if occasion requires it. If the guard of the trenches should make a vigorous attack upon the fall, this detachment will support them, and jointly encounter the besiegers. If the latter are repulsed, which must be the case if the fall is not foreseen and expected, the workmen must set about demolishing the works, and filling up the trenches as fast as possible. These troops should also endeavour to penetrate as far as the batteries, in order to nail up the cannon, and to maintain themselves in the trenches long enough for the workmen to destroy great part of them. When they have done what they proposed, they retreat to the covert-way in good order; and if the enemy should be so imprudent as to pursue them as far as the glacis, they must be received with a brisk fire, as well from the cannon of the ramparts as from the troops in the covert-way.

In sallies, and generally in all actions performed by night, the soldiers should put something in their hats, as a white paper or handkerchief, to know one another in the dark. The troops designed for this purpose are drawn up in the place of arms within the town, or in the ditch if it be dry, or else in the covert-way. When they are to march out by different gates, some signal

signal should be agreed upon, that the troops may all move at the same time. If there are more attacks than one against the town, as generally is the case, then several sallies may be made at the same time upon these attacks. It might be proper to make a great noise on one side, in order to draw all the attention of the enemy that way; and while they are busy in the repulse, to act vigorously on the other side; for then they will meet with less resistance, and will be more capable of hurting the besiegers. However, as a sally which has not all the success that might be expected, ought not to discourage the garrison from repeating the attempt; so one that has been crowned with success, ought not to render them too confident, or inspire them with too great a contempt for the enemy. The mistakes the latter may have committed, will rouse their attention, and put them upon their guard. We ought ever to suppose, that they will do all that we should do, were we in their place, and that they will take proper measures to remove every obstacle that may oppose them.

Hitherto we have taken no notice of the use of cavalry in sallies; and yet on some occasions they may be of service, which is when the besiegers are at a distance from the place. In this case, two detachments of horse are ordered to the right and left to support the sallies, and to hinder the enemy's horse from falling upon them. These detachments serve also to protect their retreat, and to prevent their being cut off; but when the besiegers have finished their third parallel, the sallies are then made with foot only, and should, as we have above observed, be often repeated, provided the garrison is numerous enough to dispute every inch of ground with the enemy.

As soon as the troops are returned from the sally, fire-balls should be thrown into the trenches, to discourage the workmen who are employed in repairing the mischief that has been done, and are at that time in some measure uncovered. The fire of the place well served at this juncture, must kill a great many of the enemy. So far relates to great sallies.

The small sallies, which are intended merely to disturb the besiegers without being able to do them much hurt, are conducted in the manner following. The governor orders out parties of 10, 15, or 20 stout men only, as hath been already observed, who are to advance softly to the head of the trenches, and to jump into them quickly, making a great noise, and throwing grenades; after which they are to retire with all expedition: the alarm which they will occasion is sufficient to make the workmen take to their heels, who desire nothing better than to have a specious pretence, as M. Goulon observes, to run away upon the least alarm; and it is impossible to prevent it, or to bring them back the same night, so that the besiegers must lose all this time. It says the same author, the besiegers become accustomed to these little sallies, so as to grow secure and take no notice of them, the besieged observing this must make one in good earnest, which coming unexpected, will easily overturn the workmen and the troops that cover them; after which they may retire without fighting, lest they should draw the whole guard of the trenches upon their backs.

§ 5. Of the defence of the glacis and the covert-way.

BESIDES the sallies which retard the lodgment of

the besiegers on the glacis, mines may increase the difficulty of approaching. We have already taken notice of these in the section of *Attack*; we have only to observe here in general, that the besieged must make the best use of them possible, in order to blow up the enemy as often as the ground will permit; this is the surest way to keep the besiegers in awe, and to oblige them to advance with the greatest circumspection.

Besides the galleries and mines which ought to be under the glacis, the besieged may also lay opposite to its angles large planks, stuck full of very long nails, with the points upwards, to incommode the enemy in passing over the glacis. These planks ought to be strongly fixed, to prevent their being easily taken away. The burying of caissons in the glacis is also productive of a good effect. These are small chests, two or three feet long, and a foot and a half broad, filled with powder; they are fired at any time by a train conveyed in a wooden trough into the covert-way: they ought never to be placed nearer than six or eight feet to the inside of the covert-way, lest they should do any damage to the troops that defend this post. Sometimes shells are put into these caissons, and then they produce a still greater effect.

When the enemy endeavour to make a lodgment on the glacis, the garrison must repeat their sallies with greater vigour; which may be done without any inconvenience, because of the facility of retreating. When the troops are returned from the sally, fire is set to the chambers and caissons, which will greatly disconcert the besiegers. If the chambers are well disposed, they must hurt their lodgments prodigiously; and as soon as they are sprung, the besieged may fall upon the enemy, this being a favourable opportunity for surprising them in disorder, and consequently of destroying part of their works. This manner of proceeding should be often repeated, in order to fatigue the besiegers, and to retard the taking of the covert-way.

When the enemy are ready to storm it, the garrison must prepare to give them a warm reception. The difficulty of making a lodgment in the covert-way may be increased by a double row of palisades: the second should be lower than the first, to the end that the enemy may not perceive them. These two rows ought to be at the distance of four or five feet from one another, to prevent the besiegers from jumping over them into the covert-way. Between them may be made a small ditch; most of the enemy's grenades will fall into it, and cause less mischief to the troops. Care must be taken to make strong retranchments in the places of arms, either by raising a parapet within-side, and parallel to its faces, with a small ditch at the foot of it, or by simple rows of palisades, which will hinder the enemy from forcing their way so easily as they would otherwise be capable of doing. In each place of arms there should be one or two barrels of powder, with balls and small-arms necessary for the defence of the covert-way.

All the batteries must be got ready to fire with the utmost briskness upon the enemy, when they are at work upon their lodgment. Every part of the place that looks into the covert-way ought to be lined with troops, who are to fire upon the besiegers: but there ought to be no troops in the parts opposite to the

places of arms, that the troops posted there may not be hurt by the fire from the body of the place.

The garrison should endeavour to be informed by deserters at what time the enemy intend to make their attack; the motions of the latter may be also observed by persons posted on steeples; and as soon as the troops are perceived to make an extraordinary motion, and the trenches to be filled more than usual, this is a sign that they are going to attack. The vicinity of the enemy's works may also enable the besieged to judge of their forwardness; and all this together direct them to take such measures as are proper for giving a warm reception to the besiegers.

As soon as the garrison perceive that the enemy are marching out of their trenches, they should keep firing upon them continually with great and small arms, from all the works facing the attack. This will destroy a great many of their men before they can reach the palisades; the two rows of which in the covert-way will prevent their jumping into it directly. They will be under a necessity of breaking them successively with hatchets; and while this is doing, a general discharge is to be made from the batteries of the town, which will do great execution. When, after a vigorous resistance, the garrison find themselves hard pressed by the enemy, they may abandon the covert-way, and retire into the places of arms; and while the besiegers are working upon their lodgment, they will be exposed to the fire of the place, which takes them in front; and to that of the places of arms, by which they are taken in flank; so that their loss must increase considerably. If they have mines ready, as we suppose they have, they must spring them, after having fullered the enemy to work for some time upon their lodgments; and after having kept firing against them continually with great and small arms, then immediately they should make a strong sally from the places of arms, and taking advantage of the disorder into which the besiegers must inevitably be thrown, they will oblige them to abandon the covert-way.

If there is no possibility of hindering the enemy from making lodgments on the crest of the covert-way, or, which is the same thing, on the ridge of the glacis, the besieged must endeavour to retard them, and to dispute as long as possible their taking possession of the places of arms. On this occasion fougasses are employed with success, and should be repeated several times if the ground will permit. When the besiegers have once completed their lodgment, and supported it in a proper manner, they want nothing further than a little time to extend themselves, and to become masters of the covert-way. The obtuseness of the besieged can only retard, but not absolutely hinder the taking of this outwork.

These kinds of attacks sword in hand are extremely bloody, as we have formerly observed; nor are they always attended with success. The allies attacked in this manner the covert-way of Lifse, and lost upwards of 2000 killed and 2667 wounded; and after all they could only make a lodgment on two salient angles, which were not defended by so great a number of troops as the rest. In the same manner did marshal Villars attack the covert-way of Friburg in 1713; and indeed he made himself master of it through the extraordinary bravery of the troops: but this exploit

cost him 1500 men killed and wounded. The single regiment of Alsace lost four captains of grenadiers, and 643 men killed and wounded. The method of proceeding by sap is infinitely less bloody and more sure; besides, according to M. Vauban, it can hardly retard the taking of the covert-way above four or five days.

Let us suppose at present that the enemy resolve to approach the covert-way by sap, and that they have raised cavaliers in the trenches to plunge into this outwork, the besieged must strive to retard this operation by every stratagem imaginable; for when the cavaliers are once constructed, it will be very dangerous to abide any longer in the covert-way. They must stop the besiegers at every step with mines; they must harass them with a constant discharge of fire-arms, and dispute every inch of ground, defending themselves behind every traverse, and in the places of arms, as well as they can, without running too great a risk of having their retreat cut off.

§ 6. *Of the defence of the passage over the ditch before the half-moon.*

THE enemy having made themselves masters of the covert-way, and perfected all their lodgments, will erect their batteries for making a breach, and prepare for the descent into the ditch. All this while the besieged must keep firing both with their great and small arms, in order to incommode the enemy in the construction of their batteries. If the ditch is dry, the soldiers may mount with ladders along the counterscarp, and from thence throw grenades into the enemy's works; and when they cover themselves in the covert-way with sand-bags, gabions, &c. against the fire of the place, these very soldiers should, with great sap-hooks, pull down part of them, and afterwards jump nimbly into the ditch, leaving the enemy exposed to the fire of the town while they are putting their materials again into order. Mines may be likewise used here with great advantage; they furnish various means to harass the enemy, to obstruct their works, and to make them lose time and men.

The batteries of the besiegers being destroyed by mines made under them, must oblige them to lose a great deal of time in repairing them, and in endeavouring to make themselves masters of the mines, otherwise they can never be secure. When the besieged have blown up the batteries that were to open the breach, they must make good use of the time which the enemy will spend in repairing them, and strive to perfect the retrenchments, which should have been set about at the commencement of the siege, in the gorge of the half-moon, and in those of the battions of the front attacked.

At the siege of Turin, in 1706, the enemy several times blew up the French batteries in the covert-way; so that by this, and other stratagems, they found means to prolong the siege, and gave time to prince Eugene to march to their assistance, who relieved the town, after he had forced the lines behind which the French army was encamped.

The mines for blowing up the batteries of the covert-way, may be disposed in such a manner as to tumble the guns into the ditch, as may be seen in the course of mathematics by M. Belidor; who performed it with success at the academy of La Fere.

It is certainly a great advantage thus to be able to become masters of the cannon of the besiegers, and to oblige them to erect new batteries, which must take them up a considerable time. A doubt here may arise, whether if these batteries are opposite to that part where the enemy intend to pass the ditch, this would not be helping to fill it up, should the besieged blow up the guns: but this inconvenience is of no great consequence, especially as it may easily be remedied, by clearing away the rubbish of the mine which tumbles into the ditch along with the battery.

As the besiegers work at the descent into the ditch at the same time that they are preparing their batteries, the besieged must think of retarding both these operations also at the same time. If the descent into the ditch is made under ground, miners should be employed to interrupt the work; and if the ditch is dry, small detachments, as M. Goulou observes, of five or six men, may be placed near the counterscarp, to watch the moment that the enemy break through it, and immediately to fire into the gallery: this discharge will either kill or frighten the miners; and at least will retard the works. Those who have fired, should retire on each side the opening to load their arms again, which may be repeated several times. Fire-balls and grenades may be likewise thrown into this opening, which will oblige the sappers to retreat. The more endeavours are used to interrupt the works of the besiegers, the more the surrender of the place will be retarded.

If the ditch is filled with water, the same operations may likewise be performed with small boats made on purpose; and to cover these boats a kind of parapet should be also raised by means of strong boards, with holes to fire through upon the soldiers, who upon opening the gallery will throw fascines into the ditch. At the siege of Lille, marshal Boufflers contrived some of this kind of boats to retard the passage over the ditch, before the grand lunettes or tenailles in the front attacked, and that before the half-moon.

When the enemy make their opening into the dry ditch, they must be opposed with a strong fire, as well from the face of the bastion which flanks the ditch before the half-moon, as from the place of arms or traverse, which ought to be constructed the whole breadth of the ditch, in order to strengthen the defence. By night small sallies should be made from this place of arms, with a view to interrupt the passage over the ditch, and to retard, as much as possible, the fixing of the miner.

There are two ways of passing the dry ditch, and of bringing the miner to the foot of the revetment, which he is to enter. The first consists in making a gallery six feet wide, with a double row of barrels. These must be filled with sand-bags, and so must the spaces between them, in order to render the passage of the gallery more safe; and that there may be a shelter from fire-works, strong planks are laid over it, and these again are covered with raw hides, or with earth and dung. This gallery is continued within three or four feet of the revetment; and in this space a good epaulement is raised with sand-bags to cover the miner on the side exposed to the place. In regard to the other side, it is of no use to stop it up; nay, it serves for an opening to fill the ditch with the earth dug out of the

galleries, which the miners are making in the rampart of the work attacked. It is easy to oppose the progress of this gallery with a continual fire, and with several lesser works constructed within the ditch.

The other way, which, as we have already seen in treating of the attack, consists only in getting to the foot of the breach by sap, with an epaulement on the side exposed to the place, and which may be covered, in order to protect the passage from the fire-works and grenades of the besieged. But this sap may be retarded by sallies; the besieged may likewise steal away the earth by night from the epaulements, and endeavour with hooks, &c. to displace the gabions and fascines.

If the ditch is filled with water, the besieged must interrupt the enemy's bridge with a continual fire from their great and small guns, as well as with grenades and shells, if they are in a condition to fire upon the bridge and its epaulement. If the water has a strong current, they must open sluices in order to break down the bridge, or at least to carry away the fascines. They should also attempt to set fire to it, with artificial works prepared for this purpose. They may likewise approach the epaulement in the night, and draw away the fascines with hooks. They may even throw anchors upon it; and by means of caplans placed in those parts which flank the ditch, they may draw these anchors with cords fastened to them, and tumble part of the epaulement into the ditch. In short, every expedient must be tried that may possibly retard the enemy's approaches: for when once they have perfected their bridge, they will soon be masters of the outwork to which that bridge leads, whatever precaution the garrison may take to defend the breach; because, as the besiegers can always pour in fresh men to supply the room of those that are lost in the attack, they must at length surmount all opposition of the besieged,

§ 7. Of the defence of the half-moon.

WHILE the enemy are effecting the passage over the ditch, besides the difficulties that are raised to retard the work, all proper precautions should be used to defend the breach, and prevent the taking of the half-moon. For this purpose guns are placed in all the works from which the breach may be seen; and they should be placed on carriages or on pieces of wood, as the garrison find most commodious, of least hindrance to the defence, and productive of the best effect.

If the half-moon has no réduit, as here we suppose it has none, the retranchments, which ought to have been made there, must be put into good condition; a row of palisades must be placed before it, in order to stop the first fury of the enemy after they have made themselves masters of the breach; in a word, the besieged must prepare to dispute every inch of ground, and to retire from the half-moon into the town, when they find themselves hard pressed and no longer able to maintain that post.

The enemy may be likewise hindered from mounting the breach, if they are ready to mount before the garrison are prepared to receive them, by throwing a great quantity of combustibles at the foot of the breach. At Turin, the garrison by this means retarded the French several days from taking the works in the front attacked. When the enemy present themselves at the foot.

When the besiegers have surmounted all these obstacles, and at last have got possession of the breach, the mines are sprung in order to blow them up, and chevaux-de-frize are placed along the whole breadth of the breach. The troops post themselves behind, and continue to make a vigorous fire upon the besiegers while they are using their utmost endeavours to penetrate into the half-moon; and when they begin to force their way, the first rank of men that defend it, being armed with piquets or halberds, and supported by the other troops, ought to fall upon the enemy, and cut them in pieces. But if the besiegers at length by dint of numbers should drive the garrison from the breach, the latter ought to retire into the retrenchment, and from thence make a very brisk firing; and when they find that this is also upon the point of being forced, then they are to withdraw their cannon, and whatever ammunition they may have, into the place; and last of all, if they have any mines under that spot, they must spring them as they retire, in order to do all the mischief and to create all the confusion they can to the besiegers.

Sometimes it shall happen that the enemy, after having made themselves masters of the half-moon, omit to leave a sufficient number of troops to guard the lodgment, upon a presumption that the besieged will not attempt to retake it. Whenever they show a confidence of this kind, a strong body of the garrison should return in the night and storm this work, either by the gorge, or by some other part. There are great odds, but such a vigorous and sudden surprise will be productive of a very good effect; at least there is no great risk in trying, if the strength of the garrison will

permit; and should they succeed, the taking of the town will be retarded several days.

Here we have supposed that the enemy are resolved to storm the half-moon; but if they should attempt to get possession of it by means of saps, in that case the workmen must be continually harassed by blowing up of mines, and kept as long as possible from the breach, by means of fire-works of all kinds. When they begin to make a lodgment in the breach, then the besieged should fall upon them briskly, and destroy the lodgment; in short, every artifice imaginable should be used to retard their progress.

This last method is less bold than the other; but on the other hand, it may be very tedious, when the besieged spare no pains to disturb the enemy's sappers and miners.

One thing that greatly deserves attention, and may render it very difficult for the besiegers to mount to the assault, or to lodge themselves in the breach by means of saps, is to clear away the rubbish in the breach. In a dry ditch this may be easily done; but in a wet one, the thing is more difficult: on the other hand, in the latter case the breach is more easy to defend than in the former; because as the enemy cannot come to the foot of it but by the bridge of fascines, which is made in the ditch, and is seldom above 10 or 12 feet wide, they cannot of course present themselves with so large a front before the breach as in a dry ditch; consequently the garrison must find it much easier to repel them.

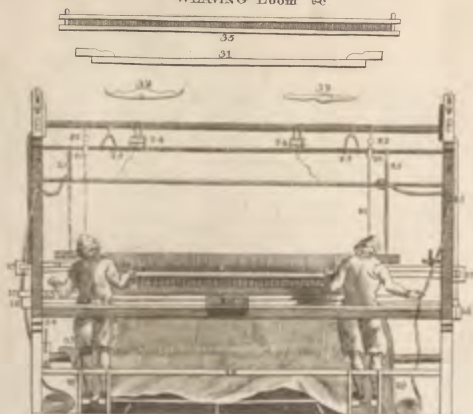
§ 8. *Of the defence of the passage over the ditch before the bastion.*

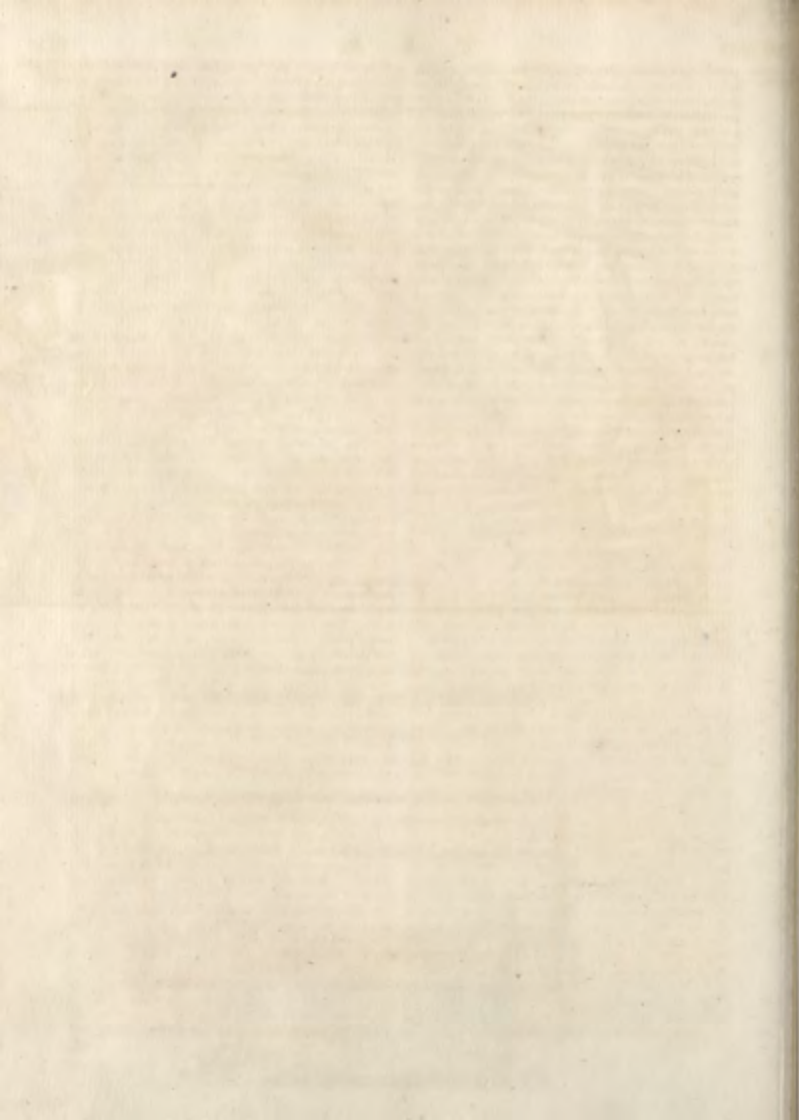
At the same time that the enemy are carrying on the attacks of the half-moon, they work at the passage over the ditch before the bastion. What has been said in regard to the defence of the ditch before the half-moon, may be applied on this occasion; we have only to add, that when this ditch is dry, the caponier will be of great use to fire upon the enemy in their passage over the ditch, and to fall from thence in order to destroy their works. The besieged must fire into the opening of the descent, as we have already observed in regard to the ditch before the half-moon; even a kind of retrenchment ought to be raised opposite to that part where it appears that the opening will be made, in order to retard it; some small cannon should be also charged with cartridge-shot, to fire into the hole: and last of all, that the soldiers in the retrenchment may be sheltered from the combustibles which the besiegers will throw upon them from the upper part of the covert-way, the retrenchment should be covered with strong planks. By proceeding in the same manner opposite to all the descents, their passage may be greatly retarded. Different retrenchments may be also made in the ditch, in order to dispute the ground inch by inch. There should likewise be frequent sallies, which cannot but be productive of a very good effect; and the horse may be employed without much danger on this occasion, because they have the extent of the ditch to retire into.

If the ditch is wet, it must be defended in the same manner as that before the half-moon: here only we shall add, that if there is a tenaille opposite to the curtain of the front attacked, the fire from thence will greatly



Fig. 2.
WEAVING Loom &c





Sieges. greatly annoy those who are employed in filling up the ditch. Besides, the boats by which we observed that the enemy might be incommoded in the passage over the ditch, the besieged may likewise have recourse to a kind of floats, made with double joists, at the end of which are fastened empty barrels, to prevent their sinking too deep in the water; and these floats should be loaded with shells, barrels of gunpowder, fascines, pitch and tar; and in short, with all sorts of combustibles proper for setting fire to the bridge, and to the enemy's epaulement: these are brought forward and fastened to the epaulement, and afterwards they are set on fire with a match, or with tow laid amidst the combustibles. Doubtless there are many other stratagems to interrupt the passage over the ditch; what we have mentioned here, is only to give some idea of it. An able governor may hit upon several other expedients to dispute this passage, which indeed is the most brilliant part of the whole defence. But in order to hold out to the very last, he should be able to withstand the assault upon the body of the place; which may be done without any great inconveniency, when there are good retrenchments in the gorges of the bastions, as we have supposed in this Treatise.

When there are dikes or sluices, by means of which the ditch may be filled with water at any time, every art must be tried to defend it while it is dry; and when all the defences are exhausted, then the water is let in, and the enemy will be obliged to begin their work again.

§ 9. *Of the defence of the bastions in the front attacked.*

HERE the reader must recollect what has been said in regard to the defence of the breach in the half-moon. The defence of the bastions is more easy, because it is not so difficult to retreat from thence, by means of the retrenchment; and this retrenchment should be larger and more spacious than that of the half-moon, and more difficult to force.

Besides all the precautions we have been mentioning, as mines under the breaches, within the bastions, &c. the besieged should also mount several pieces of cannon on the breach, charged with cartridge-shot, and pointed downwards, so as to be able to sweep the whole surface of the ground, on which the enemy must form in order to march to the assault. Care must also be taken, lest the enemy, discouraged with the difficulty of storming the breach, do attempt to scale the bastion, as hath been practised several times, and particularly by the duke de Noailles, marshal of France, at the siege of Gironne, in 1712, as mentioned by M. Folard, in his Commentary on Polybius, and in the preceding Section of *Attack*. The way to guard against this attempt, is to place along the parapet of the works that may be insulted, large pieces of timber, which are to be tumbled upon the ladders as soon as the enemy offer to mount. They should also have loaded shells all along the rampart, fastened to chains, and to let down towards the middle of the ladders, where they will burst and kill those who are mounted. They should likewise be provided with combustibles of different kinds, to throw upon the besiegers, and to keep them off from the foot of the revetement. When the garrison are well prepared against this attempt, it will be very difficult for the enemy to succeed.

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The entrance of the bastion may likewise be defended, by making a ditch in the upper part of the breach, and filling it with all sorts of combustible matter. This will form an impenetrable barrier against the enemy, at least for some days; which time is to be employed in strengthening the retrenchments, and throwing up others, one behind another, if the ground will permit, and it be resolved to defend the place to the last extremity. Though it is usual for the enemy to force their way into the town by the bastion, and therefore the principal retrenchments for defending the entrance of the place should be raised in this part; yet it is proper not to neglect the curtain. The enemy may be apprised of these retrenchments, and as it is not the practice to make any behind the curtain, they may take it into their heads to batter it in breach, and to construct a bridge in the ditch before it, in order to penetrate into the town. Thus did prince Eugene act at Liffes; as the back part of the curtain was open, the place was obliged to capitulate. The breaches may likewise be defended by repairing them with large trees laid across one another, the branches pointed towards the enemy. Cannon will make no great impression on this kind of wall; which was the principal defence of the ancients when a breach was made.

When the besiegers have triumphed over all these obstacles, so as to be masters of the breach, and to extend their lodgments on the bastion; then it is no longer possible to defer capitulating, unless there are several retrenchments one behind the other. For in that case, the besieged, if they think proper, may defend themselves to the very last. At Osend the garrison held out till they were forced into the very heart of the town; and the inhabitants of Barcelona did the same in 1713: but this desperate defence is very rare. Few governors defer surrendering till reduced to the last extremity; they choose to preserve the garrison, and to save the town from being plundered, which would be the case, according to the laws of war, if it was taken by storm. When the enemy insist upon the garrison's surrendering prisoners of war, I should think this condition ought not to be submitted to, till they are reduced to the last extremity; but it belongs to the generals, and the commanding officers in fortified towns, to behave on this article as their own prudence shall direct, and according to the orders they may have received. A discussion of this kind is neither within our province, nor the nature of this work.

§ 10. *Of precautions to be used against the surprising of towns, scaladers, sudden attacks, &c.*

THE right way to prevent surprises, is to think that the enemy have a design upon the town, and to use all the precautions possible in order to frustrate their designs. With this view a governor should put the fortifications into a good state of defence, should see that the several posts, as well those that are accessible as those that are inaccessible, be well guarded, that parties be sent to range in all the principal avenues of the place; in a word, he should most exactly observe whatever is prescribed in the military ordinances concerning the guard of towns, the opening and shutting of gates, &c. We shall make no mention of any of these particulars, because they are so minutely described in the ordinances; and, moreover, a very short

Of Sieges. stay in a garrison is sufficient for learning every thing that may relate to the daily and customary duty, as well for the safety of the town, as for the preserving peace and good order among the inhabitants, and for preventing any strangers or suspected persons from entering the place, &c.

We shall only observe, that when a fortress is situated upon a river, care should be taken to have boats in the night, filled with soldiers, both above and below the town, to hinder any body from getting in that way undiscovered. If the ditches are filled with water, in frosty weather the ice should be broke every day; in short, nothing should be neglected that tends to secure the place against any enterprise either from within or without.

But chiefly on fair or market days this vigilance should be exerted; the guards ought to be doubled at all the gates, and the garrison should be disposed in such a manner as to be ready to fly to their arms upon the first beat of drum; care should be also taken to make the cavalry mount on horseback, ready to act in all events. By using these precautions, it will be very difficult for the enemy to surprize the town; nay, the consequence may be, that hearing of the exact discipline observed by the garrison, they will relinquish their design; for surprizes seldom succeed, except through neglect of military duty, and too great security in the governor.

With regard to precautions against escalades, they consist in having small parties continually about the avenues of the place, in order to be better informed of the enemy's motions, and to keep a patrol all night, to see that nobody shall enter the ditch unperceived. A cuvette may be likewise dug within the ditch, and palisades planted within some distance of the wall, to hinder the enemy from fixing their ladders to it; the flanks of the bastions should be furnished with cannon, charged with cartridge shot, with balls of a quarter of a pound weight, or with pieces of old iron, to fire upon those who should attempt to scale the place opposite the curtains; in the corps de gardes, within reach of the rampart, a provision should be made of halberts, with all other offensive weapons fit for repelling the enemy when they appear on the top of the ladder, and for driving them into the ditch; the ramparts should be stocked with a great quantity of cylindrical timber, to roll down upon the ladders, and those that are upon them; and if the garrison are not so numerous as to be able to cover the whole ramparts, they should fix chevaux-de-frize, or something else, to the upper part of the parapet, which will hinder the enemy from getting over, in order to jump upon the rampart. There ought also to be a stock of shells and grenades all loaded upon the walls, in order to roll them down into the ditch upon the enemy. There should likewise be fire-works ready to throw upon them, as fascines done over with pitch and tar, powder-barrels, fire-pots, &c. a great number of fire-balls should be also hung in the ditch in order to give light, and that the cannon of the place may do good execution upon those who are got into it; the ditch should likewise be filled with crows-feet, or little holes dug and covered with hurdles and earth, so that the enemy shall not perceive them, but tumble into them: in the middle of these little ditches there should be a palisade,

or some long iron spikes, ranged in such a manner as to run those through that shall fall upon them. All these precautions will render the enemy's attempt very difficult; for, as we have observed several times in the course of this work, when men are prepared to defend themselves against a scalade, it seldom succeeds. Neither are the gates to be neglected; the enemy will not fail to try to fix a petard to them, while the troops are endeavouring to make themselves masters of the rampart. Soldiers must be placed in a convenient situation for firing on the person that fixes the petard: in all events the gates must be strengthened within side; and large trees must be got ready to debar the enemy from entering the town, should they be able to break open the gate; the whole as hath been mentioned in the attack of small towns, castles, &c.

At the first alarm of an attack, all the troops ought to run to the place assigned them, in order to be led from thence to the ramparts. With regard to the cavalry, they ought also to mount on horseback, and to divide themselves into several small bodies, which are to be at the foot of the rampart, ready at all events to charge the enemy, should they find means to penetrate by some way or other into the town.

If the enemy make several attacks at the same time, it will not be proper to quit those parts where they do not show themselves; this perhaps is a feint only to draw the troops from the side which they really intend to attack; therefore the garrison should be equally on their guard on all sides, and leave no posts naked, unless the enemy have forced their way into the town; then indeed the business is to charge them vigorously, in order to oblige them to retire.

Upon the whole, it is easy to withstand a scalade when there is no surprize; and therefore it rarely happens that a governor, who takes the necessary precautions against any such accidents, will lose a town by this kind of attack.

A scalade may be attempted in the day as well as by night; the latter indeed is more favourable to the assailants, yet they will not succeed a whit the better, if they find that the garrison are prepared to receive them, agreeable to what we have already mentioned.

There remains only to mention a word or two in regard to accelerated sieges; which is, that a governor will not be exposed to this sort of siege, if he takes the proper precautions to be informed of the steps and approaches of the besiegers.

If the enemy pretend to carry on a siege in form, and at the same time accelerate their approaches on one side of the place; the garrison must fall vigorously upon them, and spare no pains to drive them out of what works they have seized upon. One may suspect their design, if it appears that they do not make their attack on the side of the town where naturally they ought to make it, if they want to become masters of the place with greater ease; and then the besieged should double their guard on that side. In general, there should be a constant attention to all the fronts of the place, and they should be all equally guarded, till it appears clearly by the enemy's works on which side they form their attack, and which way they direct their works; neither are the other sides to be neglected, notwithstanding all this, lest the enemy should lay hold of this opportunity to attack them. It is always to be

be supposed that they are informed of every thing that passes within the town, either by their spies, or by deserters; for which reason the post that seems least accessible ought not to be neglected.

§ 11. Of capitulations.

THE capitulation being the last transaction, both in the attack and defence of a town, this seems to be the most natural place for speaking of it, as it seems to be the most proper subject for terminating this work.

When the governor, who defends a town, finds himself reduced to the last extremity, or is ordered by his court to surrender, with a view of obtaining better conditions of the enemy, both for the town and garrison, he orders the *chamade* to be beat. For this purpose one or more drummers are directed to beat their drums on the rampart, on the side next to the attack, to give notice to the besiegers that the governor has something to propose to them; one or more white colours are likewise hung out for the same purpose, and one of them remains either on the rampart or on the breach during the time of negotiation. The same is practised in demanding a suspension of arms, after a very violent attack, to bury the dead, carry off the wounded, &c.

As soon as the *chamade* is beat, the firing ceases on both sides, and the governor sends some officers of distinction to the general who commands the siege, with the conditions on which it is proposed to surrender. As a security, or as hostages for those officers, the besiegers send at the same time the same number into the town: if the governor's proposals are not agreeable to the commander of the besieging army, he rejects them, and mentions what terms he is willing to grant. Generally speaking he threatens the governor to allow him no conditions at all, if he does not determine to surrender quickly; for instance, when the passage over the ditch of the place is finished, or batteries are erected opposite the flanks, &c. If the besieged find the conditions too hard, the hostages are restored, and the drums are beat again upon the rampart, to make every body withdraw before hostilities are renewed, which is done very soon after. It is to be observed, that during the negotiation they ought to be quiet on both sides, and by no means should go on with the operations of the siege. The governor ought during this time to be upon his guard, for fear of being surpris'd by stratagem; which might expose him to the discretion of the besieger.

Suppose that the terms of capitulation are agreed upon, two or three of the principal officers of the garrison are sent as hostages to the enemy; and the general of the besieging army sends back the same number, and of equal degree, as a security for fulfilling the capitulation. When the besieged have executed every thing they promised, their hostages are returned; and when the besiegers have fulfilled their engagements, their hostages are returned also.

The conditions insisted upon by the besieged must vary according to the different circumstances and situations in which they find themselves. The following are the most usual.

1. That the garrison shall march out through the breach, with arms, baggage, horses, drums beating,

matches lighted at both ends, colours flying, a certain number of cannon and mortars, with their appurtenances, spare carriages, ammunition for a certain number of charges, to be conducted in safety to the town agreed upon, and which is generally the nearest of those that belong to the besieged. It must be observed to insert by the shortest road; or the road by which the garrison want to be conducted, is particularly mentioned. When the garrison have several days to march before they can reach the place appointed, it is required that the troops should be allowed provisions for four or five days, according to the time they are to be upon the road.

2. That the same evening, or at a certain hour the next day, one of the gates of the town shall be delivered up to the besiegers, and the garrison are to march out a day or two after, according as both parties have agreed.

3. The besiegers shall furnish a certain number of covered waggons, that is, which are not to be inspected, besides waggons for removing the sick and wounded, that are in a condition of being removed; and in general all the carriages necessary for the baggage of the garrison, and for the artillery allowed by the capitulation.

4. The sick and wounded, who are obliged to stay behind, shall have liberty to leave the town, with every thing belonging to them, as soon as they are in a condition so to do; and in the mean time they shall be furnished with lodgings *gratis*, or otherwise.

5. No indemnification shall be required of the besieged, for houses taken from the town's people, nor for houses burnt or demolished during the siege.

6. The governor, the general officers, all the officers belonging to the troops, the troops themselves, and in general every one in the king's service, shall be suffered to leave the place, without being subject to any act of reprisal, of what nature soever, and under any pretext whatsoever.

7. If those to whom the town is surrendered, are of a different religion from that of the inhabitants, it must be mentioned in the capitulation, that the inhabitants shall be maintained in the exercise of their religion.

8. The inhabitants shall also be maintained in all their rights and privileges.

9. Those who are willing to quit the town, shall be at liberty to go and settle where they please, with all their effects. It is also stipulated sometimes, and indeed ought to be stipulated, whenever there is any apprehension that the enemy will behave with rigour to the inhabitants, for any partiality they may have shown during the siege to the prince whose subjects they cease to be, that they shall not be disturbed or molested for any thing they may have done before or during the siege.

10. It is also inserted in the capitulation, that all the powder and ammunition remaining in the place shall be delivered up, and the loaded mines are likewise discovered.

11. The prisoners made on both sides during the siege shall be restored.

It must be observed, that a place should have provision and ammunition at least for three days, to be intitled to a capitulation, without which they are made prisoners of war. But if the besiegers are unacquaint-

ed with it, and the capitulation is signed, it would not be fair to make the garrison prisoners of war, upon discovering the want of ammunition.

When the besiegers refuse to grant a capitulation, unless the garrison surrender themselves prisoners of war, and the latter are under the necessity of submitting to this cruel law, they endeavour to soften it as much as possible: and therefore it is commonly agreed,

1. That the governor, and the principal officers, shall keep their swords, pistols, baggage, &c.

2. That the subaltern officers, below a captain, shall have only their swords, with their baggage.

3. That the soldiers shall be neither rifled, nor separated from their regiments.

4. That the garrison shall be conducted to such a place, to remain prisoners of war.

5. That the principal officers shall have leave for two or three months to go and settle their affairs.

6. That when the garrison quit a place, it shall not be allowed to decoy the soldiers, in order to make them desert from their regiments.

When the capitulation is entirely settled, an officer of artillery from the besiegers enters the town, to take an inventory of all the artillery and ammunition remaining in the place, in conjunction with an officer of artillery from the garrison. A commissary of stores enters likewise to take an account of the provisions.

When a governor finds that he must surrender, and that there are considerable magazines of ammunition and provisions, he should destroy most of them before he offers to surrender, to the end that there may remain no more in the place than what is necessary for a capitulation, and that the enemy may reap no advantage from thence. If he should not, before he enters into a capitulation, burn or destroy those magazines, the enemy might insist on their being preserved; but they can think nothing of it, when those precautions are taken before hand.

As soon as the besieged have delivered up a gate of the town to the enemy, the first regiment of the army enters, and mounts guard.

When the day is come that the garrison are to leave the place, the besieging army is drawn up in two files of battalions and squadrons, and the garrison are to pass between them. The hour for their marching out being arrived, the general and the principal officers put themselves at the head of the troops, to see the garrison depart before them.

The governor puts himself at the head, followed by the principal officers; and he makes the garrison march in the best order possible. The oldest regiments move commonly in the van and the rear, and the others in the centre with their baggage. When there is any cavalry, it is divided in the same manner into three corps, for the van, the centre, and the rear. Small detachments of horse and foot are made to march

along with the baggage, and to take care of its not being rifled.

The artillery granted by the capitulation marches after the first battalion. When the garrison arrive at the place agreed upon, they deliver up the hostages of the besiegers to the escort; and when the latter have rejoined the army, they send back the hostages which the besieged left for the security of the escort, with the waggons, and other things granted by the besieging army for escorting the garrison.

When the garrison are made prisoners of war, they are likewise escorted to the town agreed upon by the terms of the capitulation.

Every thing settled in the capitulation ought to be sacred and inviolable, and should be understood in its genuine and most natural sense: yet as this is not always practised, the governor should take the utmost precaution to have no word inserted that shall be in the least equivocal, or liable to different interpretations. There are a great many examples which prove the necessity of this precaution.

When the garrison of a town capitulate in order to retire to the citadel, there are some particular conditions to be observed, such as follow.

That the citadel shall not be attacked on the side next the town; that the sick and wounded, who cannot be removed, shall stay in their present lodgings; and when they are recovered, they shall be provided with carriages and transports, to retire in safety to the place agreed on in the capitulation. None should be suffered to enter the citadel, but those who may be of use in defending it; the rest, who are called *useless mouths*, by no means ought to be admitted. Mention should be made in the capitulation, that those people shall be conducted to some neighbouring place in the dominions of their sovereign, which should be named. A certain time ought also to be allowed for the whole garrison to enter the citadel; and it should be expressly mentioned, that during this time the besiegers shall construct no works that are necessary for the reduction of the citadel.

A maritime town requires also some particular attention, in regard to the ships that may be in the harbour. It should be stipulated, that they shall quit the harbour the same day as the garrison march out of the town, or when the weather permits to sail to the port agreed upon. They should preserve their artillery, rigging, ammunition, and provisions, &c. If they should be obliged by stress of weather to put into any harbour of the besiegers by the way, it ought to be mentioned in the capitulation, that they shall be received there, and supplied with necessaries for continuing their voyage; they ought also to be provided with passports, and, in a word, to have every kind of security, that they shall not be insulted by the enemy's ships, but suffered without the least obstacle to steer to the port agreed upon.

W A R

Man of War. See *MAN of War*.

Man-of-War Bird. See *PELICANUS*.

War-Cry was formerly customary in the armies of most nations, when just upon the point of engaging. Sometimes they were only tumultuous shouts, or horrid yells, uttered with an intent to strike terror into

W A R

their adversaries; such as is now used by the Indians in America, called the *war-whoop*.

WARBLES, in farriery. See there § xxxi.

WARD (Dr Seth), an English prelate, chiefly famous for his knowledge in mathematics and astronomy, was born at Buntingford in Hertfordshire, about the

Ward
 Wardrobe.

year 1617. He was admitted of Sidney college, Cambridge, where he applied with great vigour to his studies, particularly to the mathematics, and was chosen fellow of his college. He was involved not a little in the consequences of the civil war, but soon after the Restoration obtained the bishopric of Exeter; in 1667, he was translated to Salisbury, and in 1671 was made chancellor of the order of the garter: he was the first Protestant bishop that enjoyed that honour, and he procured it to be annexed to the see of Salisbury. Bishop Ward was one of those unhappy persons who have the misfortune to survive their senses, which happened in consequence of a fever ill cured; he lived to the revolution without knowing any thing of the matter, and died in 1690. He was the author of several Latin works in mathematics and astronomy, which were thought excellent in their day; but their use has been superseded by later discoveries and the Newtonian philosophy.

WARD (Dr John), was the son of a dissenting minister, and born at London in 1679. He for some years kept a school in Tenter-alley, Moor-fields; but rendered himself so eminent in the study of antiquity, that in 1720 he was chosen professor of rhetoric in Gresham college: in 1723, during the presidency of Sir Isaac Newton, he was elected a fellow of the royal society; and in 1752 one of the vice-presidents, in which office he was continued to his death. He was elected one of the trustees of the British Museum in 1753, and died at Gresham college in 1758. The work for which he is best known, is his *Lives of the Professors of Gresham College*; which is a considerable addition to the history of learning in our country. His *Lectures on Oratory* were published after his death, in 2 vols 8vo.

WARD, is variously used in our old books: a ward in London is a district or division of the city, committed to the special charge of one of the aldermen; and in London there are 26 wards, according to the number of the mayor and aldermen, of which every one has his ward for his proper guard and jurisdiction. A forest is divided into wards; and a prison is called a ward. Lastly, the heir of the king's tenant, that held in *capite*, was termed a ward during his nonage: but this wardship is taken away by the statute 12 Car. II. c. 24.

WARD-Holding, in Scots law. See LAW, N^o clxv. 1. and clxvi. 3.

WARD-Hook, or Wadd-hook, in gunnery, a rod or staff, with an iron end turned serpent-wise, or like a screw, to draw the wadding out of a gun when it is to be unloaded.

WARDEN, or GUARDIAN, one who has the charge or keeping of any person, or thing, by office. Such is the warden of the fleet, the keeper of the fleet prison; who has the charge of the prisoners there, especially such as are committed from the court of chancery for contempt.

WARDHUYS, a port of Norwegian Lapland, 120 miles south-east of the North Cape. E. Long. 28. N. Lat. 71.

WARDMOTE, in London, is a court so called, which is kept in every ward of the city; answering to the *curia comitis* of Rome.

WARDROBE, a closet or little room adjoining

to a bed-chamber, serving to dispose and keep a person's apparel in; or for a servant to lodge in, to be at hand to wait, &c.

Wardrobe, in a prince's court, is an apartment wherein his robes, wearing apparel, and other necessaries, are preserved under the care and direction of proper officers; as the master of the wardrobe, clerk, &c. of the wardrobe.

WARDSHIP, in chivalry, one of the incidents of tenure by knight-service. See FEODAL System, KNIGHT-Service, and TENURE.

Upon the death of a tenant, if the heir was under the age of 21, being a male, or 14, being a female, the lord was intitled to the wardship of the heir, and was called the *guardian in chivalry*. This wardship consisted in having the custody of the body and lands of such heir, without any account of the profits till the age of 21 in males, and 16 in females. For the law supposed the heir-male unable to perform knight-service till 21; but as for the female, she was supposed capable at 14 to marry, and then her husband might perform the service. The lord therefore had no wardship, if at the death of the ancestor the heir-male was of the full age of 21, or the heir-female of 14: yet if she was then under 14, and the lord once had her in ward, he might keep her so till 16, by virtue of the statute of Westm. 1. 3 Edw. I. c. 22. the two additional years being given by the legislature for no other reason but merely to benefit the lord.

This wardship, so far as it related to land, though it was not nor could be part of the law of feuds, so long as they were arbitrary, temporary, or for life only; yet when they became hereditary, and did consequently often descend upon infants, who by reason of their age could neither perform nor stipulate for the services of the feud, does not seem upon feudal principles to have been unreasonable. For the wardship of the land, or custody of the feud, was retained by the lord, that he might out of the profits thereof provide a fit person to supply the infant's services till he should be of age to perform them himself. And if we consider a feud in its original import, as a stipend, fee, or reward for actual service, it could not be thought hard that the lord should withhold the stipend so long as the service was suspended. Though undoubtedly to our English ancestors, where such stipendary donation was a mere supposition or signment, it carried abundance of hardship; and accordingly it was relieved by the charter of Henry I. before-mentioned, which took this custody from the lord; and ordained that the custody, both of the land and the children, should belong to the widow or next of kin. But this noble immunity did not continue many years.

The wardship of the body was a consequence of the wardship of the land; for he who enjoyed the infant's estate was the properest person to educate and maintain him in his infancy: and also in a political view, the lord was most concerned to give his tenant a suitable education, in order to qualify him the better to perform those services which in his maturity he was bound to render.

When the male heir arrived to the age of 21, or the heir-female to that of 16, they might sue out their *livery* or *ousterlemain*; that is, the delivery of their lands out of their guardian's hands. For this they were obliged

Wardship.

Wardship, ligned to pay a fine, namely, half a year's profits of the land; though this seems expressly contrary to *magna carta*. However, in consideration of their lands having been so long in ward, they were excused all reliefs, and the king's tenants also all primer feins. In order to ascertain the profits that arose to the crown by these fruits of tenure, and to grant the heir his livery, the itinerant justices, or justices in eyre, had it formerly in charge to make inquisition concerning them by a jury of the county, commonly called an *inquisitio post mortem*; which was instituted to inquire (at the death of any man of fortune) the value of his estate, the tenure by which it was holden, and who, and of what age, his heir was; thereby to ascertain the relief and value of the primer fein, or the wardship and livery accruing to the king thereupon. A manner of proceeding that came in process of time to be greatly abused, and at length an intolerable grievance; it being one of the principal accusations against Empson and Dudley, the wicked engines of Henry VII. that by colour of false inquisitions they compelled many persons to sue out livery from the crown, who by no means were tenants thereunto. And afterwards a court of wards and liveries was erected, for conducting the same inquiries in a more solemn and legal manner.

When the heir thus came of full age, provided he held a knight's fee, he was to receive the order of knighthood, and was compellable to take it upon him, or else pay a fine to the king. For in those heroic times, no person was qualified for deeds of arms and chivalry who had not received this order, which was conferred with much preparation and solemnity. We may plainly discover the footsteps of a similar custom in what Tacitus relates of the Germans, who, in order to qualify their young men to bear arms, presented them in a full assembly with a shield and lance; which ceremony, as was formerly hinted, is supposed to have been the original of the feudal knighthood. This prerogative, of compelling the vassals to be knighted, or to pay a fine, was expressly recognized in parliament, by the statute *de militibus*, 1 Edw. II.; was exerted as an expedient for raising money by many of our best princes, particularly by Edw. VI. and queen Elizabeth; but this was the occasion of heavy murmurs when exerted by Charles I.: among whose many misfortunes it was, that neither himself nor his people seemed able to distinguish between the arbitrary stretch and the legal exertion of prerogative. However, among the other concessions made by that unhappy prince before the fatal recourse to arms, he agreed to divest himself of this undoubted flower of the crown; and it was accordingly abolished by stat. 16 Car. I. c. 20.

WARE, a town of Hertfordshire, with a market on Tuesdays, and a fair on the last Tuesday in April, and Tuesday before St. Matthew's day (Sept. 21.) for horses and other cattle. It is a large, well frequented, and well inhabited thoroughfare town, seated on the river Lea, 21 miles north of London. It carries on a great trade in malt and corn, which they are continually sending in large quantities to London. E. Long. o. 3. N. Lat. 51. 50.

WARE (Sir James), in Latin *Wareus*, a celebrated antiquarian and historian, was the son of Sir James Ware, and was born at Dublin on the 26th of November 1604. He was educated at Trinity college in

that city, where he made an uncommon proficiency. He afterwards received the honour of knighthood, and upon the death of his father enjoyed his post of auditor-general of Ireland. In 1639 he was made one of the privy-council of that kingdom; and when the rebellion broke out there, suffered much in his estate. In 1644 the marquis of Ormond, who enjoyed the post of lord-lieutenant, sent him with two lords to Charles I. who was then in Oxford, about some important affairs, which were concluded to their satisfaction; but in their return they were taken by a parliament ship, and committed prisoners to the Tower of London, where he was detained 11 months. He was afterwards forced to retire to France, where he staid a year and a half. Then coming to England, he settled in London, where he composed several of his works. Upon the restoration he returned to Ireland, and was restored to his places of auditor-general and privy-counsellor. He wrote in Latin, Annals of the reigns of Henry VI. Henry VIII. Edward VI. and Mary; a Treatise on the Writers of Ireland; and many other works. He died at Dublin in 1666.

WARN, in law, is to summon a person to appear in a court of justice.

WARNING of TENANTS, in Scots law. See LAW, N° clxvii. 16.

WARP, in the manufactures, a name for the threads, whether of silk, wool, linen, hemp, &c. that are extended lengthwise on the weaver's loom; and across which the workman, by means of his shuttle, passes the threads of the woof, to form a cloth, ribband, fustian, or the like.

WARP, a small rope employed occasionally to remove a ship from one place to another, in a port, road, or river. And hence,

To WARP, is to change the situation of a ship, by pulling her from one part of a harbour, &c. to some other, by means of warps, which are attached to buoys; to anchors sunk in the bottom; or to certain stations upon the shore, as posts, rings, trees, &c. The ship is accordingly drawn forwards to those stations, either by pulling on the warps by hand, or by the application of some purchase, as a tackle, windlass, or capstern, upon her deck.

When this operation is performed by the ship's lesser anchors, these machines, together with their warps, are carried out in the boats alternately towards the place where the ship is endeavouring to arrive: so that when she is drawn up close to one anchor, the other is carried out to a competent distance before her, and being sunk, serves to fix the other warp by which she is farther advanced.

Warping is generally used when the sails are unbent, or when they cannot be successfully employed, which may either arise from the unfavourable state of the wind, the opposition of the tide, or the narrow limits of the channel.

WARRANTICE, in Scots law. See LAW, N° clxiv. 11.

WARRANT, an act, instrument, or obligation, whereby a person authorizes another to do something which he otherwise had not a right to do.

A warrant may be granted in extraordinary cases by the privy council, or secretaries of state; but ordinarily by justices of the peace. This they may do in any cases

cafes where they have a jurisdiction over the offence, in order to compel the person accused to appear before them: for it would be absurd to give them power to examine an offender, unless they had also a power to compel him to attend, and submit to such examination. And this extends undoubtedly to all treasons, felonies, and breaches of the peace; and also to all such offences as they have power to punish by statute. Sir Edward Coke indeed hath laid it down, that a justice of the peace cannot issue a warrant to apprehend a felon upon bare suspicion; no, not even till an indictment be actually found: and the contrary practice is by others held to be grounded rather upon convinnance than the express rule of law; though now by long custom established. A doctrine which would in most cases give a loose to felons to escape without punishment; and therefore Sir Matthew Hale hath combated it with invincible authority and strength of reason: Maintaining, 1. That a justice of peace hath power to issue a warrant to apprehend a person accused of felony, tho' not yet indicted; and, 2. That he may also issue a warrant to apprehend a person suspected of felony, though the original suspicion be not in himself, but in the party that prays his warrant; because he is a competent judge of the probability offered to him of such suspicion. But in both cases it is fitting to examine upon oath the party requiring a warrant, as well to ascertain that there is a felony or other crime actually committed, without which no warrant should be granted; as also to prove the cause and probability of suspecting the party against whom the warrant is prayed. This warrant ought to be under the hand and seal of the justice, should set forth the time and place of making, and the cause for which it is made, and should be directed to the constable, or other peace-officer, (or it may be to any private person by name), requiring him to bring the party either generally before any justice of the peace for the county, or only before the justice who granted it: the warrant in the latter case being called a *special warrant*. A general warrant to apprehend all persons suspected, without naming or particularly describing any person in special, is illegal and void for its uncertainty; for it is the duty of the magistrate, and ought not to be left to the officer, to judge of the ground of suspicion. And a warrant to apprehend all persons, guilty of a crime therein specified, is no legal warrant: for the point upon which its authority rests, is a fact to be decided on a subsequent trial; namely, whether the person apprehended thereupon be really guilty or not. It is therefore in fact no warrant at all; for it will not justify the officer who acts under it: whereas a warrant, properly penned (even though the magistrate who issues it should exceed his jurisdiction), will, by statute 24 Geo. II. c. 44. at all events indemnify the officer who executes the same ministerially. And when a warrant is received by the officer, he is bound to execute it, so far as the jurisdiction of the magistrate and himself extends. A warrant from the chief, or other justice of the court of king's-bench, extends all over the kingdom; and is test'd, or dated, England; not Oxfordshire, Berks, or other particular county. But the warrant of a justice of the peace in one county, as Yorkshire, must be backed, that is, signed by a justice of the peace in another, as Middlesex, before it can be executed there.

Formerly, regularly speaking, there ought to have been a fresh warrant in every fresh county; but the practice of backing warrants had long prevailed without law, and was at last authorized by stat. 23 Geo. II. c. 26. and 24 Geo. II. c. 55. And now, by statute 13 Geo. III. c. 31. any warrant for apprehending an English offender, who may have escaped into Scotland, and *vice versa*, may be indorsed and executed by the local magistrates, and the offender conveyed back to that part of the united kingdoms in which such offence was committed.

WARREN (Sir Peter), an admiral, distinguished by his virtue, learning, and undaunted courage, was descended from an ancient family in Ireland, and received a suitable education to qualify him for a command in the royal navy, in which he served for several years with great reputation; but the transaction which placed his great abilities in their full light, was the taking of Louisburg in the year 1745, when he was appointed commodore of the British squadron sent on that service. He joined the fleet of transports from Boston in Casco-bay on the 25th of April, having under his command the *Superb* of 60, and the *Launceston* and *Eltham* of 40 guns; he was afterwards joined by several other men of war sent from England, and took possession of Louisburg on the 17th of June. The French, exasperated at this loss, were constantly on the watch to retake it; and in 1747 fitted out a large fleet for that purpose, and at the same time another squadron to prosecute their success in the East-Indies. These squadrons failed at the same time; but the views of the French were rendered abortive by the gallant admiral Anson and Mr Warren, who had been created rear-admiral, who with a large fleet of ships fell in with the French, defeated the whole fleet, and took the greatest part of the men of war. This was the last service Sir Peter rendered to his country as a commander in the British fleet; for a peace being concluded in the succeeding year, the fleet was laid up in the several harbours.

He was now chosen one of the representatives in parliament for Westminster; and in the midst of his popularity he paid a visit to Ireland, his native country, where he died of an inflammatory fever in 1752, sincerely lamented by all ranks of people; and an elegant monument of white marble was erected to his memory in Westminster-abbey.

WARREN, is a franchise or place privileged by prescription or grant from the king, for the keeping of beasts and fowls of the warren; which are hares and coney, partridges, pheasants, and some add quails, woodcocks, and water-fowl, &c. These being *feræ nature*, every one had a natural right to kill as he could: but upon the introduction of the forest laws at the Norman conquest, these animals being looked upon as royal game, and the sole property of our savage monarchs, this franchise of free-warren was invented to protect them, by giving the grantee a sole and exclusive power of killing such game, so far as his warren extended, on condition of his preventing other persons. A man therefore that has the franchise of warren, is in reality no more than a royal game-keeper: but no man, not even a lord of a manor, could by common law justify sporting on another's soil, or even on his own, unless

he had the liberty of free-warren. This franchise is almost fallen into disrepute since the new statutes for preserving the game; the name being now chiefly preserved in grounds that are set apart for breeding hares and rabbits. There are many instances of keen sportsmen in ancient times, who have sold their estates, and reserved the free-warren, or right of killing game, to themselves; by which means it comes to pass that a man and his heirs have sometimes free-warren over another's ground.

A warren may lie open; and there is no necessity of inclosing it as there is of a park. If any person offend in a free warren, he is punishable by the common law, and by stat. 21 Edw. III. And if any one enter wrongfully into any warren, and chase, take, or kill any coney without the consent of the owner, he shall forfeit treble damages, and suffer three months imprisonment, &c. by 22 and 23 Car. II. c. 25. When coney are on the soil of the party, he hath a property in them by reason of the possession, and action lies for killing them; but if they run out of the warren and eat up a neighbour's corn, the owner of the land may kill them, and no action will lie.

WARSAW, the capital of Warovia in Poland, and indeed of the whole kingdom, stands on the Vistula, almost in the centre of the kingdom, and in N. Lat. 52. 14. and E. Long. 21. ; 154 miles south-east of Dantzic, 133 north of Cracow, and 300 north of Vienna. Here the king usually keeps his court in a large square palace, standing amidst delicate gardens and groves; and at this place are held the general diets, where there is such a concourse of people, that great numbers of them are obliged to live in tents. The city is large and populous, contains a great many churches, palaces, and convents, both within and without the walls, and is pretty well fortified. Here is also a stately castle, an arsenal, and a curious wooden bridge over the river. Count Zaluski's library, said to contain 200,000 volumes, was opened in 1746. The ordinary diets are held at the royal palace; but during the interregnum, in a field not far from the city, near the village of Wola. Goods are brought to the city by the Vistula and other rivers, and sent from thence to Dantzic. Baron Polnitz, who spent some time in this city, says, he observed the same politeness here as at Paris; that the ladies are amiable, witty, and sprightly, and passionately fond of music and plays. Near this city are two royal palaces, viz. Vialdow, pleasantly situated on the Vistula, and Villanow, where, in 1732, Augustus II. reviewed his troops, and made them go through all the different military exercises.

WART, in surgery, a little round hard excrecence, being first a small and almost imperceptible induration of the skin, which if observed in time may be easily eradicated. If suffered to remain, it penetrates deeper into the cellular membrane, and sends forth roots, frequently becoming cancerous if irritated by the imprudent use of caustics.

WARWICK, the capital of Warwickshire in England, and from which this county derives its name. It is very ancient, and supposed by Camden to be the place called by the Romans *Præsidium*, where the Dalmatian horse were posted. It stands on a rock of free-stone, of which all the public edifices in the town are built. At the Norman invasion it was a

considerable place; and had many burgessees, of whom 12 were obliged by their tenure to accompany the king in his wars. The castle was anciently very strong, both by nature and art, and is now a most noble and delightful dwelling; the rock on which it stands being 40 feet above the river, but on the north side level with the town. In September 1694, the city suffered much by a fire, occasioned by a spark blown from a stick, as it was carrying coals a lane; but by an act of parliament for rebuilding it, and the liberal contributions of the nation, it hath risen again out of its ashes more magnificent than it was before. It is supplied with water brought in pipes from springs half a mile from the town, besides what it derives from the wells within it made in the rock; and it is easily kept clean, by being situated upon a declivity. Four streets, from the four cardinal points of the compass, meet in the centre of the town. The country all around is very beautiful; of which, from a terrace in the castle, now the seat of earl Brook and Warwick, there is a very noble prospect. The principal public buildings are St Mary's, a very stately edifice, an hospital, a town-house of free-stone, three charity schools, and a noble bridge over the Avon. It has had several charters; but is governed at present by a mayor, 12 brethren, 24 burgessees, &c. It is a very handsome populous town, and gives title of earl to the family of the Grevilles.

WASH, among distillers, the fermentable liquor used by the malt distillers. See BREWERY.

WASHING, in painting, is when a design, drawn with a pen or crayon, has some one colour laid over it with a pencil, as Indian ink, bistre, or the like, to make it appear the more natural, by adding the shadow of prominences, aperture, &c. and by imitating the particular matters whereof the thing is supposed to consist.

Thus they wash with a pale red, to imitate brick and tile; with a pale Indian blue, to imitate water and slate; with green, for trees and meadows; with saffron or French berries, for gold or brass; and with several colours for marbles.

WASHING of Ores, the purifying an ore of any metal, by means of water, from earths and stones, which would otherwise render it difficult of fusion.

WASP, in zoology. See VESPA.

WATCH, in the art of war, a number of men posted at any passage, or a company of the guards who go on the patrol.

WATCH, in the navy, the space of time wherein one division of a ship's crew remains upon deck, to perform the necessary services, whilst the rest are relieved from duty, either when the vessel is under sail or at anchor.

The length of the sea-watch is not equal in the shipping of different nations. It is always kept four hours by our British seamen, if we except the dog-watch between four and eight in the evening, that contains two reliefs, each of which are only two hours on deck. The intent of this is to change the period of the night-watch every 24 hours; so that the party watching from 8 till 12 in one night, shall watch from midnight till four in the morning on the succeeding one. In France the duration of the watch is extremely different, being in some places six hours, and in others

others seven or eight : and in Turkey and Barbary it is usually five or six hours.

A ship's company is usually classed into two parties ; one of which is called the starboard and the other the larboard watch. It is, however, occasionally separated into three divisions, as in a road or in particular voyages.

In a ship of war the watch is generally commanded by a lieutenant, and in merchant-ships by one of the mates : so that if there are four mates in the latter, there are two in each watch ; the first and third being in the larboard, and the second and fourth in the starboard watch : but in the navy, the officers who command the watch usually divide themselves into three parties, in order to lighten their duty.

WATCH, is also used for a small portable movement, or machine, for the measuring of time ; having its motion regulated by a spiral spring.

Watches, strictly taken, are all such movements as show the parts of time ; as clocks are such as publish it, by striking on a bell, &c. But commonly the name *watch* is appropriated to such as are carried in the pocket ; and *clock* to the large movements, whether they strike the hour or not. See *Clock*.

The invention of spring or pocket-watches, belongs to the present age. It is true, we find mention made of a watch presented to Charles V. in the history of that prince : but this, in all probability, was no more than a kind of clock to be set on a table, some resemblance whereof we have still remaining in the ancient pieces made before the year 1670. In effect, it is between Dr Hooke and M. Huygens that the glory of this excellent invention lies : but to which of them it properly belongs, is greatly disputed ; the English ascribing it to the former, and the French, Dutch, &c. to the latter. Mr Derham, in his *Artificial Clockmaker*, says roundly, that Dr Hooke was the inventor ; and adds, that he contrived various ways of regulation. One way was with a loadstone. Another with a tender straight spring, one end whereof played backwards and forwards with the balance ; so that the balance was to the spring as the bob to a pendulum, and the spring as the rod thereof. A third method was with two balances, of which there were divers sorts ; some having a spiral spring to the balance for a regulator, and others without. But the way that prevailed, and which continues in mode, was with one balance, and one spring running round the upper part of the verge thereof : Though this has a disadvantage, which those with two springs, &c. were free from ; in that a sudden jerk, or confused shake, will alter its vibrations, and put it in an unusual hurry.

The time of these inventions was about the year 1658 ; as appears, among other evidences, from an inscription on one of the double balance watches presented to king Charles II. viz. Rob. Hooke Inven. 1658. T. Tompion fecit, 1675. The invention presently got into reputation, both at home and abroad ; and two of them were sent for by the dauphin of France. Soon after this, M. Huygens's watch with a spiral spring got abroad, and made a great noise in England, as if the longitude could be found by it. It is certain, however, that his invention was later than the year 1673, when his book de *Horol. Oscillat.* was published ; wherein he has not one word of this, though

he has of several other contrivances in the same way.

One of these the lord Brouncker sent out of France, where M. Huygens had got a patent for them. This watch agreed with Dr Hooke's, in the application of the spring to the balance ; only M. Huygens's had a longer spiral spring, and the pulses and beats were much slower. The balance, instead of turning quite round, as Dr Hooke's, turns several rounds every vibration.

Mr Derham suggests, that he has reason to doubt M. Huygens's fancy first was set to work by some intelligence he might have of Dr Hooke's invention from Mr Oldenburg, or some other of his correspondents in England ; though Mr Oldenburg vindicates himself against that charge, in *Philosophical Transactions*, N^o 118 and 129. Huygens invented divers other kinds of watches, some of them without any spring or chain at all ; which he called, particularly, *pendulum watches*.

As it was in England that watches had their first rise ; so it is there too they have arrived at their greatest perfection. Witness that exceeding value put on an English watch in all foreign countries, and that vast demand made for them.

M. Savary, in his *Diction. de commerce*, pretends to match the French watchmakers against the English. He asserts, " That if the English be in any condition to dispute it with them, they owe it entirely to the great number of French workmen who took shelter here upon the revocation of the edict of Nantz." He adds, " That three fourths of the watches made in England are the work of Frenchmen."—From what authorities he says this we know not : but it need not be told Englishmen that it is false ; there not being one French name, that we know of, among all our famed watchmakers ; nor, in the body of watchmakers, is there one eighth part French.

It is certain the French people prefer our watches vastly to their own ; inasmuch, that to have them with the more ease, a number of English workmen were invited over in 1719, and established with great countenance at Versailles, under the direction of the famous Mr Law. But the establishment, though every thing promised well for it, and the French watch and clock makers seemed undone by it, fell to the ground in less than a year's time. M. Savary imputes its fall entirely to that strong prejudice of the French people in behalf of the English workmen, and to the opinion that the watches did not come from England. But the truth is, the workmen sent over being most of them men of loose characters, grew dissolute, quarrelled with the priests, insulted the magistrates, and were dismissed of necessity.

Striking WATCHES are such, as besides the proper watch part for measuring of time, have a clock-part for striking the hours, &c.

Repeating WATCHES, are such as by pulling a string, &c. repeat the hour, quarter, or minute, at any time of the day or night.—This repetition was the invention of Mr Barlow, and first put in practice by him in larger movements or clocks about the year 1676. The contrivance immediately set the other artists to work, who soon contrived divers ways of effecting the same. But its application to pocket-watches was not known before king James the Second's reign ; when

Watch.

the ingenious inventor above-mentioned, having directed Mr Thompson to make a repeating watch, was soliciting a patent for the same. The talk of a patent engaged Mr Quare to resume the thoughts of a like contrivance, which he had had in view some years before: he now effected it; and being pressed to endeavour to prevent Mr Barlow's patent, a watch of each kind was produced before the king and council; upon trial of which, the preference was given to Mr Quare's. The difference between them was, that Barlow's was made to repeat by pushing in two pieces on each side the watch-box; one of which repeated the hour, and the other the quarter: whereas Quare's was made to repeat by a pin that stuck out near the pendant, which being thrust in (as now it is done by thrusting in the pendant itself), repeated both the hour and quarter with the same thrust.

Plate
LXXX.
(Vol. III.)

Of the Mechanism of a WATCH. Watches, as well as clocks, are composed of wheels and pinions, and a regulator to direct the quickness or slowness of the wheels, and of a spring which communicates motion to the whole machine. But the regulator and spring of a watch are vastly inferior to the weight and pendulum of a clock, neither of which can be employed in watches. In place of a pendulum, therefore, we are obliged to use a balance (fig. 4.) to regulate the motion of a watch; and of a spring (fig. 6.) which serves in place of a weight, to give motion to the wheels and balance.

The wheels of a watch, like those of a clock, are placed in a frame formed of two plates and four pillars. Fig. 3. represents the inside of a watch, after the plate (fig. 5.) is taken off. A is the barrel which contains the spring (fig. 6.) the chain is rolled about the barrel, with one end of it fixed to the barrel A, and the other to the fusee B.

When a watch is wound up, the chain which was upon the barrel winds about the fusee, and by this means the spring is stretched; for the interior end of the spring is fixed by a hook to the immovable axis, about which the barrel revolves; the exterior end of the spring is fixed to the inside of the barrel, which turns upon an axis. It is therefore easy to perceive how the spring extends itself, and how its elasticity forces the barrel to turn round, and consequently obliges the chain which is upon the fusee to unfold and turn the fusee; the motion of the fusee is communicated to the wheel CC; then, by means of the teeth, to the pinion *c*, which carries the wheel D; then to the pinion *d*, which carries the wheel E; then to the pinion *e*, which carries the wheel F; then to the pinion *f*, upon which is the balance-wheel G, whose pivot runs in the pieces A called the *potance*, and B called a *follower*, which are fixed on the plate fig. 5. This plate, of which only a part is represented, is applied to that of fig. 3. in such a manner, that the pivots of the wheels enter into holes made in the plate fig. 3. Thus the impressed force of the spring is communicated to the wheels: and the pinion *f* being then connected to the wheel F, obliges it to turn (fig. 7.) This wheel acts upon the palettes of the verge 1. 2. (fig. 4.) the axis of which carries the balance H, (fig. 4.) The pivot I, in the end of the verge, enters into the hole *c* in the potance A (fig. 5.) In this figure the palettes are represented; but the balance

is on the other side of the plate, as may be seen in fig. 11. The pivot 3 of the balance enters into a hole of the cock BC, (fig. 10.) a perspective view of which is represented in (fig. 12.) Thus the balance turns between the cock and the potance *c*, (fig. 5.) as in a kind of cage. The action of the balance-wheel upon the palettes 1, 2, (fig. 4.) is the same with what we have described with regard to the same wheel in the clock; *i. e.* in a watch the balance-wheel obliges the balance to vibrate backwards and forwards like a pendulum. At each vibration of the balance a palette allows a tooth of the balance-wheel to escape; so that the quickness of the motion of the wheels is entirely determined by the quickness of the vibrations of the balance, and these vibrations of the balance and motion of the wheels are produced by the action of the spring.

But the quickness or slowness of the vibrations of the balance depend not solely upon the action of the great spring, but chiefly upon the action of the spring *a, b, c*, called the *spiral spring*, (fig. 14.) situated under the balance H, and represented in perspective (fig. 11.) The exterior end of the spiral is fixed to the pin *a*, (fig. 14.) This pin is applied near the plate in *a*, (fig. 11.); the interior end of the spiral is fixed by a peg to the centre of the balance. Hence if the balance is turned upon itself, the plates remaining immovable, the spring will extend itself, and make the balance perform one revolution. Now, after the spiral is thus extended, if the balance be left to itself, the elasticity of the spiral will bring back the balance, and in this manner the alternate vibrations of the balance are produced.

In fig. 7. all the wheels above described are represented in such a manner, that you may easily perceive at first sight how the motion is communicated from the barrel to the balance.

In fig. 8. are represented the wheels under the dial-plate by which the hands are moved. The pinion *a* is adjusted to the force of the prolonged pivot of the wheel D, (fig. 7.) and is called a *canon pinion*. This wheel revolves in an hour. The end of the axis of the pinion *a*, upon which the minute-hand is fixed, is square; the pinion (fig. 8.) is indented into the wheel *b*, which is carried by the pinion *a*. Fig. 9. is a wheel fixed upon a barrel, into the cavity of which the pinion *a* enters, and upon which it turns freely. This wheel *d* revolves in 12 hours, and carries along with it the hour-hand.

WATCHING, in medicine, is when, through too great a determination of blood to the head, or emptiness of the vessels, and an exhausted state of the body, the patient cannot sleep. In fevers it is a dangerous symptom, and if long continued ends in a delirium.

WATER, in physiology, a clear insipid and colourless fluid, coagulable into a transparent solid substance at 32° of Fahrenheit's thermometer, and volatile in every degree of heat above that. Many different kinds of waters are commonly spoken of, such as Chalybeate waters, sulphureous, saline, putrid waters, &c. but all these differ from one another only in having various substances mixed with them, from which when perfectly freed, the water is always the same; so that it has not improperly been reckoned one of the four elements.

Watch
||
Water.

The general and most effectual method of freeing water from any heterogeneous substance is distillation. Thus it may be perfectly purified from almost every saline substance whatever; and thus sea-water may be rendered perfectly fresh and wholesome. It must be observed, however, that all distilled water acquires an empyreumatic smell and taste by this operation; so that it makes but disagreeable drink until it has stood for some time. Another disadvantage which attends water when newly distilled, is its want of fixed air; which, however, it soon recovers by exposure to the air for some time. If water is actually putrid, it cannot be made fit for use by simple distillation. In this case a quantity of lime is necessary, which extracts a volatile alkali, but destroys the putrid substance. After the water is once distilled in this manner, it may be more fully purified by adding some vitriolic or other acid to neutralise the alkali, and redistilling it with this addition. The substance from which it is most difficult to free water is any volatile oil. This rises in distillation, and will also pass through every kind of strainer. The only cure in this case therefore is to expose the fluid for a considerable time to the air, when the oil will fly off or become effete and fixed, so that it cannot rise in distillation; after which the water may easily be purified.

Whether or not it is possible to convert water into earth, is a question which has much engaged the attention of philosophers. Mr Boyle relates, that a friend of his, by distilling a quantity of water an hundred times, found at length, that he had got six-tenths of the first quantity in earth: whence he concludes, that the whole water, by further prosecuting the operation, might be converted into earth. Others have made experiments to the same purpose, and seemingly with the same success; but the deception is now found out. Water has the power of corroding the hardest bodies, even glass itself, by long digestion, especially when assisted by heat; and hence those who have made the experiments just mentioned have been themselves deceived, by supposing the earth which really came from the containing vessel to come from the water.

It is surprising to consider the plenteous stock of water which even dry bodies afford. Hartshorn kept forty years, and turned as hard and dry as any metal, so that if struck against a flint it will yield sparks of fire; yet being put into a vessel, and distilled, will afford one-eighth part of its quantity of water. Bones dead and dried 25 years, and thus become almost as hard as iron; yet, by distillation, have afforded half their weight of water. And the hardest stones, ground and distilled, do always discover a portion thereof.

From considerations of this kind, Thales, and some other philosophers, have been led to hold, that all things were made of water; which opinion, probably, had its rise from the writings of Moses, where he speaks of the spirit of God moving upon the face of the waters: But Mr Boyle does not conceive the water here mentioned by Moses as the universal matter, to be our elementary water: we need only suppose it an agitated congeries of a great variety of seminal principles, and of other corpuscles fit to be subdued and fashioned by them; and it may yet be a body fluid like water, in case the corpuscles it was made up of were by their

Creator made small enough, and put into such an actual motion as might make them roll and glide easily over one another. However, Basil Valentine, Paracelsus, Van Helmont, Sendivogius, and others, have maintained the same principle, viz. that water is the elemental matter or flamen of all things, and suffices alone for the production of all the visible creation. Thus Sir Isaac Newton, "All birds, beasts, and fishes, insects, trees, and vegetables, with their several parts, do grow out of water, and watery tinctures, and salts; and, by putrefaction, return again to watery substances."

Helmont endeavours to prove this doctrine from an experiment; wherein, burning a quantity of earth till all the oil was consumed, and then mixing it up with water to draw out all the salt; and putting this earth, thus prepared, into an earthen pot, which nothing but rain-water could enter; yet a willow, planted therein, grew up to a considerable height and bulk, without any sensible diminution of the earth: whence he concluded, that the water was the only nutriment of the vegetable kind, as vegetables are of the animal. The same thing is inferred by Mr Boyle, from a parallel experiment: and the whole is countenanced by Sir Isaac Newton, who observes, that water, standing a few days in the open air, yields a tincture, which, like that of malt, by standing longer, yields a sediment, and a spirit; but before putrefaction, is fit nourishment for animals and vegetables.

But Dr Woodward endeavours to shew the whole a mistake: water containing extraneous corpuscles, some of these, he shows, are the proper matter of nutrition; the water being still found to afford so much the less nourishment the more it is purified by distillation. Thus a plant in distilled water will not grow so fast as in water not distilled; and if the water be distilled three or four times over, the plant will scarce grow at all, or receive any nourishment from it. So that water, as such, does not seem the proper nutriment of vegetables, but only the vehicle thereof, which contains the nutritious particles, and carries them along with it through all the parts of the plant. See AGRICULTURE, sect. i. ii.

No standard for the weight and purity of water.—Water scarce ever continues two moments exactly of the same weight, by reason of the air and fire contained therein. Thus, a piece of pure limpid ice, laid in a nice balance, never continues in equilibrio. In effect, the expansion of water in boiling, shows what effect the different degree of fire has, on the gravity of water. This makes it difficult to fix the specific gravity of water, in order to settle its degree of purity; but this we may say in the general, that the purest water we can procure, is that which is 880 times as heavy as air. However, neither have we any tolerable standard in air: for, water being so much heavier than air, the more water is contained in the air, the heavier of course must it be; as, in effect, the principal part of the weight of the atmosphere seems to arise from the water.

Property and effects of water.—Water is found the most penetrative of all bodies, after fire, and the most difficult to confine; so that a vessel through which water cannot pass may retain any thing. Nor is it any objection, that syrups and oils will sometimes pass

through bodies which will hold water; this not being owing to the greater subtlety and penetration of their particles, but to the refin wherewith the wood of such vessels abounds, to which oils and fyrups are as menstrooms; so that, dissolving the refin, they make their way through the spaces left thereby: whereas water, not acting on refin, is retained.

And yet water gradually makes its way even through all woods, and is only retainable in glass and metals; nay, it was found by experiment at Florence, that when shut up in a spherical vessel of gold, and then violently pressed with a huge force, it made its way through the pores even of the gold: so that the moist solid body in nature is permeable to water.

Water has been supposed more fluid than air; a body being reputed more fluid than another, when its parts will find way through smaller pores: now air, it is known, will not pass through leather, as is evident in the case of an exhausted receiver covered therewith; whereas water passes with ease. Again, air may be retained in a bladder, but water oozes through. In effect, it is found, that water will pass through pores ten times smaller than air will. M. Homborg, however accounts for this passage of water through the narrow pores of animal substances which will not admit the air, on another principle, viz. its moistening and dissolving the glutinous matter of the fine fibres of the membranes, and rendering them more pliable and distensible; which the air, for want of a wetting property, cannot do. As a proof of this doctrine, he filled a bladder, and compressed it with a stone, and found no air to come out; but placing the bladder thus compressed in water, the air easily escaped.

This property of water, joined with its smoothness and lubricity, fits it to serve as a vehicle for the commodious and easy conveyance of the nutritious matter of all bodies: being so fluid, and passing and repassing so readily, it never stops up the pores, but leaves room for the following water to bring on a new supply of nutritious matter. And yet the same water, as little cohesive as it is, and as easily separated from moist bodies, according to some is the principle of union in a great number of bodies, and binds them together into the most solid masses. Water, we see, mixed up with earth or ashes, gives them the utmost firmness and fixity. The ashes, *e. gr.* of an animal, incorporated with pure water into a paste, and baked with a vehement fire, grow into a coppel; which is a body remarkable for this, that it will bear the utmost effort of a refiner's furnace. It is, in effect, upon the glutinous nature of water alone that our houses stand: for take but this out of wood, and it becomes ashes; or out of tiles, and they become dust. Thus, a little clay dried in the sun, becomes a powder, which, mixed with water, sticks together again, and may be fashioned at pleasure; and this dried again by a gentle fire, or in the sun, and then baked in a potter's oven by an intense fire, becomes little other than a stone. It cannot however be proved that the small quantity of water supposed to remain in bricks, &c. is the cause of their cohesion. It seems more probable that an incipient vitrification is the reason why bricks and earthen ware of all kinds stick together. Some of these, porcelain and stone ware in particular, are evidently vitrified.

For a long time water was supposed to be incompressible, or incapable of being, by any force whatever, reduced into a less compass. This was thought to be demonstrated by the famous experiment above-mentioned, made by order of the great duke of Tuscany. The water being incapable of condensation, rather than yield, transuded through the pores of the metal, so that the ball was found wet all over the outside; till at length making a cleft in the gold, it sprung out with great vehemence. From this last circumstance, indeed, some have weakly concluded it was elastic. For the impetus wherewith the water darted forth, was more probably owing to the elasticity of the gold, which communicated that impression to the water.—Of late, however, the contrary opinion has been adopted; and Mr Canton has made some experiments to show, that water not only may be, but actually is, compressed, by the weight of the atmosphere. These we shall relate in his own words. "Having procured a small glass-tube of about two feet in length, with a ball at one end of it of an inch and a quarter in diameter, I filled the ball and part of the tube with mercury; and keeping it with a Fahrenheit's thermometer in water which was frequently stirred, it was brought exactly to the heat of 50°; and the place where the mercury stood in the tube, which was about 6½ inches above the ball, was carefully marked. I then raised the mercury by heat to the top of the tube, and sealed the tube hermetically; and when the mercury was brought to the same degree of heat as before, it stood in the tube $\frac{1}{10}$ of an inch higher than the mark.

"The same ball, and part of the tube, being filled with water exhausted of air instead of the mercury, and the place where the water stood in the tube when it came to rest in the heat of 50° being marked, which being sealed six inches above the ball, the water was then raised by heat till it filled the tube; which being sealed again, and the water brought to the heat of 50° as before, it stood in the tube $\frac{1}{10}$ of an inch above the mark.

"Now the weight of the atmosphere (or about 73 pounds averdupois) pressing on the outside of the ball and not on the inside, will squeeze it into less compass. And by this compression of the ball the mercury and water will be equally raised in the tube: but the water is found, by the experiments above related, to rise $\frac{1}{10}$ of an inch more than the mercury, by removing the weight of the atmosphere.

"In order to determine how much water is compressed by this or a greater weight, I took a glass ball of about an inch and $\frac{1}{10}$ in diameter, which was joined to a cylindrical tube of four inches and $\frac{1}{10}$ in length, and diameter about $\frac{1}{10}$ of an inch; and by weighing the quantity of mercury that exactly filled the whole length of the tube, I found that the mercury in $\frac{3}{10}$ of an inch of the tube, was the 100,000th part of that contained in the ball; and with the edge of a file I divided the tube accordingly.

"This being done, I filled the ball and part of the tube with water exhausted of air; and left the tube open, that the ball, whether in rarefied or condensed air, might always be equally pressed within and without, and therefore not altered in its dimensions. Now by placing this ball and tube under the receiver of an air-pump, I could see the degree of expansion of the

water

Water.

water answering to any degree of rarefaction of the air; and by putting it into a glass receiver of a condensing engine, I could see the degrees of compression of the water answering to any degree of condensation of the air. But great care must be taken in making these experiments, that the heat of the glass ball be not altered, either by the coming on of moisture, or its going off by evaporation; which may easily be prevented by keeping the ball under water, or by using oil only in working the pump and condenser.

"In this manner, I have found by repeated trials, when the heat of the air has been above 50°, and the mercury at a mean height in the barometer, that the water will expand and rise in the tube by removing the weight of the atmosphere four divisions and $\frac{6}{10}$; or one part in 21,740; and will be as much compressed under the weight of an additional atmosphere. Therefore the compression of water by twice the weight of the atmosphere, is one part in 10,870 of its whole bulk.

"The famous Florentine experiment, which so many philosophical writers have mentioned as a proof of the incompressibility of water, will not, when carefully considered, appear sufficient for that purpose: for in forcing any part of the water contained in a hollow globe of gold through its pores by pressure, the figure of the gold must be altered, and consequently the internal space containing the water diminished; but it was impossible for the gentlemen of the academy *del Cimento* to determine, that the water which was forced into the pores and through the gold, was exactly equal to the diminution of the internal space by the pressure."

An easy confirmation of this doctrine of Mr Canton's would be, to fill a vial exactly with water taken up at a great depth, by a perton in a diving bell. If the water at that depth was really compressed by what lay above it, it must expand during its ascent to the surface, and either break the vial, or drive out the stopper.

Hard WATER. By this name is understood such water as will not entirely dissolve soap, but produces a white or greyish coagulum, more or less in quantity in proportion to the hardness of the water. Formerly the hardness of waters was thought to be occasioned by sea-salt: but Dr Home in his Treatise on Bleaching, shows, that this salt can never make water hard, nor indeed can it be done by any perfect neutral, unless mixed in very large quantity with the water. On the other hand, acids of all kinds, imperfect neutrals, and ammoniacal salts, will harden water. The reason of this is, that the alkali of the soap has a less attraction for the oil with which it is united than with the acid, and therefore leaves the oil in order to unite with it; and it is the oil thus separated which we see floating like a curd in hard water when soap is mixed with it. From this theory we have an easy method of softening hard waters; viz. by dissolving in them a quantity of fixed alkali sufficient to absorb the acid, after which it can have no more effect in separating the oil which makes part of the soap. The most common substances by which waters are rendered hard, are selenites and calcareous nitre. From the former they may in good measure be freed by boiling; but not from the latter,

nor from any imperfect salt which readily dissolves in water.

Holy WATER, a water prepared every Sunday in the Romish church, with divers prayers, exorcisms, &c. used by the people to cross themselves withal at their entrance to and going out of church; and pretended to have the virtue of washing away venial sins, driving away devils, preserving from thunder, dissolving charms, securing from, or curing diseases, &c. Many of the Reformed take the use of holy water to have been borrowed from the lustral water of the ancient Romans.

Medicinal WATERS are generally impregnated with iron dissolved in the acridal acid or fixed air, with vitriol, sulphur, bitumen, &c. in consequence of which they produce various effects on the human body. The following directions for analysing them are given by Dr Lettison.

"As many springs contain a volatile principle soon liable to be dissipated, it is necessary to make our experiments on the spot, in order to discover the contents of such waters. Various as these contents may at first appear, the apparatus proper to detect all of them may be reduced into a very small compass.

"When we propose to examine any medicinal spring, the soil and face of the country should be considered, the stony or mineral appearance, and particularly whether there are any mineral veins; the degree of heat of the water should be ascertained by a thermometer, and its comparative weight to other springs in the neighbourhood also carefully observed; after which we may enter on our experiments.

"I. *Aërial Matters.* 1. **MEPHITIC**, fixable, or fixed air, is heavier than common or vital air, and frequently mixed with water; by which union common water is capable of dissolving iron, and thereby forming a chalybeate spring, as in Pyrmont, Spa, and many other celebrated mineral waters.

"This mephitic air is detected by lime-water; the former precipitating the calcareous earth of the latter in a white powder. To discover the quantity of this ærial matter, a bottle filled with the mineral water should be tied over the mouth with a loose bladder: the bottle is then to be placed in boiling water, the heat whereof will extricate the mephitic air, which rising into the bladder, may be collected by tying the bladder close to the neck of the bottle, and afterwards measured by a proportionable bulk of water.

"II. *Saline Bodies.* 1. An acid is sometimes found in the composition of mineral waters, which is always the vitriolic.

"a. In its fixed state, which is supposed to be separated from pyrites: this is however very rare, and probably never occurs, as it cannot remain long in this state without being neutralised by earths, salts, or metals.—Many of those springs called *acidule*, received this name from the mephitic air we have already mentioned. If this acid be present, it may be discovered by an infusion of syrup of violets, or by an infusion of lacmus, or archil, which are turned of a brighter or reddish colour by it. This acid may be detected also by a solution of lead in the nitrous acid; the solution should be fully saturated. The nitrous acid uniting with calcareous earth, or fossil alkali, falls in a white sediment,

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sediment, while the vitriolic acid combines with the lead.

" b, In its volatile sulphureous state.

" 2. An alkali is also very seldom found in water in its proper state.

" When a fossil alkali is present, it is more nicely detected by the syrup of violets, or infusion of lacmus, than the former, these being turned green by the least portion of alkali. If a considerable quantity of alkali were combined with the water, it might be precipitated by a solution of calcareous earth, or by acids.

" A volatile alkali may be distinguished by a solution of corrosive sublimate mercury in water, or in the nitrous acid, the alkali rendering the solution white, a precipitation of a white powder ensues; but no change is produced when the alkali is the fixed or fossil; or if any, the mercury will be precipitated in an orange, brown, or reddish powder; where there is a considerable quantity of the volatile alkali, the water turns blue by the addition of copper. When this alkali is in a very small proportion, some of the water should be distilled over.

" 3. Neutral salts are frequently found in medicinal waters.

" Glauber's salt, compounded of vitriolic acid, and fixed fossil alkali; spirit of wine added to a solution of this salt precipitates it in a white powder; but no change is produced by the addition of any alkaline salt.

" Epsom salt, formed of the same acid, and the earth of magnesia, is often a composition in purging waters. Any alkaline salt, either fixed or volatile, turns this water milky or curdly; the alkaline salt uniting with the vitriolic acid precipitates the earth of magnesia.

" Nitre is composed of the nitrous acid and fixed alkali. Water containing this salt should be evaporated, and the nitre remaining may be known by deflagration, or by its making a crackling noise over the fire. When the nitrous acid is combined with calcareous earth instead of the fixed alkali, the earth may be precipitated by the addition of this alkali.

" Common salt, consisting of the muriatic acid, and fossil alkaline salt. The acid of this salt is nicely detected by a solution of silver in the nitrous acid; the muriatic acid having a nearer affinity with silver than the nitrous, unites with the silver, which falls down in a white sediment, while the nitrous acid joins with the alkali of the common salt. It is proper to have a redundancy of the nitrous acid in the solution of silver, lest the silver be precipitated by a calcareous earth which may be in the water.

" III. *Earthy Substances.* CALCAREOUS earth, or calcined lime-stone, is found in most wells and medicinal springs; the presence of which is best discovered by a solution of lead in the nitrous acid. This acid should be saturated with as much lead as it will dissolve, lest the superfluous acid should saturate the earth and prevent the precipitation of the lead. If there be any calcareous earth in the water, this solution turns it milky, and after some time a white powder is deposited, the calcareous earth precipitating the lead, by uniting with the nitrous acid.

" If calcareous earth be suspended in water by combination with the vitriolic acid, gypsum or selenites is formed, which may be discovered by the addition of

alkaline salt to this compound; the mixture should be warmed a little, to promote the precipitation of the selenitic earth.

" The same acid united with argillaceous earth, or earth of alum, produces an aluminous austere composition; and the earth may be precipitated also by alkaline salt, which uniting with the vitriolic acid, allows the earth to fall down in a sediment.

" IV. *Sulphureous.* SULPHUR may be suspended in its proper form, tho' it is not soluble in this state: but when the principle of inflammability in sulphur is combined with calcareous earth, or any alkali, in the form of an hepar sulphuris, it readily dissolves; in which case the water smells disagreeably, like the scourings of a gun, or putrid eggs. It is distinguished also by a solution of saccharum saturni (sugar of lead) in the nitrous or vegetable acids: a little of this solution being marked in lines on paper, and the paper suspended over the water, the volatile sulphureous fumes arising from the water turn these lines of a brown or dark colour; the inflammable matter of the sulphur uniting with the lead in the solution of the saccharum saturni, partly revives the metal, and hence produces that dark colour.

" V. *Bituminous Bodies.* BITUMEN frequently runs from amongst rocks, whence it is called *petroleum*; it is also common in the bowels of the earth, as hath been often fatally experienced from those bituminous vapours called *fire-damps*, which prove inflammable, and therefore differ from mephitic air, the latter extinguishing fire. Whether this inflammable vapour is formed of the principle of inflammability of sulphur and the vitriolic acid in a volatile state, is not so well ascertained as the remarkable effects produced by these bituminous bodies in the mountains of *Ætna*, *Vesuvius*, and many others mentioned in history.

" Liquid bitumen, naphtha, or petroleum, is never found combined with water, but floats on its surface in a manner evident to the eye, and may be particularly distinguished by the taste and smell.

" VI. *Metallic Substances.* IRON is a common ingredient in mineral waters, whence they are called *chalybeate*. The general method of distinguishing this metal is by an infusion of powder of galls, which turns water containing iron of a purple or black colour, deeper in proportion to the quantity of iron present.

" But the most accurate method is by means of the Prussian alkali fully saturated with the inflammable matter of dried blood. This alkali mixed with a chalybeate water turns the latter immediately blue, and deposits the iron in a powder of the same colour.

" Copper in water is precipitated in a red powder by the same alkali.

" Zinc is precipitated in a white powder by the Prussian alkali. Although this alkali precipitates all the metallic substances from acids, so that they may be distinguished from one another, it does not any of the earths.

" Arsenic has been suspected in some mineral springs, but I am acquainted with no proof of it. However, it may possibly happen that water running through arsenical veins may carry off a quantity of arsenic. To discover this, the water should be evaporated, and the residuum may be placed on a hot bar of iron; and if there be any arsenic, it is known by emitting

emitting a strong garlic-like smell: or this residuum may be moistened with oil, and put between two bright plates of copper; which, when heated, are turned of a white colour if any arsenic be present: but the smell generally affords a sufficient test."

Rain-Water may be looked upon as the purest distilled water, but impregnated during its passage thro' the air with a considerable quantity of phlogistic and putrescent matter; whence it is superior to any other in fertilizing the earth. Hence also it is inferior for domestic purposes to spring or river-water, even if it could be readily procured; but such as is got from spouts placed below the roofs of houses, the common way of procuring it in this country, is evidently very impure, and becomes putrid in a short time.

River or Running Water, is next in purity to snow or distilled water; and for domestic purposes superior to both, in having less putrescent matter, and more fixed air. Such water, however, is to be chosen as runs in a clear stream through a rocky or stony channel; such as passes over mud, clay, or mossy ground, being impregnated with some part of these substances. The water of large rivers which run slowly is apt to be putrescent.

Putrid Water, is that which has acquired an offensive smell and taste by the putrescence of animal or vegetable substances contained in it. It is in the highest degree pernicious to the human frame, and capable of bringing on mortal diseases even by its smell. It is not always from the apparent muddiness of waters that we can judge of their disposition to putrefy; some which are seemingly very pure being more apt to become putrid than others which appear much more mixed with heterogeneous matters. Under the article *ANIMALCULE*, n° 33, is mentioned a species of insects which have the property of making water stink to an incredible degree, though their bulk in proportion to the fluid which surrounds them, is less than that of one to a million. Other substances no doubt there are which have the same property; and hence almost all water which is kept confined from the air is apt to become offensive, even though kept in glass or stone ware vessels. Indeed it is a common observation, that water keeps much longer sweet in earthen or stone ware vessels than in glass; but of all others it is most apt to putrefy in those of wood. Hence, as ships can only be supplied with water kept in wooden casks, sailors are extremely liable to those diseases which arise from putrid water; and the discovery of a method by which water could easily be prevented from becoming putrid at sea would be exceedingly valuable. This may indeed be done by quicklime; for when water is impregnated with it, all putrescent matters are either totally destroyed, or altered in such a manner as never to be capable of undergoing the putrefactive fermentation again. But a continued use of lime-water could not fail of being pernicious, and it is therefore necessary to throw down the lime; after which the water will have all the purity necessary for preserving it free from putrefaction. This can only be done by means of fixed air; and mere exposure in broad shallow vessels to the atmosphere would do it without any thing else, only taking care to break the crust which formed upon it. Two methods, however, have been thought of for doing this with more expedition. The one, invented by

Dr Alston, is, by throwing into the water impregnated with lime a quantity of magnesia. The lime attracts fixed air more powerfully than magnesia, in consequence of which the latter parts with it to the lime; which thus becoming insoluble, falls along with the caustic magnesia to the bottom, and thus leaves the water perfectly pure. Another method is that of Mr Henry, who proposes to throw down the lime by means of an effervescing mixture of oil of vitriol and chalk put down to the bottom of the water-cask. His apparatus for this purpose is as simple as it can well be made, though it is hardly probable that sailors will give themselves the trouble of using it; and Dr Alston's scheme would seem better calculated for them, were it not for the expence of the magnesia; which indeed is the only objection made to it by Mr Henry. Putrid water may be restored and made potable by a process of the same kind.

Sea-Water is a solution of common salt, sal catharticus anarus, a selenitic substance, and a compound of muriatic acid with magnesia, mixed together in various proportions. It may be freshened by simple distillation without any addition; a discovery for which we are indebted to Dr Lind. Sea-water by itself has a purgative quality, owing to the salts it contains; and has been greatly recommended in scrophulous disorders. Externally applied, sea-water is more powerful than common water, by reason of its superior coldness and specific gravity.

Spring-Water is commonly impregnated with a small portion of imperfect neutral salt, extracted from the different strata through which it percolates. Some contain a vast quantity of stony matter, which they deposit as they run along, and thus form masses of stone; sometimes incrustating various animal and vegetable matters, which they are therefore said to petrify. Spring-water is much used for domestic purposes, and on account of its coolness is an agreeable drink; but on account of its being generally somewhat hard, is inferior to that which has run for a considerable way in a channel.

Water-Engine, or engine for extinguishing fires. See *HYDROSTATICS*, n° 33.

Water-Ordeal. See *ORDEAL*.

Water, among jewellers, is properly the colour or lustre of diamonds and pearls. The term, though less properly, is sometimes used for the hue or colour of other stones.

Water-Bellows. See *Machines for blowing Air into FURNACES*.

Water-Colours, in painting, are such colours as are only diluted and mixed up with gum-water, in contradistinction to oil-colours. See *COLOUR-Making*.

Water-Gang, a channel cut to drain a place by carrying off a stream of water.

Water-Line of a Ship, certain horizontal lines supposed to be drawn about the outside of a ship's bottom, close to the surface of the water in which the floats. They are accordingly higher or lower upon the bottom, in proportion to the depth of the column of water required to float her. See *SHIP-buildings*, Part I.

Water Lodged, the state of a ship when, by receiving a great quantity of water into the hold, by leaking, &c. she has become heavy and inactive upon the sea,

sea, so as to yield without resistance to the efforts of every wave rushing over her decks. As, in this dangerous situation, the centre of gravity is no longer fixed, but fluctuating from place to place, the stability of the ship is utterly lost : she is therefore almost totally deprived of the use of her sails, which would operate to overfet her, or press the head under water. Hence there is no resource for the crew, except to free her by the pumps, or to abandon her by the boats as soon as possible.

Water-Sail, a small sail spread occasionally under the lower studding-sail, or driver-boom, in a fair wind and smooth sea.

Water-Spout, an extraordinary and dangerous meteor, consisting of a large mass of water, collected into a sort of column by the force of a whirlwind, and moved with rapidity along the surface of the sea.

A variety of authors have written on the cause and effects of these meteors, with different degrees of accuracy and probability.

Dr Franklin, in his physical and meteorological observations, supposes a water-spout and a whirlwind to proceed from the same cause ; their only difference being, that the latter passes over the land, and the former over the water. This opinion is corroborated by M. de la Pyrme, in the Philosophical Transactions, where he describes two spouts observed at different times in Yorkshire, whose appearances in the air were exactly like those of the spouts at sea, and their effects the same as those of real whirlwinds.

Whirlwinds have generally a progressive as well as circular motion ; so had what is called the spout at Topsham, described in the Transactions ; and this also by its effects appears to have been a real whirlwind.—Water-spouts have also a progressive motion, which is more or less rapid ; being in some violent, and in others barely perceptible.

Whirlwinds generally rise after calms and great heats : the same is observed of water-spouts, which are therefore most frequent in the warm latitudes.

The wind blows every way from a large surrounding place to a whirlwind. Three vessels, employed in the whale-fishery, happening to be becalmed, lay in sight of each other, at about a league distance, and in the form of a triangle. After some time a water-spout appeared near the middle of the triangle ; when a brisk gale arose, and every vessel made sail. It then appeared to them all by the trimming of their sails, and the course of each vessel, that the spout was to leeward of every one of them ; and this observation was further confirmed by the comparing of accounts when the different observers afterwards conferred about the subject. Hence whirlwinds and water-spouts agree in this particular likewise.

But if the same meteor, which appears a water-spout at sea, should, in its progressive motion, encounter and pass over land, and there produce all the phenomena and effects of a whirlwind, it would afford a stronger conviction that a whirlwind and a water-spout are the same thing. An ingenious correspondent of Dr Franklin gives one instance of this that fell within his own observation.

“ I had often seen (says he) water-spouts at a distance, and heard many strange stories of them, but never knew any thing satisfactory of their nature or cause, until

that which I saw at Antigua ; which convinced me that a water-spout is a whirlwind, which becomes visible in all its dimensions by the water it carries up with it.

There appeared, not far from the mouth of the harbour of St John's, two or three water-spouts, one of which took its course up the harbour. Its progressive motion was slow and unequal, not in a straight line, but as it were by jerks or flans. When just by the wharf, I stood about 100 yards from it. There appeared in the water a circle of about 20 yards diameter, which to me had a dreadful though pleasing appearance. The water in this circle was violently agitated, being whisked about, and carried up into the air with great rapidity and noise, and reflected a lustre, as if the sun shined bright on that spot, which was more conspicuous, as there appeared a dark circle around it. When it made the shore, it carried up with the same violence shingles, flaves, large pieces of the roofs of houses, &c. and one small wooden house it lifted entirely from the foundation on which it stood, and carried it to the distance of 14 feet, where it settled without breaking or oversetting ; and, what is remarkable, though the whirlwind moved from west to east, the house moved from east to west. Two or three negroes and a white woman were killed by the fall of the timber, which it carried up into the air, and dropped again. After passing through the town, I believe it was soon dissipated ; for, except tearing a large limb from a tree, and part of the cover of a sugar-work near the town, I do not remember any further damage done by it.”

A fluid moving from all points horizontally towards a centre, must at that centre either mount or descend. If a hole be opened in the middle of the bottom of a tub filled with water, the water will flow from all sides to the centre, and there descend in a whirl : but air flowing on or near the surface of land or water, from all sides towards a centre, must at that centre ascend ; because the land or water will hinder its descent.

If these concentrating currents of air be in the upper region, they may indeed descend in the spout or whirlwind ; but then, when the united current reached the earth or water, it would spread, and probably blow every way from the centre. There may be whirlwinds of both kinds ; but from the effects commonly observed, Dr Franklin suspects the rising one to be most frequent : when the upper air descends, it is perhaps in a greater body, extending wider, as in thunder-gusts, and without much whirling ; and when air descends in a spout or whirlwind, he conceives that it would rather press the roof of a house inwards, or force in the tiles, shingles, or thatch, and force a boat down into the water, or a piece of timber into the earth, than snatch them upwards, and carry them away.

The whirlwinds and spouts are not always, though most frequently, in the day-time. The terrible whirlwind which damaged a great part of Rome, June 11, 1749, happened in the night, and was supposed to have been previously a water-spout, it being asserted as an undoubted fact, that it gathered in the neighbouring sea, because it could be traced from Ostia to Rome.

This whirlwind is said to have appeared as a very black, long, and lofty cloud, discoverable, notwithstanding the darkness of the night, by its continually lightning, or emitting flashes on all sides, pushing a-

Fig. 1.

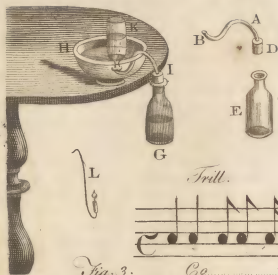


Fig. 5. Aphides



Fig. 7. Culices.



Fig. 6. Bruchus



Trill.

Fig. 2.

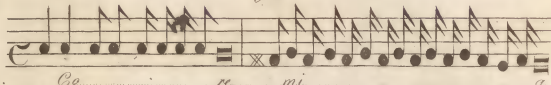


Fig. 3. Proportional COMPASS

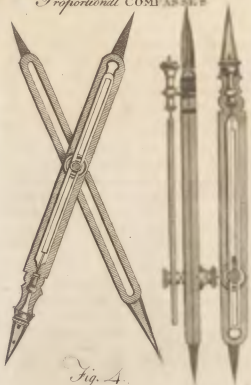


Fig. 8. Curculiones.

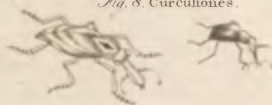


Fig. 9. Coccæ.



Fig. 10. Coccinellæ.



Fig. 11. Dynastes.



Fig. 4. Cantharis.



Fig. 12. Fulgora.



Fig. 14. Hemerobius.



Fig. 15. Cicindela.



Fig. 16. Meloe.

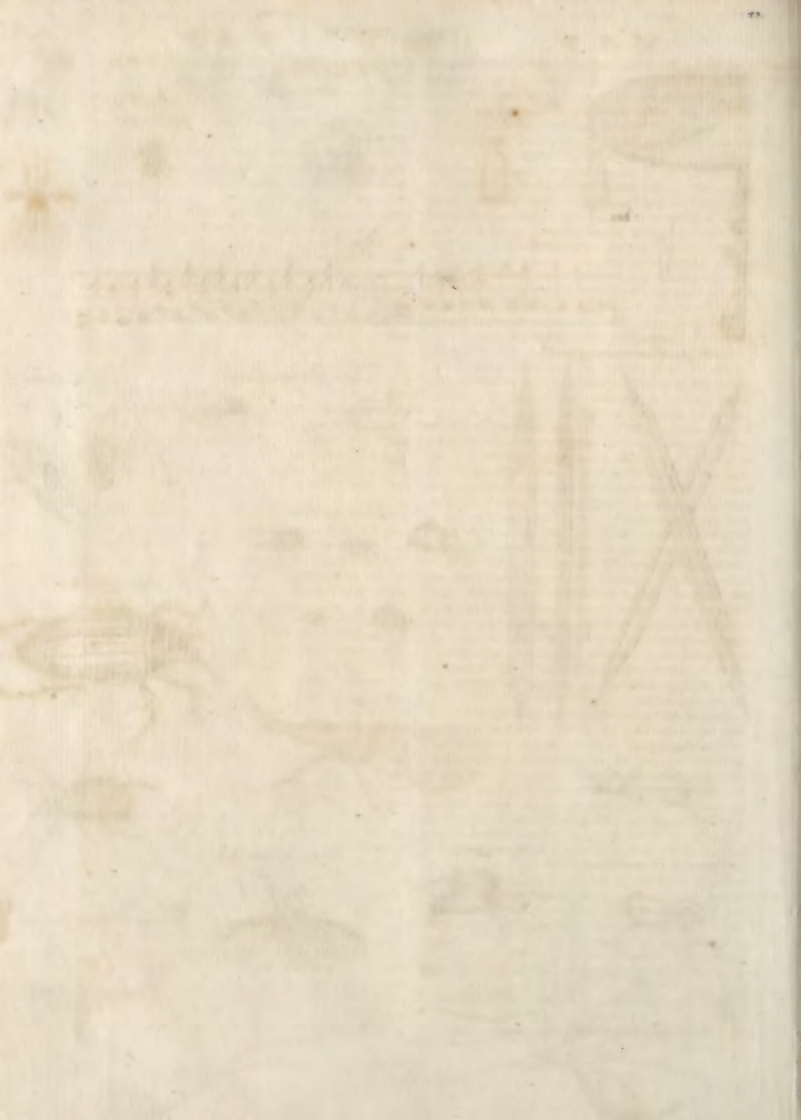


Fig. 12. Ephemeræ.



Fig. 17. Tipula.





Water. long with a surprising swiftness, and within three or four feet of the ground. Its general effects on houses were, stripping off the roofs, blowing away chimnies, breaking doors and windows, forcing up the floors, and unpaving the rooms; and the very rafters of the houses were broke and dispersed, and even hurled against houses at a considerable distance, &c.

The Doctor, in proceeding to explain his conceptions, begs to be allowed two or three positions, as a foundation for his hypothesis. 1. That the lower region of air is often more heated, and so more rarified, than the upper, and by consequence specifically lighter. The coldness of the upper region is manifested by the hail, which sometimes falls from it in warm weather. 2. That heated air may be very moist, and yet the moisture so equally diffused and rarified as not to be visible till colder air mixes with it; at which time it condenses and becomes visible. Thus our breath, although invisible in summer, becomes visible in winter.

These circumstances being granted, he presupposes a tract of land or sea, of about 60 miles in extent, unsheltered by clouds and unrefreshed by the wind, during a summer's day, or perhaps for several days without intermission, till it becomes violently heated, together with the lower region of the air in contact with it; so that the latter becomes specifically lighter than the superincumbent higher region of the atmosphere, wherein the clouds are usually floated: he supposes also that the air surrounding this tract has not been so much heated during those days, and therefore remains heavier. The consequence of this, he conceives, should be, that the heated lighter air should ascend, and the heavier descend; and as this rising cannot operate throughout the whole tract at once, because that would leave too extensive a vacuum, the rising will begin precisely in that column which happens to be lightest or most rarified; and the warm air will flow horizontally from all parts to this column, where the several currents meeting, and joining to rise, a whirl is naturally formed, in the same manner as a whirl is formed in a tub of water, by the descending fluid receding from all sides of the tub towards the hole in the centre.

And as the several currents arrive at this central rising column, with a considerable degree of horizontal motion, they cannot suddenly change it to a vertical motion; therefore as they gradually, in approaching the whirl, decline from right to curve or circular lines, so, having joined the whirl, they ascend by a spiral motion: in the same manner as the water descends spirally through the hole in the tub before mentioned.

Lastly, as the lower air nearest the surface is more rarified by the heat of the sun, it is more impressed by the current of the surrounding cold and heavy air which is to assume its place, and consequently its motion towards the whirl is swiftest, and so the force of the lower part of the whirl strongest, and the centrifugal force of its particles greatest. Hence the vacuum which incloses the axis of the whirl should be greatest near the earth or sea, and diminish gradually as it approaches the region of the clouds, till it ends in a point.

This circle is of various diameters, sometimes very large.

If the vacuum passes over water, the water may rise

in a body or column therein to the height of about 32 feet. This whirl of air may be as invisible as the air itself, though reaching in reality from the water to the region of cool air, in which our low summer thunder-clouds commonly float; but it will soon become visible at its extremities. The agitation of the water under the whirling of the circle, and the swelling and rising of the water in the commencement of the vacuum, renders it visible below. It is perceived above by the warm air being brought up to the cooler region, where its moisture begins to be condensed by the cold into thick vapour, and is then first discovered at the highest part, which being now cooled condenses what rises behind it, and this latter acts in the same manner on the succeeding body; where, by the contact of the vapours, the cold operates faster in a right line downwards, than the vapours themselves can climb in a spiral line upwards: they climb, however; and as by continual addition they grow denser, and by consequence increase their centrifugal force, and being risen above the concentrating currents that compose the whirl, they fly off, and form a cloud.

It seems easy to conceive, how, by this successive condensation from above, the spout appears to drop or descend from the cloud, although the materials of which it is composed are all the while ascending. The condensation of the moisture contained in so great a quantity of warm air as may be supposed to rise in a short time in this prodigiously rapid whirl, is perhaps sufficient to form a great extent of cloud; and the friction of the whirling air on the sides of the column may detach great quantities of its water, disperse them into drops, and carry them up in the spiral whirl mixed with the air. The heavier drops may indeed fly off, and fall into a shower about the spout; but much of it will be broken into vapour, and yet remain visible.

As the whirl weakens, the tube may apparently separate in the middle; the column of water subsiding, the superior condensed part drawing up to the cloud. The tube or whirl of air may nevertheless remain entire, the middle only becoming invisible, as not containing any visible matter.

Dr Stuart, in the Philosophical Transactions, says, "It was observable of all the spouts he saw, but more perceptible of a large one, that towards the end it began to appear like a hollow canal, only black in the borders, but white in the middle; and though it was at first altogether black and opaque, yet the sea-water could very soon after be perceived to fly up along the middle of this canal like smoke in a chimney."

When Dr Stuart's spouts were full charged, that is, when the whirling pipe of air was filled with quantities of drops and vapour torn off from the column, the whole was rendered so dark that it could not be seen through, nor the spiral ascending motion discovered; but when the quantity ascending lessened, the pipe became more transparent, and the ascending motion visible. The spiral motion of the vapours, whose lines intersect each other on the nearest and furthest side of this transparent part, appeared therefore to Stuart like smoke ascending in a chimney; for the quantity being still too great in the line of sight through the sides of the tube, the motion could not be discovered there, and so they represented the solid sides of the chimney.

Water.

Water
||
Watering.

Dr Franklin concludes by supposing a whirlwind or spout to be stationary, when the concurring winds are equal; but if unequal, the whirl acquires a progressive motion in the direction of the strongest pressure. When the wind that communicates this progression becomes stronger above than below, or below than above, the spout will be bent or inclined. Hence the horizontal process and obliquity of water-spouts are derived. See WHIRLWIND.

WATER-works, in general, denote all manner of machines moved by or employed in raising or sustaining water. See **HYDROSTATICS** including **HYDRAULICS**.

WATER-Works for entertainment. See **HYDROSTATICS**, chap. iv.

WATERFORD, a county of Ireland in the province of Munster, bounded on the west by the county of Cork; on the south by the ocean; on the north by the river Sure, which parts it from the county of Tipperary and Kilkenny; and on the east by its own haven, which parts it from the county of Wexford. Its greatest length, according to some, is 46 miles, but according to others only 38; and its breadth 24. It contains 259,000 acres, and six baronies. The members it sends to parliament are two knights for the shire, and two burgesses a-piece for Waterford city, Lismore, Dungarvan, and Tallagh.

Waterford, capital of the county of the same name, standing upon the river Sure, was first built by certain pirates of Norway, and hath been a bishop's-see ever since the year 1096, when these pirates, who had embraced Christianity, sent Malchus, a benedictine monk of Winchester, to be consecrated their bishop by Anselm, archbishop of Canterbury. Till it was eclipsed by Cork, it was accounted the second city in the kingdom for trade, wealth, and populousness, being situated on a fine harbour, defended by Duncannon fort on the east side. The soil, however, about it is barren, and the air thick. Many considerable privileges have been conferred upon it by the kings of England, as a reward for its constant fidelity, since it was first reduced by Richard earl of Pembroke. During the Irish rebellion it was in the hands of the rebels, who often made excursions from it, and committed great outrages; but Oliver Cromwell reduced it in 1650. The Popish party got possession of it also in 1689, and held it till after the battle of Boyne. Here is a fine cathedral; but the houses are generally of timber, and make but a mean appearance. The city drives a great trade, particularly with England, and ships of burden come up close to its fine key. Waterford haven extends near eight miles and a half from south to north, almost in a straight line, all the way deep and clear, and but little incumbered with rocks or sand. The city and its liberties make a distinct county. There is a citadel on the west side, and on the east a block-house and store-house. Waterford, jointly with Wexford, or Weisford, gives the title of earl to the earl of Suresbury in England, and is the county town.

WATERING, in the manufactures, is to give a lustre to stuffs, &c. by wetting them lightly with gum-water, and then passing them through the press or calender whether hot or cold. The gum-water ought to be pure, thin, and clear, otherwise the folds of the stuff will all stick together: the operation must also be performed when the water is very hot, that it may penetrate.

Waterland
||
Wave.

WATERLAND (Dr Daniel), a learned English divine who distinguished himself greatly in theological controversies, was born in 1683 at Wafely in Lincolnshire, of which place his father was rector. He had his academical learning at Magdalen college, Cambridge, where he drew up a useful tract which went through several editions, intitled, *Advice to a young Student, with a Method of Study for the first four years*. In 1713 he became master of the college, was soon after appointed chaplain to George I. and in 1720, preached the first course of lectures founded by Lady Moyer in defence of our Lord's divinity. He went through several promotions; and at the time of his death in 1740, was canon of Windsor, archdeacon of Middlesex, and vicar of Twickenham. Besides his controversial writings, he published two volumes of sermons.

WATTS (Dr Isaac), a learned and eminent dissenting minister, was born at Southampton in 1674, of parents eminent for piety, and considerable sufferers for conscience-sake. In 1690 he was sent up to London for academical education, under the tuition of the Rev. Mr Thomas Rowe; and in 1696 was himself engaged as tutor to the son of Sir John Hartopp, bart. at Stoke Newington. He began to preach in 1698, and met with general acceptance; and after officiating for three years as an assistant to the Rev. Dr Isaac Chauncy, he succeeded him in his pastoral charge in 1702, and continued to preside over that church as long as he lived. Though his whole income did not amount to an hundred a-year, he allotted one-third of it to the poor. He died in 1748. His numerous works have rendered his name famous among people of every denomination, both in this and other countries, and they have been translated into a variety of languages. His Lyric Poems, his Psalms and Hymns, and his divine Songs for Children, are a sufficient proof of his poetical talents, and have had an amazing number of editions. His logic and philosophy have been much admired. He also wrote works upon a variety of other subjects, and printed several volumes of his sermons. He was admired for the mildness and benevolence of his disposition, and the sweetness of his manners. After his death, his works were collected, and published in 6x volumes quarto.

WATLING-STREET. See **WAY**.

WAVE, in philosophy, a cavity in the surface of water, or other fluids, with an elevation aside thereof.

The waves of the sea are of two kinds, natural and accidental. The natural waves are those which are exactly proportioned in size to the strength of the wind, whose blowing gives origin to them. The accidental waves are those occasioned by the wind's reacting upon itself by repercussion from hills and mountains, or high shores, and by the washing of the waves themselves; otherwise of the natural kind, against rocks and shoals: all these cases give the waves an elevation, which they can never have in their natural state.

Mr Boyle has proved, by numerous experiments, that the most violent wind never penetrates deeper than six feet into the water; and it should seem a natural consequence of this, that the water moved by it can only be elevated to the same height of six feet from the level of the surface in a calm: and this six feet of elevation being added to the six of excavation,

Wave. in the part whence that water so elevated was raised, should give twelve feet for the utmost elevation of a wave. This is a calculation that does great honour to its author: for count Marfigi measured carefully the elevation of the waves near Provence, and found, that in a very violent tempest they arose only to seven feet above the natural level of the sea; and this additional foot in height he easily resolved into the accidental shocks of the water against the bottom, which was, in the place he measured them in, not so deep as to be out of the way of affecting the waves; and he allows that the addition of one-sixth of the height of a wave, from such a disturbance from the bottom, is a very moderate alteration from what would have been its height in a deep sea; and concludes, that Mr Boyle's calculation holds perfectly right in deep seas, where the waves are purely natural, and have no accidental causes to render them larger than their just proportion. In deep water, under the high shores of the same part of France, this author found the natural elevation of the waves to be only five feet; but he found also, that their breaking against rocks, and other accidents to which they were liable in this place, often raised them to eight feet high.

We are not to suppose, from this calculation, that no wave of the sea can rise more than six feet above its natural level in open and deep water; for waves immensely higher than these are formed in violent tempests in the great seas. This, however, are not to be accounted waves in their natural state; but they are single waves formed of many others: for in these wide plains of water, when one wave is raised by the wind, and would elevate itself up to the exact height of six feet, and no more, the motion of the water is so great, and the succession of the waves so quick, that, during the time this is rising, it receives into it several other waves, each of which would have been at the same height with itself; these run into the first wave, one after another, as it is rising; by this means its rise is continued much longer than it naturally would have been, and it becomes terribly great. A number of these complex waves arising together, and being continued in a long succession by the continuation of the storm, make the waves so dangerous to ships, which the sailors in their phrase call *mountain-high*.

Stilling WAVES by means of oil. This wonderful property, though well known to the ancients, as appears from the writings of Pliny, was for many ages either quite unnoticed, or treated as fabulous by succeeding philosophers. Of late it has, by means of Dr Franklin, again attracted the attention of the learned; though from some anecdotes it appears that the vulgar have always been acquainted with it. In Martin's description of the Western Islands of Scotland, we have the following passage: "The steward of Kilda, who lives in Pabbay, is accustomed, in time of a storm, to tie a bundle of puddings, made of the fat of sea-fowl, to the end of his cable, and lets it fall into the sea behind his rudder. This, he says, hinders the waves from breaking, and calms the sea." Mr Pennant in his *British Zoology*, vol. iv. under the article *Seal*, takes notice, that when these animals are devouring a very oily fish, which they always do under water, the waves above are remarkably smooth; and by this mark the fishermen know where to find them.

Wave. Sir Gilbert Lawton, who served long in the army at Gibraltar, assured Dr Franklin, that the fishermen in that place are accustomed to pour a little oil on the sea, in order to still its motion, that they may be enabled to see the oysters lying at its bottom, which are there very large, and which they take up with a proper instrument. A similar practice obtains among fishermen in various other parts, and Dr Franklin was informed by an old sea-captain, that the fishermen of Lisbon, when about to return into the river, if they saw too great a surf upon the bar, to empty a bottle or two of oil into the sea, which would suppress the breakers, and allow them to pass freely.

The Doctor having revolved in his mind all these pieces of information, became impatient to try the experiment himself. At last having an opportunity of observing a large pond very rough with the wind, he dropped a small quantity of oil upon it. But having at first applied it on the lee-side, the oil was driven back again upon the shore. He then went to the windward side, and poured on about a tea-spoonful of oil. This produced an instant calm over a space several yards square, which spread amazingly, and extended itself gradually till it came to the lee-side; making all that quarter of the pond, perhaps half an acre, as smooth as glass. This experiment was often repeated in different places, and always with success. Our author accounts for it in the following manner:

"There seems to be no natural repulsion between water and air, to keep them from coming into contact with each other. Hence we find a quantity of air in water; and if we extract it by means of the air pump, the same water again exposed to the air will soon imbibe an equal quantity.—Therefore air in motion, which is wind, in passing over the smooth surface of water, may rub as it were upon that surface, and raise it into wrinkles; which if the wind continues, are the elements of future waves. The smallest wave once raised does not immediately subside and leave the neighbouring water quiet; but in subsiding raises nearly as much of the water next to it, the friction of the parts making little difference. Thus a stone dropped in a pool raises first a single wave round itself, and leaves it, by sinking to the bottom; but that first wave subsiding raises a second, the second a third, and so on in circles to a great extent.

"A small power continually operating, will produce a great action. A finger applied to a weighty suspended bell, can at first move it but little; if repeatedly applied, though with no greater strength, the motion increases till the bell swings to its utmost height, and with a force that cannot be resisted by the whole strength of the arm and body. Thus the small first raised waves being continually acted upon by the wind, are, though the wind does not increase in strength, continually increased in magnitude, rising higher and extending their bases, so as to include a vast mass of water in each wave, which in its motion acts with great violence. But if there be a mutual repulsion between the particles of oil, and no attraction between oil and water, oil dropped on water will not be held together by adhesion to the spot whereon it falls; it will not be imbibed by the water; it will be at liberty to expand itself; and it will spread on a surface that, besides being smooth to the most perfect degree of polish, pre-

Waved. vents, perhaps by repelling the oil, all immediate contact, keeping it at a minute distance from itself; and the expansion will continue, till the mutual repulsion between the particles of the oil is weakened and reduced to nothing by their distance.

"Now I imagine that the wind blowing over water thus covered with a film of oil cannot easily catch upon it, so as to raise the first wrinkles, but slides over it, and leaves it smooth as it finds it. It moves a little the oil indeed, which being between it and the water, serves it to slide with, and prevents friction, as oil does between those parts of a machine that would otherwise rub hard together. Hence the oil dropped on the windward side of a pond produces gradually to leeward, as may be seen by the smoothness it carries with it quite to the opposite side. For the wind being thus prevented from raising the first wrinkles that I call the *elements of waves*, cannot produce waves, which are to be made by continually acting upon and enlarging those elements; and thus the whole pond is calmed.

"Totally therefore we might suppress the waves in any required place, if we could come at the windward place where they take their rise. This in the ocean can seldom if ever be done. But perhaps something may be done on particular occasions to moderate the violence of the waves when we are in the midst of them, and prevent their breaking where that would be inconvenient. For when the wind blows fresh, there are continually rising on the back of every great wave a number of small ones, which roughen its surface, and give the wind hold, as it were, to push it with greater force. This hold is diminished by preventing the generation of those small ones. And possibly too, when a wave's surface is oiled, the wind, in passing over it, may rather in some degree press it down, and contribute to prevent its rising again, instead of promoting it.

"This, as mere conjecture would have little weight, if the apparent effects of pouring oil into the midst of waves were not considerable, and as yet not otherwise accounted for.

"When the wind blows so fresh, as that the waves are not sufficiently quick in obeying its impulse, their tops being thinner and lighter are pushed forward, broken, and turned over in a white foam. Common waves lift a vessel without entering it; but these when large sometimes break above and pour over it, doing great damage.

"That this effect might in any degree be prevented, or the height and violence of waves in the sea moderated, we had no certain account; Pliny's authority for the practice of seamen in his time being slighted. But discoursing lately on this subject with his excellency count Bentinck of Holland, his son the honourable captain B-tinck, and the learned professor Allemand (to all whom I showed the experiment of smoothing in a windy day the large piece of water at the head of the Green Park), a letter was mentioned which had been received by the Count from Batavia, relative to the saving of a Dutch ship in a storm by pouring oil into the sea."

WAVED, in heraldry, is said of a bordure, or any ordinary or charge, in a coat of arms, having its outlines indented in manner of the rising and falling of waves: it is used to denote, that the first of the family

in whose arms it stands, acquired its honours for service.

WAVING, in the sea-language, is the making signs to a vessel to come near or keep off.

WAX, or *Bees-Wax*, in natural history, a firm and solid substance, moderately heavy, and of a fine yellow colour, formed by the bees from the farina of flowers. See *Apis*.

The best sort is that of a lively yellow colour, and an agreeable smell, somewhat like that of honey: when new, it is toughish, yet easy to break; but by age it becomes harder and more brittle, loses its fine colour, and in a great measure its smell.

From the common yellow wax, by the mere effect of sun and air, or by what is called *bleaching*, is formed what we term *white-wax*, and some very improperly *virgin wax*. The greater the surface is in proportion to the quantity, the sooner and more perfectly this operation is performed. The usual way is to melt the wax in hot water; when melted, they press it through a strainer of tolerable fine linen, and pour it into round and very shallow moulds. When hardened by cooling, it is taken out and exposed to the sun and air, sprinkling it now and then with water, and often turning it; by this means it soon becomes white. The best sort is of a clear and almost transparent whiteness, dry, hard, brittle, and of an agreeable smell, like that of the yellow wax, but much weaker.

The common yellow wax is of very great use both in medicine and in many of the arts and manufactures. It is sometimes given internally, as in dysenteries and other erosions of the intestines; but its great use is in the making ointments and plasters, and the greater part of those of the shops owe their consistence to it. The white wax is also an ingredient in some of the cerates and ointments of the shops; and is used in making candles, and in many of the nicer arts and manufactures where wax is required.

Sealing-Wax is made in the following manner: Take one pound of bees-wax; three ounces of fine turpentine: olive oil and rosin, finely powdered, of each one ounce: when they are well melted, and the dross taken off, put in an ounce and a half of vermilion, or red-lead, finely ground, and stir them together till they are well incorporated; and when this mixture grows a little cool, roll it into sticks, or in any other form. If you would have it black, instead of vermilion or red-lead, put in lamp-black. The soft, red, and green wax, used in large seals to some of our law-writings, are thus made: Melt bees-wax over a gentle heat, with such a proportion of Venice turpentine as, when cold, will give it the due consistence: this is determined by repeated trials, first putting in but little turpentine, and afterwards more and more, till by dropping a piece upon a marble to cool, it is found of the true consistence. They then colour it with red-lead, or vermilion, or with verditer, or whatever colours they please, the mixture in this state receiving any.

Wax-Work, the representation of the faces, &c. of persons living or dead; made by applying plaster of Paris in a kind of paste, and thus forming a mould containing the exact representation of the features. Into this mould melted wax is poured, and thus a kind of masks are formed; which being painted and set with glass eyes, and the figures dressed in their proper habits,

bits, they bear such a resemblance that it is difficult to distinguish between the copy and the original.

WAY, a passage or road.

The Roman ways are divided into consular, prætorian, military, and public; and of these we have four remarkable ones in England: the first, Watling-street, or Watling-freet, leading from Dover to London, Dunstable,oucester, Aterfton, and the Severn, extending as far as Angleica in Wales. The second, called *Hikeild*, or *Ikenild street*, stretches from Southampton over the river Iſis at Newbridge; thence by Camden and Litchfield; then passes the Derwent near Derby, and ends at Tinnmouth. The third, called *Eſſe-way*, because in some places it was never perfected, but lies as a large ditch, leads from Cornwall through Devonshire, by Tethbury, near Stow in the Wolds; and beside Coventry to Leicester, Newark, and so to Lincoln. The fourth, called *Erming*, or *Erminage-street*, extends from St David's, in Wales, to Southampton.

Way of a Ship, is sometimes the same as her rake, or run forward or backward: but this term is most commonly understood of her sailing.

Way-leaves, in the coal-business. See **COALERY**, p. 2030, col. 2.

Right of Ways, in law. This may be grounded on a special permission; as when the owner of the land grants to another a liberty of passing over his grounds, to go to church, to market, or the like: in which case the gift or grant is particular, and confined to the grantee alone; it dies with the person; and if the grantee leaves the country, he cannot assign over his right to any other; nor can he justify taking another person in his company. A way may be also by prescription; as if all the owners and occupiers of such a farm have immemorially used to cross another's ground; for this immemorial usage supposes an original grant, whereby a right of way thus appurtenant to land may clearly be created. A right of way may also arise by act and operation of law; for if a man grants me a piece of ground in the middle of his field, he at the same time tacitly and impliedly gives me a way to come at it; and I may cross his land for that purpose without trespass. For when the law doth give any thing to one, it giveth impliedly whatsoever is necessary for enjoying the same. By the law of the twelve tables at Rome, where a man had the right of way over another's land, and the road was out of repair, he who had the right of way might go over any part of the land he pleased: which was the established rule in public as well as private ways. And the law of England, in both cases, seems to correspond with the Roman.

Way-Wade, a title given to the governors of the chief places in the empire of Muscovy and in Poland.

WEANING. See **ABLACTATION**.

WEAR, or **WEER**, a great flank or dam in a river, fitted for the taking of fish, or for conveying the stream to a mill. New wears are not to be made, or others altered, to the nuisance of the public, under a certain penalty.

WEASEL, in zoology. See **MUSTELA**.

WEATHER, the state or disposition of the atmosphere with regard to heat, cold, wind, rain, frost, &c.

Weather-Cock, a moveable vane, in form of a cock, or other shape, placed on high, to be turned round ac-

cording to the direction of the wind, and point out the quarter from whence it blows.

WEATHER-Glasses. See **BAROMETER** and **THERMOMETER**.

WEATHERING, among sailors, signifies the doubling or sailing by a head-land or other place.

WEAVING, the art of working a web of cloth, silk, or other stuff, in a loom with a shuttle. For an idea of the manner in which this is performed, see **CLOTH**.

WEAVING Loom, a machine for weaving cloth, silk, &c. by raising the threads of the warp in order to throw in the shoot, and strike it close. Of these there are various kinds, distinguished by the different sorts of cloths, stuffs, silks, &c. in which they are employed; and which are chiefly distinguished by the number and variety of the threads they raise in order to work the warp, either plain or in figures, by making more or less of the woof or shoot appear through the warp. In order to give a general idea of weaving, we shall here describe the parts of the common weaver's loom. See plate CCCXI. fig. 2. in which 9, 9, are the loom-posts. 10. The cross-bars. 11. The batten; which serves to strike in, and close more or less the threads of the woof. 12. The cap of the batten, or a long bar, which the weaver takes hold of in one hand and then in the other. 13. The block, or under part of the same, containing the reed within the lower bar. 14. The cross-piece, or burdon and pin, which helps to make the batten moveable. 15. The gallews; a piece of wood suspending the pulley on which the cord moves that is tied to the two lams. 16. The breast-bar; a flat square piece of wood, with an opening in it to let the stuff through which is rolled on the knee-roll. 17. The cane-roll, which the warp is turned on at the other end of the loom. 18. The reed. 20. Pulleys, upon which the cords roll that are fastened to the lams. 21. The tumbler; which is a cord that passes from one lam to the other over the pulley 20, and causes the working of the lams by its ascending and descending. 22. The muffle in which the pulley acts. 23. A skain, or leish, cut into proper lengths, to mend the leashes of the harness that happen to break. 24. A bobbin of the warp, to mend the threads of the warp that occasionally break. 25. Lizard-thread, to mend those of the lizard that happen to break; and which, especially in cloth, are very different from the warp. 26. The box to hold the quills. 28. The foot-bar. 29. The trundles, or moveable bars, tied with two cords to the lower virge of each lam. When the foot presses a treadle, the lam that is fastened to it sinks, and the other rises by the help of the tumbler. 30. The foot-step. 31. The temple; a double flat ruler, having small teeth at the extremities; it may be lengthened or shortened by the help of a catch that is in one of the rulers, and introduced in a groove in the other ruler. The teeth in the extremities are fastened in the lizard of the work, by which means it is kept of an equal breadth; and as the work advances the temple is moved forwards. 32. The shuttle seen in front and profile. 33. The knee-roll, on which the work is rolled as it is wove. 34. The tantow; an iron lever to turn the knee-roll. 35. The reed seen separate.

WEB, a sort of tissue or texture formed of threads inter-

interwoven with each other; some whereof are extended in length, and called the *warps*; others are drawn across, and called the *wwoof*.

WECHER (Christian), a famous printer in Paris, before the middle of the 16th century. His editions were so extremely correct, that the errata of a folio volume did not sometimes contain above two faults; but he was brought into trouble in 1534, for having fold a book of Erasmus *De usu interdicti Carnium*, which had been censured by the faculty of divinity. According to father Garasse, he fell into poverty, by an immediate curse of God, for printing a book, in which the author endeavoured to prove that innocent children would not be eternally damned for dying without baptism.

WECHER (Christian and Andrew) two celebrated printers at Francfort, whose editions are correct and much esteemed. They were sons of the former, and owed this perfection of their art to the learned Frederic Sylburgius, corrector of their printing-house. Christian was living in 1552, and Andrew died in 1581. A catalogue of the books which proceeded from their presses was printed at Francfort, in 8vo, in 1590.

WEDGE, one of the mechanical powers. See MECHANICS.

WEDNESDAY, the fourth day of the week, so called from a Saxon idol named *Woden*, supposed to be Mars, worshipped on this day.

Ash-WEDNESDAY, the first day of Lent, so called from the custom observed in the ancient Christian church of penitents expressing their humiliation at this time, by appearing in sackcloth and ashes.

WEED, a common name for all rank and wild herbs, that grow of themselves, to the detriment of other useful herbs they grow among.

WEED, in the miners language, denotes the degeneracy of a load or vein of fine metal into an useless marcadite.

WEEK, in chronology, a division of time comprising seven days. See ASTRONOMY.

Passion-WEEK, or the *Holy WEEK*, is the last week in Lent, wherein the church celebrates the mystery of our Saviour's death and passion.

WECK or **WYCK**, in geography, a parliament and port-town of Scotland, in the shire of Caithness. W. Long. 2. 45. N. Lat. 58. 40.

WEEVER, in ichthyology. See TRACHINUS.

WEIGH, a weight of cheefe, wool, &c. containing 256 pounds averdupois. Of corn, the weigh contains 40 bushels; of barley or malt, six quarters. In some places, as Essex, the weight of cheefe is 300 pounds.

WEIGHING, the act of examining a body in the balance to find its weight.

WEIGHING anchor, is the drawing it out of the ground it had been cast into, in order to set fail, or quit a port, road, or the like.

WEIGHT, in physics, a quality in natural bodies, whereby they tend downwards towards the centre of the earth. Or, weight may be defined in a less limited manner, to be a power inherent in all bodies whereby they tend to some common point, called the *centre of gravity*; and that with a greater or less velocity, as they are more or less dense, or as the medium

they pass through is more or less rare. See MECHANICS.

WEIGHT in commerce, denotes a body of a known weight appointed to be put in the balance against other bodies whose weight is required.

The security of commerce depending, in good measure, on the justness of weights, which are usually of lead, iron, or brass, most nations have taken care to prevent the falsification thereof, by stamping or marking them by proper officers, after being adjusted by some original standard. Thus, in England, the standard of weights is kept in the exchequer by a particular officer, called the *clerk of the market*.

Weights may be distinguished into ancient and modern, foreign and domestic.

Ancient WEIGHTS, 1. Those of the ancient Jews, reduced to the English Troy weights, will stand as in the following table:

		lb.	oz.	dwt.	gr.
Shekel	-	-	0	0	9 $\frac{2}{3}$
60	Manch	-	2	3	6 $\frac{10}{12}$
3000	50 Talent	-	113	10	1 $\frac{10}{12}$

2. Grecian and Roman weights, reduced to English Troy weight; will stand as in the following table:

			oz.	dwt.	gr.
Lentes	-	-	0	0	0 $\frac{1}{12}$
4	Siliqua	-	0	0	3 $\frac{1}{2}$
12	3 Obolus	-	0	0	9 $\frac{1}{2}$
24	6 2 Scriptorium	-	0	0	18 $\frac{1}{2}$
72	18 6 3 Drachma	-	0	2	6 $\frac{1}{2}$
96	24 8 4 1 $\frac{1}{2}$ Sextula	-	0	3	0 $\frac{1}{2}$
144	36 12 6 2 1 $\frac{1}{2}$ Siciliens	-	0	4	13 $\frac{1}{2}$
192	48 16 8 2 $\frac{1}{2}$ 1 $\frac{1}{2}$ Dactyla	-	0	6	1 $\frac{1}{2}$
576	144 48 24 8 6 4 3 Uncia	-	0	18	5 $\frac{1}{2}$
6912	1728 576 288 96 72 48 36 24 12 6 3 1 Libra	-	10	18	13 $\frac{1}{2}$

The Roman ounce is the English averdupois ounce, which they divided into 7 denarii, as well as 8 drachms; and since they reckoned their denarius equal to the Attic drachm, this will make the Attic weights one eighth heavier than the corresponding Roman weights.

Modern European WEIGHTS. 1. English weights: by the 27th chapter of *magna carta*, the weights all over England are to be the same; but for different commodities there are two different sorts, viz. Troy weight and averdupois weight. The origin from which they are both raised, is a grain of wheat gathered in the middle of the ear.

In Troy weight, 24 of these grains make a penny-weight sterling; 20 penny-weights make 1 ounce; and 12 ounces 1 pound. See TROY.

By this weight we weigh gold, silver, jewels, grains, and liquors. The apothecaries also use the Troy pound, ounce,

Weight. ounce, and grain; but they differ from the rest in the intermediate divisions. They divide the ounce into 8 drachms, the drachm into 3 scruples, and the scruple into 28 grains. See ARITHMETIC, p. 655.

In averduois weight, the pound contains 16 ounces, but the ounce is less by near one-twelfth than the Troy ounce; this latter containing 490 grains, and the former only 448. The ounce contains 16 drachms. Eighty ounces averduois are only equal to 73 ounces Troy; and 17 pounds Troy equal to 14 pounds averduois. See AVERDUOIS.

By this weight are weighed mercury and grocery wares, base metals, wool, tallow, hemp, drugs, bread, &c. See ARITHMETIC, p. 655.

The moneyers, jewellers, &c. have a particular class of weights for gold and precious stones, viz. carat and grain; and for silver, the penny-weight and grain. See the article CARACT.

The moneyers have also a peculiar subdivision of the grain Troy: Thus,

The	{	Grain	into	{	20 Mites.
					24 Droits.
					20 Perits.
					24 Blanks.

The dealers in wool have likewise a particular set of weights, viz. the sack, weigh, tod, stone, and clove.

2. French weights: The common or Paris pound is 16 ounces; which they divide two ways: the first division is into 2 marcs; the marc into 8 ounces; the ounce into 8 gros; the gros into 3 penny-weights; the penny-weight into 24 grains; the grain equivalent to a grain of wheat. The second division of the pound is into 2 half-pounds; the half-pound into 2 quarters; the quarter into 2 half-quarters; the half-quarter into 2 ounces; and the ounce into 2 half-ounces.

The weights of the first division are used to weigh gold, silver, and the richer commodities; and the weights of the second division for commodities of less value.

Grains.

24	Penny-weight.			
72	3	Gros.		
576	24	8	Ounce.	
4608	192	64	8	Marc.
9216	384	128	16	Pound.

Half-ounce.

2	Ounce.				
4	2	Half-quarter pound			
8	4	2	Quarter-pound.		
16	8	4	2	Half-pound.	
32	16	8	4	Pound.	
3200	1600	800	400	100	Quintal.

But the pound is not the same throughout France.

At Lyons, *e. gr.* the city pound is only 14 ounces: so that 100 Lyons pounds make only 88 Paris pounds. But beside the city pound, they have another at Lyons for silk, containing 16 ounces. At Tholouse, and throughout the Upper Languedoc, the pound is 13 ounces and a half of Paris weight. At Marseilles, and throughout Provence, the pound is 13 ounces of Paris weight. At Rouen, beside the common Paris pound and marc, they have the weight of the vicomte; which is 16 ounces, a half, and five-sixths of the Paris weight. The weights enumerated under the two articles of English and French weights, are the same that are used throughout the greatest part of Europe; only under somewhat different names, divisions, and proportions.

Particular nations have also certain weights peculiar to themselves: thus; Spain has its arrobas, containing 25 Spanish pounds, or one-fourth of the common quintal; its quintal macho, containing 150 pounds, or one-half common quintal, or 6 arrobas; its aldarne, containing one-sixteenth of its ounce. And for gold, it has its castellan, or one-hundredth of a pound. Its tomin, containing 12 grains, or one-eighth of a castilian. The same are in use in the Spanish West Indies.

Portugal has also its arroba, containing 32 Lisbon arratels, or pounds: Savary also mentions its faratelle, containing 2 Lisbon pounds; and its rottoli, containing about 12 pounds. And for gold, its chego, containing 4 carats. The same are used in the Portuguese East Indies.

Italy, and particularly Venice, have their migliaro, containing 4 mirres; the mirre containing 30 Venice pounds: the faggio, containing a sixth part of an ounce. Genoa has five kinds of weights, viz. large weights, whereby all merchandises are weighed at the custom-house; cash weights, for piasres and other species; the cantara, or quintal, for the coarsest commodities; the large balance for raw silks; and the small balance for the finer commodities. Sicily has its rottola, 32 and a half pounds of Messina.

Germany, Flanders, Holland, the Hanse towns, Sweden, Denmark, Poland, &c. have their schippont, which at Antwerp and Hamburg, is 300 pounds; at Lubeck, 320; and at Coningberg, 400 pounds. In Sweden, the schippont for copper is 320 pounds; and the schippont for provisions 400 pounds. At Riga and Revel, the schippont is 400 pounds; at Dantzic, 340 pounds; in Norway, 300 pounds; at Amsterdam, 300; containing 20 lyspondts, each weighing 15 pounds.

In Muscovy, they weigh their large commodities by the bercheroff, or berkewits, containing 400 of their pounds. They have also the poet, or poede, containing 40 pounds, or one-tenth of the bercheroff.

In order to show the proportion of the several weights used throughout Europe, we shall add a reduction of them to one standard, viz. the London and Amsterdam pound.

I. Proportion of the weights of the principal places of Europe.

The 100 lb. of England, Scotland, and Ireland are equal to

1b oz.	
91	8 of Amsterdam, Paris, &c.
96	8 of Antwerp or Brabant.

Weights.

lb	oz.
88	0 of Rouen, the viscounty weight.
106	0 of Lyons, the city weight.
90	9 of Rochelle.
107	11 of Tholouse and Upper Languedoc.
113	0 of Marseilles or Provence.
81	7 of Geneva.
93	5 of Hamburg.
89	7 of Francfort, &c.
96	1 of Leipzig, &c.
137	4 of Genoa.
132	11 of Leghorn.
153	11 of Milan.
152	0 of Venice.
154	10 of Naples.
97	0 of Seville, Cadiz, &c.
104	13 of Portugal.
96	5 of Leige.
112	$\frac{1}{2}$ of Russia.
107	$\frac{1}{2}$ of Sweden.
89	$\frac{1}{2}$ of Denmark.

II. Proportion of the weights of the chief cities in Europe to those of Amsterdam.

An 100 pounds of Amsterdam are equal to

lb	
108	of Alicant.
105	of Antwerp.
120	of Archangel, or 3 poedes.
105	of Arschor.
120	of Avignon.
98	of Basil in Switzerland.
100	of Bayonne in France.
166	of Bergamo.
97	of Bergen-op-zoom.
95 $\frac{1}{2}$	of Bergen in Norway.
111	of Bern.
100	of Befançon.
100	of Bilbao.
105	of Bois-le-duc.
151	of Bologna.
100	of Bourdeaux.
104	of Bourg en Bresse.
103	of Bremen.
125	of Breslaw.
105	of Bruges.
105	of Brussels.
105	of Cadiz.
105	of Cologne.
125	of Coningsberg.
107 $\frac{1}{2}$	of Copenhagen.
87	rotto of Constantinople.
113 $\frac{1}{2}$	of Dantzic.
100	of Dort.
97	of Dublin.
97	of Edinburgh.
143	of Florence.
98	Francfort on the Maine.
105	of Gaunt.
89	of Geneva.
163	of Genoa, cash weight.
102	of Hamburg.
106	of Leyden.
105	of Leipzig.
105 $\frac{1}{2}$	of Liege.
114	of Lule.

Weights

lb	
143	of Leghorn.
106 $\frac{1}{2}$	of Lisbon.
109	of London, averdupois weight.
105	of Lovane.
105	of Lubec.
141 $\frac{1}{2}$	of Lucca, light weight.
116	of Lyons, city weight.
114	of Madrid.
105	of Marlines.
123 $\frac{1}{2}$	of Marseilles.
154	of M ^a fina, light weight.
168	of Milan.
120	of Montpelier.
125	bercheroots of Muscovy.
100	of Nantes.
106	of Nancy.
169	of Naples.
98	of Nuremberg.
100	of Paris.
112 $\frac{1}{2}$	of Revel.
109	of Riga.
100	of Rochelle.
146	of Rome.
100	of Rotterdam.
96	of Rouen, viscounty weight.
100	of St Malo.
100	of St Sebastian.
158 $\frac{1}{2}$	of Saragosa.
106	of Seville.
114	of Smyrna.
110	of Stetin.
81	of Tholouse and Upper Languedoc.
151	of Turin.
158 $\frac{1}{2}$	of Valencia.
182	of Venice, small weight.

WEIGHTS used in the several parts of Asia, the East Indies, China, Persia, &c. In Turkey, at Smyrna, &c. they use the batman, or battemant, containing six octos; the octo weighing 3 pounds four-fifths English. They have another batman much less, consisting, as the former, of six octos; but the octo only containing 15 ounces English: 44 octos of the first kind make the Turkish quintal. At Cairo, Alexandretta, Aleppo, and Alexandria, they use the rotto, rotton, or rottoli. The rottoli at Cairo, and other parts of Egypt, is 144 drachms; being somewhat over an English pound. At Aleppo there are three sorts of rottos: the first 720 drachms, making about 7 pounds English, and serving to weigh cottons, galls, and other large commodities; the second is 624 drachms, used for all silks but white ones, which are weighed by the third rotto of 700 drachms. At Seyda the rotto is 600 drachms.

The other ports of the Levant not named here, use some of these weights; particularly the occa, or occua, the rottoli, and rotto.

The Chinese weights are the piece, for large commodities; it is divided into 100 catis, or cattis; tho' some say into 125; the cati into 16 taels, or tales; each tael equivalent to 1 $\frac{1}{4}$ of an ounce English, or the weight of 1 rial and $\frac{1}{2}$, and containing 12 mas, or masses, and each mas 10 condrens. So that the Chinese piece amounts to 137 pounds English averdupois, and the cati to 1 pound 8 ounces. The picol for silk

con-

light. containing 66 catis and $\frac{1}{2}$; the bahar, bakaire, or barr, containing 300 catis.

Tonquin has also the same weights, measures, &c. as China. Japan has only one weight, viz. the cati; which however is different from that of China, as containing 20 taels. At Surat, Agra, and throughout the states of the Great Mogul, they use the man, or maund, whereof they have two kinds; the king's man, or king's weight; and the man simply; the first used for the weighing of common provisions, containing 40 seers, or ferres; and each seer a just Paris pound. The common man, used in the weighing of merchandise, consists likewise of 40 seers, but each seer is only estimated at 12 Paris ounces, or $\frac{1}{2}$ of the other seer.

The man may be looked on as the common weight of the East Indies, though under some difference of name, or rather of pronunciation; it being called *nao* at Cambaya, and in other places *mein*, and *maun*. The seer is properly the Indian pound, and of universal use; the like may be said of the bahar, tael, and cati, above-mentioned.

The weights of Siam, are the piece, containing two shans or cattis; but the Siamese cati is only half the Japonese, the latter containing 20 taels, and the former only 10; though some make the Chinese cati only 16 taels, and the Siamese 8. The tael contains 4 baats or ticals, each about a Paris ounce; the baat 4 felings or mayons; the mayon 2 fouangs; the fouang 4 payes; the paye 2 clams; the fompaye half a fouang.

It is to be observed, that those are the names of their coins as well as weights; silver and gold being commodities there sold, as other things, by their weights.

In the isle of Java, and particularly at Bantam, they use the gantan, which amounts to near 3 Dutch pounds. In Golconda, at Visapour, and Goa, they have the furatelle, containing 1 pound 14 ounces English; the mangalis, or mangelin, for weighing diamonds and precious stones, weighing at Goa 5 grains, at Golconda, &c. $5\frac{1}{2}$ grains. They have also the rotolo, containing $14\frac{1}{2}$ ounces English; the metrical, containing the sixth part of an ounce; the wall for piastras and ducats, containing the 73d part of a rial.

In Persia they use two kinds of batmans or mans; the one called *cabi* or *cheray*, which is the king's weight, and the other *batman* of *Tauris*. The first weighs 13 pounds 10 ounces English; the second $6\frac{1}{2}$ pounds. Its divisions are the ratel, or a 16th; the derhem, or drachm, which is the 50th; the melschal, which is half the derhem; the dung, which is the 6th part of the melschal, being equivalent to 6 carat-grains; and, lastly, the grain, which is the fourth part of the dung. They have also the vakie, which exceeds a little our ounce; the sah-cheray, equal to the 1170th part of the derhem; and the toman, used to weigh out large payments of money without telling; its weight is that of 50 abassis.

African and American WEIGHTS. We have little to say as to the weights of America: the several European colonies there making use of the weights of the states or kingdoms of Europe they belong to. For as to the aroue of Peru, which weighs 27 pounds, it is evidently no other than the Spanish arroba with a little difference in the name.

As to the weights of Africa, there are few places

that have any, except Egypt, and the countries bordering on the Mediterranean; whose weights have been already enumerated among those of the ports of the Levant. The island of Madagascar indeed has weights, but none that exceed the drachm; nor are they used for any thing but gold and silver.

Regulation of WEIGHTS and Measures, is a branch of the king's prerogative. See PREROGATIVE, (and MEASURES in the APPENDIX.)

These, for the advantage of the public, ought to be universally the same throughout the kingdom; being the general criterions which reduce all things to the same or an equivalent value. But as weight and measure are things in their nature arbitrary and uncertain, it is therefore expedient that they be reduced to some fixed rule or standard: which standard it is impossible to fix by any written law or oral proclamation; for no man can, by words only, give another an adequate idea of a foot-rule, or a pound weight. It is therefore necessary to have recourse to some visible, palpable, material standard; by forming a comparison with which, all weights and measures may be reduced to one uniform size; and the prerogative of fixing this standard, our ancient law vested in the crown, as in Normandy it belonged to the duke. This standard was originally kept at Winchester: and we find in the laws of king Edgar, near a century before the conquest, an injunction that the one measure, which was kept at Winchester, should be observed throughout the realm. Most nations have regulated the standard of measures of length by comparison with the parts of the human body; as the palm, the hand, the span, the foot, the cubit, the ell (*ulna* or arm), the pace, and the fathom. But as these are of different dimensions in men of different proportions, our ancient historians inform us, that a new standard of longitudinal measure was ascertained by king Henry the First; who commanded that the *ulna* or ancient ell, which answers to the modern yard, should be made of the exact length of his own arm. And one standard of measures of length being gained, all others are easily derived from thence; those of greater length by multiplying, those of less by dividing, that original standard. Thus, by the statute called *compositio ulnarum et perticarum*, five yards and an half make a perch; and the yard is subdivided into three feet, and each foot into 12 inches; which inches will be each of the length of three grains of barley. Superficial measures are derived by squaring those of length; and measures of capacity by cubing them. The standard of weights was originally taken from corns of wheat, whence the lowest denomination of weights we have is still called a *grain*; 32 of which are directed, by the statute called *compositio mensurarum*, to compose a penny-weight, whereof 20 make an ounce, 12 ounces a pound, and so upwards. And upon these principles the first standards were made; which, being originally so fixed by the crown, their subsequent regulations have been generally made by the king in parliament. Thus, under king Richard I. in his parliament holden at Westminster, A. D. 1197, it was ordained that there should be only one weight and one measure throughout the kingdom, and that the custody of the office or standard of weights and measures should be committed to certain persons in every city and borough; from whence the ancient

Weight.

office of the king's aulnager seems to have been derived; whose duty it was, for a certain fee, to measure all cloths made for sale, till the office was abolished by the statute 11th and 12th William III. c. 20. In king John's time this ordinance of king Richard was frequently dispensed with for money; which occasioned a provision to be made for enforcing it, in the great charters of king John and his son. These original standards were called *pondus regis*, and *mensura domini regis*, and are directed by a variety of subsequent statutes to be kept in the exchequer chamber, by an officer called the *clerk of the market*, except the wine gallon, which is committed to the city of London, and kept in Guildhall.

The *Scottish* standards are distributed among the oldest boroughs. The elwand is kept at Edinburgh, the pint at Stirling, the pound at Lanark, and the first at Linlithgow.

Various statutes have been enacted for regulating and enforcing an uniformity of weights and measures; and by the articles of union, the English standards are established by law over all Great Britain. But the force of custom is so strong, that these statutes have been illobserved. The *Scottish* standards are still universally retained for many purposes; and likewise a variety of local weights and measures are used in particular places of both countries, which differ from the general standards of either.

1. *English Troy WEIGHT* is the most ancient of the different kinds used in Britain. See the article *Troy*. See also *ARITHMETIC*, p. 655, Tab. III. IV. the former exhibiting the divisions used by goldsmiths, the latter those used by apothecaries.—Goldsmiths in Scotland sometimes divide the ounce into 16 drops, and the drop into 30 grains; but in all these ways the ounce and grain is the same, and the ounce contains 480 grains.

A carat is a weight of 4 grains; but when the term is applied to gold, it denotes the degree of fineness. Any quantity of gold is supposed divided into 24 parts. If the whole mass be pure gold, it is said to be 24 carats fine; if there be 23 parts of pure gold, and 1 part of base metal or alloy, it is said to be 23 carats fine, and so on.

Pure gold is too soft to be used for coin. The standard coin of this kingdom is 22 carats fine. A pound of standard gold is coined into 44½ guineas, and therefore every guinea should weigh 5 dwts. 9²⁰/₁₀₀ grains; but as some allowance must be made for wearing, guineas not under 5 dwts. 8 gr. and half guineas not under 2 dwts. 16 gr. cannot be refused in payment.

A Joannes should weigh 9 dwts. 6 gr. Other Portugal pieces in proportion.

A pound of standard silver for coin contains 11 ounces 2 dwts. pure silver, and 18 dwts. alloy: standard silver-plate, 11 ounces pure silver, and 1 ounce alloy. A pound of silver is coined into 62 shillings; therefore the weight of a shilling should be 3 dwts. 20¹¹/₁₆ grains.

The value of a pound of gold, when coined at the mint-price, is L.46 : 14 : 6, and the value of a pound of silver L. 3. 2s.; but the current price of bullion varies like that of other commodities, according to the scarcity or demand.

About the time of the Norman conquest, 1 lb. of Silver was coined into 20 shillings, and made L. 1 of

the current money of the realm. The value of the coin was afterwards lessened by degrees; and at present a pound sterling in silver does not contain one third part of that quantity. The sums of money mentioned in the earlier part of the English history, must be understood according to the state of the coin which was current at the time. They may be reduced to money of our present standard by the help of the following table; which exhibits the number of shillings coined from 1 lb. of silver, and the value of 20 of these shillings in our present money.

Years.	Reigns.	Shill. coined from 1 lb.	Value of 10s.
1066	Will. I.	21 s 4 d	L. 2 18 1½
1087	Will. II.	20 s	3 2 —
1300	Edward I.	20 s 3 d	3 1 2½
1305	Richard II.	25 s	2 9 7½
1412	Henry IV.	32 s	1 18 9
1422	Henry V.	37 s 6 d	1 13 ¼
1426	Henry VI.	30 s	2 1 4
1461	Edward IV.	37 s 6 d	1 13 ¾
1505	Henry VII.	40 s	1 11 —
1509	Henry VIII.	45 s	1 7 6½
1543	Ditto	48 s	1 3 3½
1560	Elizabeth	60 s	1 — 8
1601	Ditto	62 s	1 — —

This table will enable the reader to compare the old prices of provisions and other commodities with the present. He will find that the prices of corn about the time of the Norman conquest was only about one tenth of the present price, and cattle were still cheaper in proportion.

It appears, by a household-book composed by the earl of Northumberland in the year 1512, that wheat was about 6s. 2 d. per quarter, malt 4s. oats 2s. a lean ox 8s. a fat ox 13s. 4d. a sheep 1s. 8d. a hog 2s. a hen 2d. a goose 3d. French wine L. 4 : 13 : 4 per ton, an ell of linen 8d. a chaldre of coals 4s. 2 d. The weight of the coin was then one third more than at present.

The prices of commodities increased slowly before the discovery of America. In the 16th century, when great quantities of gold and silver were brought from the Spanish colonies in America, the value of these metals diminished of course, and prices rose quickly, and have since continued to increase. The price of corn was formerly much more unequal than at present. A scarcity in any particular country had worse effects, because commerce was not so regular. During a dearth in Queen Elizabeth's time, wheat rose to upwards of L. 4 per quarter.

2. *Averdupois WEIGHT* was afterwards brought into England. It owed its introduction to the practice of foreign merchants, but was afterwards established by law, and is now generally known by the name of *English weight*. The denominations used in this weight are contained in Table II. (*ARITHMETIC*, p. 655.) and are better adapted for bulky commodities, as those of *Troy weight* are for minute and valuable ones. The pound *avverdupois* contains 7000 grains *Troy*. The ounce was formerly divided into eight drachms, and the drachm into three scruples; but the present division of the ounce is into sixteen drops or drachms.

This weight is used in Scotland in collecting the revenue, and in selling leather, tallow, soap, flour, bread,

bread, candle, groceries, rosin, wax, pitch, wrought metals, some Baltic goods, and all goods brought from England. It is appointed by the articles of Union as the general weight through Great Britain; but has not been adopted in Scotland, except for the above mentioned commodities.

The following table is used for wool weight :

7 lb = clove	6½ tods = 1 wey
2 cloves = 1 stone	2 weys = 1 sack
2 stones = 1 tod	12 sacks = 1 last
56 lb. old hay, or 60 lb. new hay, make a truss	
36 trusses make a load	
19½ cwt. lead make a fodder	
14 lb. make a stone, horseman's weight	
5 lb. glass a stone	
14 oz. butcher-meat, in most places, make 1 lb.	

3. *Trene* WEIGHT. See *TRONE*.

WEIMAR, a town of Upper Saxony, and in the territory of Thuringia, with a magnificent castle, wherein the duke resides. It is seated on the river Ilm, 20 miles north-east of Erfurt, and ten west of Jena. It is the capital of the duchy of Sax-Weimar. E. Long. 11. 18. N. Lat. 50. 10.

WELBY (Henry), a singular gentleman, was a native of Lincolnshire, where he had an estate of above 1000 pounds a year. He possessed, in an eminent degree, the qualifications of a gentleman. Having been a competent time at the university and the Inns of Court, he completed his education by making the tour of Europe. He was happy in the love and esteem of his friends, and indeed of all that knew him, as his heart was warm, and the virtues of it were conspicuous from his many acts of humanity, benevolence, and charity. When he was about 40 years of age, his brother, an abandoned profligate, made an attempt upon his life with a pistol; which not going off, he wrested it from his hands, and found it charged with a double bullet. Hence he formed a resolution of retiring from the world; and taking a house in Grubstreet, he reserved three rooms for himself; the first for his diet, the second for his lodging, and the third for his study. In these he kept himself so closely retired, that for 44 years he was never seen by any human creature, except an old maid that attended him, who had only been permitted to see him in some cases of great necessity. His diet was constantly bread, water-gruel, milk, and vegetables, and when he indulged himself most, the yolk of an egg. He bought all the new books that were published; most of which, upon a slight examination, he rejected. His time was regularly spent in reading, meditation, and prayer. No Carthusian monk was ever more constant and rigid in his abstinence. His plain garb, his long and silver beard, his mortified and venerable aspect, bespoke him an ancient inhabitant of the desert, rather than a gentleman of fortune in a populous city. He expended a great part of his income in acts of charity, and was very inquisitive after proper objects. He died the 29th of October 1636, in the 84th year of his age, and lies buried in St Giles's church, near Cripplegate. The old maid-servant died but six days before her master. He had a very amiable daughter, who married Sir Christopher Hilliard, a gentleman of Yorkshire; but neither she, nor any of her family, ever saw her father after his retirement.

WELD, or **WOLD**, in botany. See **RESEDA**.

WELDING-HEAT in smithery, a degree of heat given to iron, &c. sufficient only for bending or doubling it up.

Welding
||
Weld.

WELL, a hole under ground, usually of a cylindrical figure, and walled with stone and mortar: its use is to collect the water of the strata around it.

WELL, an apartment formed in the middle of a ship's hold to inclose the pumps, from the bottom to the lower deck. It is used as a barrier to preserve those machines from being damaged by the friction or compression of the materials contained in the hold, and particularly to prevent the entrance of ballast, &c. by which the tubes would presently be choked, and the pumps rendered incapable of service. By means of this inclosure, the artificers may likewise more readily descend into the hold, in order to examine the state of the pumps, and repair them, as occasion requires.

WELL of a *Fishing vessel*, an apartment in the middle of the hold, which is entirely detached from the rest, being lined with lead on every side, and having the bottom thereof penetrated with a competent number of small holes, passing also through the ship's floor; so that the salt-water running into the well is always kept as fresh as that in the sea, and yet prevented from communicating itself to the other parts of the hold.

WELL-room of a *Boat*, the place in the bottom where the water lies, between the ceiling and the platform of the stern-sheets, from whence it is thrown out into the sea with a scoop.

Burning-WELL. See **BURNING** *Well*.

WELLS, a city of Somersetshire, and see of a bishop; the bishop of Bath being also that of Wells. —It is supposed to take its name from the many springs and wells that are near it. It is not very large; but is adorned with handsome buildings, both public and private. Its cathedral is a very beautiful structure, adorned with images and carved stone-work. The bishop's palace joins to the cathedral; and on the other side are the houses for the prebendaries. In the market-place is a fine market-house, supported by pillars. It is governed by a mayor, and sends two members to parliament. The chief manufacture is knit hose. W. Long. 2. 35. N. Lat. 51. 20.

WEN, a tumour or excrescence arising on different parts of the body, and containing a cythus or bag filled with some peculiar kind of matter. See **NÆVUS**.

WERGILD, the price of *homicide*; paid partly to the king for the loss of a subject, partly to the lord whose vassal he was, and partly to the next of kin of the person slain.

WEST (Gilbert), was the son of Dr West, prebendary of Winchester, and chaplain to king George I. but at 12 years of age lost his father. He studied at Winchester and Eton schools, and from thence was placed in Christ-church college, Oxford. His studious and serious turn inclined him to take orders; but lord Cobham, his uncle, diverted him from that pursuit, and gave him a cornetcy in his own regiment. This profession he soon quitted, on account of an opening of another nature, which presented him a flattering prospect of advancement in life. A number of young gentlemen were to be elected from the universities, and, at the expense of the government, were to be taught foreign languages, and then sent to the secretaries office, to be initiated into

business,

West,
Westmin-
ster.

business, and trained there for public services, as envoys, ambassadors, &c. Mr Gilbert West was one of the few pitched upon; and on his first introduction into that office, lord Townsend, secretary of state, treated him with singular marks of regard, and the strongest inclinations to serve him were testified from all quarters. But his uncle lord Cobham's strong opposition to the measures of the government, rendered these advantages entirely fruitless; and the ministers honestly told Mr West, that he must not expect them to distinguish his merit, as any favours conferred upon him would be imputed as done to his uncle lord Cobham. Mr West now left that office, and all his views of making his fortune; and entering into marriage, retired to Wickam in Kent, where he lived in great domestic comfort and tranquil happiness. He was there visited by his valuable friends, who held the most delightful converse of wit, humour, and learning, supported upon the principles of virtue, sound reasoning, and solid friendship, which rendered the whole cheerful, animating, and instructive. Mr William Pitt, who was one of those that composed this happy society, becoming paymaster, appointed Mr West treasurer to Chelsea-hospital; and he obtained a seat at the council-board, in consequence of a friendship contracted at school with one of the duke of Devonshire's sons, who procured for his grace his being nominated one of the clerks extraordinary of that office. Towards the latter part of Mr West's life, he wholly applied himself to the study of the scriptures, being extremely anxious to try his utmost endeavours to reconcile the seeming inconsistencies which gave the enemies to revealed religion a handle to doubt and discredit their authenticity. His works bear testimony to his worth and learning. He had a mind replete with virtue, and was an honour to his country; but died at 50 years of age.

WEST, one of the cardinal points of the horizon, diametrically opposite to the east; and strictly defined the intersection of the prime vertical with the horizon on that side the sun sets in.

WESTMINSTER, a city which forms the west part of the capital of Britain, but has a government distinct from the rest. This city had its name from the situation of its abbey, anciently called a *minster*, in respect of that of St Paul. That part properly called the city of Westminster, comprehending the parishes of St John and St Margaret, was once an island formed by the Thames, called *Thorney island*, from the thorns with which it was over-run; and the abbey that stood in it, Thorney-abbey. The liberties of Westminster contain the several parishes of St Martin in the Fields, St James's, St Anne, St Paul, Covent-garden, St Mary le Strand, St Clement, Danes, St George, Hanover-square, and the precinct of the Savoy. The government, both of the city and liberties, is under the jurisdiction of the dean and chapter of Westminster, in civil as well as ecclesiastical affairs; and their authority extends to the precinct of St Martin le Grand, by Newgate-street, and in some towns of Essex, that are exempted from the jurisdiction of the bishop of London and the archbishop of Canterbury; but the management of the civil part has, ever since the Reformation, been in the hands of laymen, elected from time to time, and confirmed by the dean

and chapter. The chief of these laymen are the high-steward, the deputy-steward, and the high-bailiff, who hold their offices for life. There are also 16 burgesses and their assistants, out of which are elected two head-burgesses, one for the city, and the other for the liberties. Another officer is the high-constable, who has all the other constables under his direction.

WESTMORELAND, a small inland county of England, bounded on the east by part of Yorkshire, and the bishopric of Durham; on the south by Lancashire; and on the west and north by Cumberland. It extends 30 miles in length, and 24 in breadth, comprehending 32 parishes, eight market towns, a considerable number of villages, about 7000 houses, and about 35000 inhabitants. It is divided into the two great baronies of Westmoreland and Kendal; the former belonging to the diocese of Carlisle, and the latter to the bishopric of Chester. It was of old inhabited by the Brigantes; it afterwards constituted part of the Northumbrian kingdom; and now gives title of earl to the noble family of Fane.

Westmoreland is one of the most mountainous countries in England, particularly the barony of Kendal, which abounds in hills and fells, moors and rocks, besides the great ridge of mountains that separate this province from Yorkshire. Among the mountains of this county, one of the most remarkable is called *Isan-parler*, extremely high and difficult of access, famous for being, as it were, scooped into divers caverns and labrinths, which seem to have been formed as retreats in times of trouble and calamity. The county produces plenty of wood, both on the mountains and plains.

The largest lake in England is the Winander-merc of this county, lying among the mountains on the borders of Cumberland, stretching ten miles in length, of a very considerable depth, having a rocky bottom, fludded with several verdant isles or holmes, and abounding with the delicate fish called *char*, which being potted and preserved, is sent in presents from hence to all parts of England. It is swelled by the small rivers Ruthey and Brathey, which fall into it, and by its communication with a chain of small lakes called *Gresmere*. The most considerable rivers of this county are the Eden, the Can, the Lone, and the Loder. The last hath given the name to the ancient family of Lowthier.

The air of Westmoreland is keen and salubrious; but the climate is moist, consequently not very agreeable. The barony of Kendal is mountainous, therefore not so fit for tillage as for pasture: but the other part, properly called *Westmoreland*, is an open champaign country, which, if well cultivated, would be fruitful in both. Besides the water of the common fountains and rivers, which is pure, agreeable, and fit for all the usual purposes, this county affords some springs of peculiar qualities. In Betham-park, there is the dropping-well, in which moss, wood, and leaves are petrified. On the north side of Jeffery-mount there is a small spring called *Goudsike*, which continually throws up small spangles that glitter like silver. In the neighbourhood of Burrow, upon Stanemore, the inhabitants have discovered a chalybeate fountain.

In all probability, the mountains of Westmoreland are well stored with minerals, though no mines are worked in this county: yet here is plenty of coal for fuel.

Westmo-
land

Weltphalia
Wetstein,

WETSTEIN (John James), a very learned German divine, born at Basil in 1693. On his admission to the ministry, he maintained a thesis *de variis Novi Testamenti lectionibus*; in which he showed that the great variety of readings of the New Testament

The most remarkable places in Westmoreland are Appleby, Shap, Kirkby-Stephen, Orton, Ambleside,

Wetteravia afford no argument against the authenticity of the text. He had made these various readings the object of his attention; and travelled into foreign countries to examine all the MSS. he could come at. In 1730, he published *Prolegomena ad Novi Testamenti Græci editionem accuratissimam, &c.* Some divines dreading his unsettling the present text, procured a decree of the senate of Basil against his undertaking, and even got him prohibited from officiating in the ministry; on which he went to Amsterdam, where the remonstrants named him to succeed the famous Le Clerc, then superannuated, as professor of philosophy and history. At last he published his edition of the New Testament, in 2 vols. folio, 1752; in which he left the text as he found it, placing the various readings, with a critical commentary, underneath; subjoining two epistles of Clemens Romanus, till then unknown to the learned, but discovered by him in a Syriac MS. of the New Testament. He also published some small works; and is said to have been not only a universal scholar, but to abound in good and amiable qualities. He died at Amsterdam of a mortification in 1754.

WETTERAVIA, the southern division of the Landgrate of Hesse in Germany, lying along the northern bank of the river Maine, comprehending the counties of Hanau and Nassau.

WEXFORD, or **WEISFORD**, a county of Ireland, in the province of Munster, bounded by Wicklow on the north, St George's channel on the south and south-west, and part of Catherlogh and Kilkenny on the west. Its greatest length is about 47 miles, breadth about 27, and contains eight baronies. The air is good, but the soil various. In some places it is coarse and poor, in others fruitful both in corn and grass. The county sends 18 members to parliament; namely, two for the county, and two for each of the boroughs of Wexford, New-Ross, Enniscorthy, Feathard, Newborough, Bannow, Clomenis, Taghman.

WEXFORD, or *Weisford*, the capital of the above county, is a large ancient town, at the mouth of the Slane, the first place the English got possession of when they invaded Ireland in 1170, and is now much frequented by strangers in summer, on account of a chalybeate spring near it. Here is a very good harbour for vessels of considerable burden, and barracks for two companies of foot, with a very ancient castle still standing. Both Wexford and Waterford give title of earl to the Talbots, earls of Shrewsbury, in England.

WEYMOUTH, a town of Dorsetshire in England, deriving its name from its situation at the mouth of the river Wey. It is a very neat agreeable town, though it lies low. Melcombe-Regis, which stands on the opposite bank of the river, makes with it but one corporation, which sends as many members to parliament as London; every voter having, as in the capital, the privilege of polling for four persons. The corporation consists of a mayor, recorder, two bailiffs, 24 capital burgesses; and every mayor is an alderman for life. Here is a customhouse and good quay; but little trade, unless what is clandestine. Their fair trade is chiefly in wine, and fish brought from Newfoundland. The town gives title of viscount to the family of Thynne.—Melcombe-Regis, as we observed before, makes but one corporation with Weymouth, being situated upon the opposite bank of the river,

and joined to it by a bridge. These towns were united into one corporation in the reign of James I. Melcombe has four tolerable streets, and is the most thriving and populous of the two. The port, which is said to be the most frequented in the county, and is defended by two castles, goes by the name of *Weymouth*.

WHALE, in ichthyology. See *BALÆNA* and *PHYSETER*.

WHARF, a space on the banks of a haven, creek, or hithe, provided for the convenient loading and unloading of vessels.

WHARTON, (Philip duke of), a nobleman of the most brilliant parts, but of the most whimsical, extravagant, and inconsistent turn of mind, was educated by his father's express order at home. He very early married a young lady, the daughter of major-general Holmes, which disappointed his father's views of disposing of him in such a marriage as would have been a considerable addition to the fortune and grandeur of his illustrious family; yet that amiable lady deserved infinitely more felicity than she met with by this alliance. This precipitate marriage is thought to have hastened the death of his father; after which the duke being free from paternal restraints, plunged into those excesses which rendered him, as Pope expresses it,

"A tyrant to the wife his heart approv'd,

"A rebel to the very king he loved."

In the beginning of the year 1716, his lordship began his travels; and as he was designed to be instructed in the strictest Whig principles, Geneva was thought a proper place for his residence. He first passed through Holland, and visited several courts of Germany; and being arrived at Geneva, conceived such a disgust against his governor, that he left him, and set out post for Lyons, where he wrote a letter to the chevalier de St George, who then resided at Avignon, and presented him a very fine stout horse; which the chevalier no sooner received than he sent a man of quality to him, who took him privately to his court, where he was entertained with the greatest marks of esteem, and had the title of duke of Northumberland conferred upon him. He, however, remained there but one day, and then returned post to Lyons, from whence he set out for Paris. He likewise paid a visit to the consort of James II. who then resided at St Germain, to whom he also paid his court. During his stay at Paris, his winning address and abilities gained him the esteem and admiration of all the British subjects of rank of both parties.

About the latter end of December 1716, he arrived in England, whence he soon after set out for Ireland, where, though under age, he was allowed the honour to take his seat in the house of peers, and immediately distinguished himself, notwithstanding his former conduct, as a violent partizan for the ministry; in consequence of which zeal the king created him a duke. He no sooner came of age than he was introduced to the house of lords in England with the same blaze of reputation. In a little time he opposed the court, and appeared one of the most vigorous in defence of the bishop of Rochester; and soon after printed his thoughts twice a-week, in a paper called the *True Briton*, several thousands of which were dispersed weekly.

The duke's boundless profusion had by this time

Whale
Wharton

so burdened his estate, that by a decree of Chancery it was vested in the hands of trustees for the payment of his debts, allowing him a provision of 1200l. per ann. for his subsistence. This being not sufficient to support his title with suitable dignity, he went abroad and thence to great advantage, with respect to his personal character, at the Imperial court. From thence he made a tour to Spain; where the English minister was so alarmed at his arrival, as to send two expresses from Madrid to London, upon the apprehension that his grace was received there in the character of an ambassador: upon which the duke received a summons under the privy-seal to return home; but instead of obeying it, he endeavoured to inflame the Spanish court against that of Great-Britain, for exercising an act of power, as he was pleased to call it, within the jurisdiction of his catholic majesty. He then acted openly in the service of the Pretender, and was received at his court with the greatest marks of favour.

While his grace was thus employed, his neglected duchess died in England on the 14th of April 1726, without issue; and soon after the duke fell violently in love with M. Oberne, one of the maids of honour to the queen of Spain, the daughter of an Irish colonel who had died in that service, and whose fortune chiefly consisted in her personal accomplishments. All his friends, and particularly the queen of Spain, opposed the match; but he falling into a lingering fever, occasioned by his disappointment, the queen gave her consent, and they were soon after married. He then spent some time at Rome, where he accepted of a blue garter, assumed the title of duke of Northumberland, and for a while enjoyed the confidence of the exiled prince. But not always keeping within the bounds of Italian gravity, it became necessary for him to remove from thence; when, going by sea to Barcelona, he wrote a letter to the king of Spain, acquainting him that he would assist at the siege of Gibraltar as a volunteer. The king thanked him for the honour, and accepted his service: but the duke soon growing weary, wrote a respectful letter to the chevalier de St George, expressing a desire to visit his court; but the chevalier advised him to draw near to England.

The duke seemed resolved to follow his advice; and setting out with his duchess, arrived at Paris in May 1728, whence he soon after proceeded to Rouen, where he took up his residence; and was so far from making any concession to the government of England, that he did not give himself the least trouble about his estate, or any other concern there; though, on his arrival at Rouen, he had only about 600l. in his possession, and a bill of indictment was preferred against him in England for high-treason. Soon after the chevalier sent him 2000l. which he squandered away in a course of extravagance; when, to save the charges of travelling by land, he went from Orleans to Nantz by water, and staid there till he got a remittance from Paris, which was squandered almost as soon as received. At Nantz he was joined by his ragged servants, and from thence took shipping with them for Bilbao, when the queen of Spain took the duchess to attend her person. About the beginning of the year 1731, the duke, who commanded a regiment, was at Lerida, but declined so fast that he could not move without assistance; yet when free from pain did not lose his gaiety. He,

however, received benefit from some mineral waters in Catalonia; but soon after relapsed at a small village, where he was utterly destitute of all the necessaries of life, till some charitable fathers of a Bernardine convent removed him to their house, and gave him all the relief in their power. Under their hospitable roof he languished a week, and then died, without one friend or acquaintance to close his eyes; and his funeral was performed in the same manner in which the fathers inter those of their own fraternity.

Thus died Philip duke of Wharton, "who, like Buckingham and Rochester (says Mr Walpole), comforted all the grave and dull, by throwing away the brightest profusion of parts on witty fooleries, debaucheries, and serapes, which may mix graces with a great character, but never can compose one. If Julius Cæsar had only rioted with Catiline, he had never been emperor of the world. Indeed, the duke of Wharton was not made for conquests; he was not equally formed for a round-house and Pharosia: in one of his ballads he bantered his own want of heroism. It was in a song he made on being seized by the guard in St James's park, for singing the Jacobite air, The king shall have his own again.

The duke he drew out half his sword,
The guard drew out the rest.

"With attachment to no party, though with talents to govern any party, this lively man changed the free air of Westminster for the gloom of the Elicurial, the prospect of king George's garter for the Pretender's; and with indifference to all religion, the frolic lord who had writ the ballad on the archbishop of Canterbury, died in the habit of a capuchin. It is difficult to give an account of the works of so mercurial a man, whose library was a tavern, and women of pleasure his muses. A thousand fallacies of his imagination may have been lost. There are only two volumes in 8vo, called his *Life and Writings*. These contain nothing of the latter, but 74 numbers of the True Briton, and his speech against the bishop of Rochester. His other works are the ballads above mentioned; the Drinking Match at Eden-hall, in imitation of the Chevy-Chace, printed in a miscellany called *Whartoinana*; and a parody of a song sung at the opera-house by Mrs Tofts. His lordship also began a play on the story of the queen of Scots."

WHARTON (Henry), a learned English divine, was born in 1664, at Worstead in Norfolk, of which parish his father was vicar. He studied at Gonville and Caius college, Cambridge, where he prosecuted his studies with great vigour; and was instructed in the mathematics by Mr Isaac Newton, amongst a select company to whom that great man taught that science in his own private chamber. He afterwards assisted Dr William Cave in compiling his *Historia Literaria*, and at length became tutor to the only son of the Lord Arundel. In 1678, he distinguished himself by publishing several pieces in defence of the Protestant religion; and, though as yet no more than a deacon, was honoured by archbishop Sancroft with a licence for preaching through the whole province of Canterbury, and was also made one of the archbishop's chaplains. The same year he obtained the vicarage of Minister in the Isle of Thanet, and afterwards the rectory of Chatham; but died in the 31st year of his

Wharton.

Wheat
Wheelings.

Wheeling
Which.

age, in consequence of his immoderate studies. He was interred in Westminster abbey, where a small monument is erected to his memory. He was a man of great natural endowments; and was modest, sober, pious, and charitable. His death was greatly lamented by all learned men both at home and abroad. His principal works are, *Anglia Sacra*, 2 vols, folio; and *Historia de Episcopis et Decanis Londoniensibus*, 8vo.

WHEAT, in botany. See TRITICUM. For the culture of wheat, see AGRICULTURE, n° 112—115.

WHEEL, in mechanics, a simple machine, consisting of a round piece of wood, metal, or other matter, which revolves on its axis. See MECHANICS.

WHEEL-Carriages. See MECHANICS, chap. v.

WHEEL-Animal. See ANIMALCULE, n° 16—22.

WHEEL of Orffyreus, a machine supposed by professor Gravefande to be a perpetual motion; of which we have the following account in a Letter from the Professor to Sir Isaac Newton. "It is an hollow wheel, or kind of drum, about 14 inches thick, and 12 feet diameter; being very light, as it consists of several croses pieces of wood framed together; the whole of which is covered over with canvas, to prevent the inside from being seen. Thro' the centre of this wheel or drum runs an axis of about 6 inches diameter, terminated at both ends by iron axes of $\frac{1}{4}$ ths of an inch diameter, upon which the machine turns. I have examined these axes, and am firmly persuaded that nothing from without the wheel in the least contributes to its motion. When I turned it but gently, it always stood still as soon as I took away my hand; but when I gave it any tolerable degree of velocity, I was always obliged to stop it again by force; for when I let it go, it acquired in two or three turns its greatest velocity, after which it revolved from 25 to 26 times in a minute. This motion it preserved some time ago for two months, in an apartment of the castle: the doors and windows of which were locked and sealed, so that there was no possibility of fraud. At the expiration of that term, indeed his serene highness ordered the apartment to be opened, and the machine to be stopped; least, as it was only a model, the parts might suffer by so much agitation. The landgrave being himself present on my examination of this machine, I took the liberty to ask him, as he had seen the inside of it, whether, after being in motion for a certain time, no alteration was made in the component parts; or whether none of those parts might be suspected of concealing some fraud; on which his serene highness assured me to the contrary, and that the machine was very simple."

WHEELER (Sir George), a learned traveller and divine, was the son of colonel Wheeler of Charing in Kent, and was born in 1650 at Breda, where his parents as royalists were then in exile. He travelled through various parts of Greece and the East in company with Dr James Spon of Lyons; and taking orders on his return, was installed a prebend of Durham, made vicar of Basingstoke, and afterward rector of Houghton le Spring. He published an account of his Travels in 1682 in folio; and in 1689, his Observations on ancient edifices of Churches yet remaining in the East, compared with Eusebius: also the Protestant Monastery, or Christian oeconomies. He died in 1724.

WHEELINGS, in the military art, are different motions made both by horse and foot, either to the

right and left, or to the right and left about.

General Rules for WHEELING. The circle is divided into four equal points: thence, wheeling to the right or left, is only a quarter of the circle; wheeling to the right or left about, is one half of the circle.

When you wheel to the right, you are to close to the right, so near as to touch your right-hand man, but without pressing him; and to look to the left, in order to bring the rank about even.

When you wheel to the left, you are to close to the left, and look to the right, as above directed. This rule will serve for all the wheeling by ranks; as when a battalion is marching by subdivisions with their ranks open, then each rank wheels distinctly by itself, when it comes to the ground on which the ranks before it wheeled, but not before.

In wheeling, the men are to take particular care neither to open nor close their ranks, and to carry their arms well.

In wheeling, the motion of each man is quicker or slower, according to the distance he is from the right or the left: thus, when you wheel to the right, each man moves quicker than his right-hand man; and wheeling to the left, each man moves quicker than his left-hand man; the circle that every man wheels being larger, according to the distance he is from the hand he wheels to; as may be seen by describing several circles within one another, at two feet distance from each, which is nearly the space every man is supposed to take up.

WHELK, in zoology. See BUCCINUM.

WHELP, the young of a dog, fox, lion, or any wild beast.

WHELPS, in a ship, the seaman's term for those brackets which are set up on the capstan close under the bars; they give the sweep to it, and are so contrived that the cable winding about them may not surge so much as it might otherwise do if the body of the capstan were quite round and smooth.

WHETSTONE, a stone which serves for the whetting of knives and other tools upon.

WHEY, the serum, or watery part of milk.

WHICHCOT (Dr Benjamin), a learned English divine, was born in Shropshire in 1609, and educated at Cambridge, where he was chosen fellow of his college, and was an excellent tutor and instructor of youth. He was afterwards made provost of King's college, where he was a most vigilant and prudent governor, a great encourager of learning and good order, and by his wise management of the estate of the college he brought it into a very flourishing condition. After he left Cambridge he came to London, and was chosen minister of Blackfriars, where he continued till the fire of London, and then retired to a donative which he had at Milton near Cambridge, where he preached constantly, and relieved the poor. In 1668 he was presented to the rectory of St. Laurence Jewry; but during the building of that church, he preached for about the space of seven years before the court of aldermen at Guildhall chapel with great approbation. When his church was built, he constantly officiated twice a week, and gained the general love and respect of his parish. He died in 1683. Dr John Tillotson preached his funeral sermon, in which his character is drawn to great advantage. His Select Sermons were printed

Whig printed in London in 1698, with a preface by the late Earl of Shaftesbury author of the *Characteristicks*.

WHIG, a party in Britain, opposite to the Tories, from whom they differ chiefly in their political principles. See *TORIES*.

The names of *Whig* and *Tory* were not known till about the middle of the reign of Char. II. when these were given as party-distinctions. These parties may be considered either with regard to the state, or to religion. The state Tories are either violent or moderate: the first would have the king to be absolute; and therefore plead for passive obedience, non-resistance, and the hereditary right of the house of Stuart. The moderate Tories would not suffer the king to lose any of his prerogative; but then they would not sacrifice those of the people. The state Whigs are either strong republicans or moderate ones. "The first (says Rapin) are the remains of the party of the long parliament, who attempted to change monarchy to a commonwealth: but these make no slender a figure, that they only serve to strengthen the party of the other Whigs. The Tories would persuade the world, that all the Whigs are of this kind; as the Whigs would make us believe that all the Tories are violent. The moderate state Whigs are much in the same sentiments with the moderate Tories, and desire that the government may be maintained on the ancient foundation: all the difference is, that the first bear a little more to the parliament and people, and the latter to that of the king. In short, the old Whigs were always jealous of the encroachments of the royal prerogative, and watchful over the preservation of the liberties and properties of the people.

WHIP, or WHIP-Staff, in a ship, a piece of timber, in form of a strong staff, fastened into the helm, for the steersman, in small ships, to hold in his hand, in order to move the rudder and direct the ship.

WHIRLPOOL, an eddy, vortex, or gulph, where the water is continually turning round.

These in rivers are very common, from various accidents, and are usually very trivial, and of little consequence. In the sea they are more rare, but more dangerous. Sibbald has related the effects of a very remarkable marine whirlpool among the Orcades, which would prove very dangerous to strangers, though it is of no consequence to the people who are used to it. This is not fixed to any particular place, but appears in various parts of the limits of the sea among those islands. Wherever it appears, it is very furious; and boats, &c. would inevitably be drawn in and perished with it; but the people who navigate them are prepared for it, and always carry an empty vessel, a log of wood, or large bundle of straw, or some such thing, in the boat with them; as soon as they perceive the whirlpool, they toss this within its vortex, keeping themselves out: this substance, whatever it be, is immediately received into the centre, and carried under water; and as soon as this is done, the surface of the place where the whirlpool was becomes smooth, and they row over it with safety; and in about an hour they see the vortex begin again in some other place, usually at about a mile's distance from the first.

WHIRLWIND, a wind that rises suddenly, is exceedingly rapid and impetuous when risen, but is soon spent. See *WIND*.

VOL. X.

The origin of whirlwinds has been already given *Whirlwind.* under that of *WATER-SPOUT*. It is, however, highly probable that all these violent motions of the air are ultimately owing to the emission of electric matter from the earth. It is mentioned as a certain sign of an approaching hurricane in the West Indies, that the sea-water becomes exceedingly clear and transparent of a sudden; after which it seems to boil, and the waves begin to rise, though there is not the least wind. Both these phenomena can be accounted for on no other principle than that of a quantity of electric matter attempting to get out from the earth. Now though hurricanes are not precisely of the nature of whirlwinds, as not having a circular motion, it is highly probable that the latter also are occasioned somehow or other by a similar cause. A stream of electric matter issuing with violence into the atmosphere from any part of the earth, will cause a kind of vacuum in the atmosphere directly above that place, and of consequence a whirlwind or water-spout by the air rushing in on all sides to supply the vacuum*. If this is the true principle on which these phenomena depend, then we are sure that there never was any hurricane or whirlwind so violent as to remove an obstacle of the size of only one cubic inch, provided that was supported by a power equivalent to 15 pounds; for this is the utmost force of the atmosphere when rushing into a perfect vacuum, which never could take place in the centre of a whirlwind or water-spout. Indeed, notwithstanding the dreadful effects sometimes observed from hurricanes and whirlwinds, we shall easily perceive that the utmost of their power always falls very far short of this. The diminution of the specific gravity of the air by only $\frac{1}{4}$ th in the middle of the column, would produce such an afflux of air from all quarters, that an obstacle presenting a surface of one foot square would require a force of 504 pounds to prevent it from being carried away; which scarce the strongest walls that can be built by human art could resist. Nay, even the tenth part of this, or the diminution of the gravity of the atmosphere by $\frac{1}{10}$ th part, would produce a pressure of upwards of 50 pounds on every square foot of surface, which it is to be doubted whether any of our common houses could resist.

As this degree of rarefaction in the atmosphere would only produce a descent of about $\frac{1}{4}$ th of an inch in the barometer, it may seem wonderful why the most violent whirlwinds do not take place at those times when the mercury descends two or more inches, which descents are by no means unfrequent. But here it is to be remembered, that by whatever means this descent of the barometer is occasioned, by a certain expansive power in the rarefied place of the atmosphere, the air is prevented from rushing in eddies, and forming the whirlwind. Now, in the case of electric matter escaping from the earth, ascending into the high regions of the atmosphere, and carrying part of the air along with it, we see that there could be no expansion, but on the contrary a continued suction; and if the electric stream should happen to be stopped in one place and break out in another, the spout or whirlwind would immediately vanish in the one place and appear in the other, as is often observed in whirlwinds and water-spouts. Its progressive motion might be owing to the electric current perpetually shifting its place;

Whirlwind.
||
Whifton.

place; in which case the whirlwind would constantly follow it, for the reasons already given.

Some kinds of whirlwinds move with a slow motion, and are injurious only by their vortex; while others seem to do mischief as well by their progressive as their whirling motion. Of this kind are those called *typhons*; which, by their frequently following the course of rivers, seem thus also to discover their electrical origin. Of the destructive effects of these, we have an instance in what happened at Charlestown in South Carolina on the 1st of June 1761. It was first observed about noon, on land, upwards of 50 miles west-by-south of Charleston, and destroyed several houses, &c. as it passed along, in many places making wide avenues through the woods; from whence every tree and shrub was torn up, and great branches of trees were driven about in the column as it passed along. It directed its course to Ashley river, down which it came with surprising velocity; in its appearance resembling a column of smoke or vapour, whose motion was very irregular and tumultuous. Its momentum was so great, that Ashley river was ploughed to the bottom, and the channel laid bare. As it came down this river it made a constant noise like thunder; its diameter being computed about 300 fathoms. It was met at White Point by another of the same kind which came down Cooper's river, but with inferior strength; however, on their meeting together, the agitation of the air was much greater, while the clouds, which were driving in all directions to the place, seemed to be precipitated and whirled round with incredible velocity. It then fell upon the shipping in the road; entirely destroying some, and damaging others: being scarce three minutes in its passage, though the distance was near two leagues. In that short time it did damage to the amount of 20,000 l.; and had not its direction been altered by that gust which came down Cooper's river, it must have totally destroyed Charlestown, as no obstacle whatever seemed capable of resisting its fury.

It is observable, that whirlwinds do not arise with all their fury at once, but increase in strength as they go along. Dr Franklin relates, that he once rode for a considerable way by the side of one which had but newly arisen, and could scarce lift up any thing but dust, its vortex being only a few inches in diameter; but as it went along the strength and diameter constantly increased, till at last, as it began to take up and whirl round large branches of trees, it became dangerous for him to accompany it any longer. See *WATER-SPOUT and WIND*.

WHISPERING-PLACES. See *ACOUSTICS*, n°25.

WHIST, a well known game at cards, so called from the silence observed during the time of play.

WHISTON (William), an English divine of great parts, uncommon learning, and of a singular character, was born at Norton near Twycrosse in the county of Leicester, where his father was rector, in 1667. He was admitted of Clarehall, Cambridge, where he pursued his studies, particularly in the mathematics, and commenced tutor; which his ill health at length forced him to decline. Having entered into orders, he, in 1694, became chaplain to Dr More bishop of Norwich; and in this station he published his first work, intitled, *A New Theory of the Earth, &c.* in which he undertook to prove the Mosaic doctrine of the earth

perfectly agreeable to reason and philosophy: which work, though it was wrote against by Mr John Keil, brought no small reputation to the author. In the beginning of this century he was made Sir Isaac Newton's deputy, and afterward his successor, in the Lucasian professorship of mathematics; when he resigned a living he had in Suffolk, and went to reside at Cambridge. About this time he published several scientific works explanatory of the Newtonian philosophy; and he had the honour of being one of the first, if not the very first, who rendered those principles popular and intelligible to the generality of readers. About the year 1710, he was known to have adopted Arian principles, and was forming projects to support and propagate them: among other things, he had translated the Apostolical Constitutions into English, which favoured the Arian doctrine, and which he asserted to be genuine. The consequence was, that he was deprived of his professorship, and banished the university; he nevertheless pursued his scheme, by publishing the next year his *Primitive Christianity Revived*, 4 vols, 8vo. for which the convocation fell upon him very vehemently. On his expulsion from Cambridge Mr Whiston settled in London; where, without suffering his zeal to be intimidated, he continued to write, and to propagate his Primitive Christianity with as much ardour as if he had been in the most flourishing circumstances. In 1721, a subscription was made for the support of his family, which amounted to 470 l. For though he drew profits from reading astronomical and philosophical lectures, and also from his publications, which were very numerous, yet these of themselves would have been very insufficient: nor, when joined with the benevolence and charity of those who loved and esteemed him for his learning, integrity, and piety, did they prevent his being frequently in great distress. He continued long a member of the church of England, and regularly frequented its service, though he disapproved of many things in it: but at last he went over to the Baptists, and attended Dr Forster's meeting at Pinner's Hall, Broadstreet. Among other performances not specified above, he wrote *Memoirs of his own life and writings*, which contain some curious particulars. He died in 1762.

WHITBY (Dr Daniel), a very learned English writer, was born in 1638, and bred at Oxford; where in 1664 he was elected perpetual fellow of his college. He afterward became chaplain to Dr Seth Ward, bishop of Salisbury; who collated him in 1668 to the prebend of Yatebury in that church, and soon after to that of Hulsborn and Burbach. In 1672 he was admitted chanter of the said church on the death of Mr John South, and then, or soon after, rector of St Edmund's church in Salisbury. He was made a prebendary of Taunton Regis in 1696, and died in 1726. He was ever strangely ignorant of worldly affairs, even to a degree that is scarcely to be conceived. His writings are numerous, and well known; particularly his *Commentary on the New Testament*.

WHITBY, a sea-port town in the North Riding of Yorkshire, seated on the river Esk, near the place where it falls into the sea; over which there is a wooden bridge. It was formerly of great note for its abbey; which, though now in ruins, continues to be very useful as a land mark. The houses are neat, strong, and

Whito.
Whitb.

White,
Whitefield.

convenient; the number of inhabitants about 9000. Ship-building is their principal manufacture. W. Long. o. 7. N. Lat. 54. 30.

WHITE, one of the colours of natural bodies.

WHITE of the Eye, denotes the first tunic or coat of the eye, called *albuginea*. See ANATOMY, n° 406, i.

WHITE of an Egg. See ALBUMEN and EGG.

WHITE-Friars, a name common to several orders of monks, from being clothed in a white habit.

WHITE-Sea, is a bay of the Frozen Ocean, so called, in the north part of Mucovy, lying between Russian Lapland and Samoieda; at the bottom of which stands the city of Archangel. This was the chief port the Russians had before their conquest of Livonia.

WHITE-Colour for painting. See CHEMISTRY, n° 152.

WHITE-Copper. See CHEMISTRY, n° 381.

WHITE-Drop, Ward's. See CHEMISTRY, n° 191.

WHITE-Lead. See CHEMISTRY, n° 281.

WHITE-Throat, in ornithology. See MÔTACILLA.

WHITEFIELD (George), the celebrated preacher among the people called *Methodists*, was born in the year 1714, at the Bell in the city of Gloucester, which was then kept by his mother. At about 12 years of age he was put to a grammar school; but his mother entering into a second marriage, which proved a disadvantageous one, he, when about 15, put on a blue apron, and served her in the capacity of a drawer or waiter. After continuing about a year in this servile employment, he turned over the business to his brother; who marrying, and George not agreeing with his sister-in-law, he left the inn. Some time after, meeting with an old school-fellow, then a servitor in Pembroke college, Oxford, he was induced to attempt getting into the same college in a like capacity, and succeeded. Here Mr Whitefield, who from his own account appears to have always had a strong tincture of enthusiasm in his constitution from his very childhood, distinguished himself by the austerities of his devotion, and acquired considerable eminence in some religious assemblies in that city. At the age of 21, the fame of his piety recommended him so effectually to Dr Benson, then bishop of Gloucester, that he made him a voluntary officer of ordination. Immediately after this regular admission into the ministry, Mr Whitefield applied himself to the most extraordinary, the most indefatigable duties of his character, preaching daily in prisons, fields, and open streets, wherever he thought there would be a likelihood of making profelytes. Having at length made himself universally known in England, he embarked for America, where the tenets of Methodism began to spread very fast under his friends the Wesleys; and first determined upon the institution of the orphan-house at Georgia, which he afterwards effected. After a long course of peripatation, his fortune increased as his fame extended among his followers, and he erected two very extensive buildings for public worship, under the name of *tabernacles*; one in Tottenham-Court Road, and the other in Moorfields. Here, with the help of some assistants, he continued for several years, attended by very crowded congregations, and quitting the kingdom only occasionally. Besides the two tabernacles already mentioned, Mr Whitefield, by being chaplain to the countess dowager of Huntingdon, was connected with two other religious meetings, one at Bath, and

White-
ven,
Whitehead.

the other at Tunbridge, chiefly erected under that lady's patronage. By a lively, fertile, and penetrating genius, by the most unwearied zeal, and by a forcible and persuasive delivery, he never failed of the desired effect upon his ever crowded and admiring audiences. America, however, which always engaged much of his attention, was destined to close his eyes; and he died at Newberry, about 40 miles from Boston in New England, in 1770.

WHITEHAVEN, a sea-port town of Cumberland, with a market on Thursdays, and one fair on August 1st, for merchandise and toys. It is seated on a creek of the sea, on the north end of a great bergh or hill, washed by the tide of flood on the west side, where there is a large rock or quarry of hard white stone, which gives name to the place, and which, with the help of a strong stone wall, secures the harbour, into which small barks may enter. It is lately much improved in its buildings, and noted for its trade in pit-coal and salt, there being near it a prodigious coal-mine, which runs a considerable way under the sea. They have a customhouse here; and they carry on a good trade to Ireland, Scotland, Chester, Bristol, and other parts. It is 10 miles south-west of Cocker-mouth, and 289 north-west of London. W. Long. 3. 6. N. Lat. 54. 30.

WHITEHEAD (Paul), a celebrated satirist, the son of a taylor, was born in Westminster in the year 1710, and put apprentice to a woollen-draper. Unhappily he became acquainted with Mr Fleetwood the manager of Drury-lane theatre; who, in one of his difficulties, prevailed on Whitehead to become joint security with him for the payment of 3000 l. which Fleetwood failing to discharge, his deluded friend was reduced to take refuge in the liberties of the Fleet-prison for a considerable time. It was principally owing to him that the town was well diverted with the burlesque procession calculated to ridicule the anniversary parade of the society of Free Masons; whose public appearance has been discontinued from that time. He was very active on the part of Sir George Vandeput in the famous contested Westminster election in 1749; frequently heading numerous bodies of electors in person, and supplying the press with electioneering squibs. He was indeed generally reputed a rank Tory, heightened with a strong tincture of the Jacobite; for which supposition the frequent sneers at the House of Hanover, to be met with in his writings, furnished no small countenance. But if we pay any regard to the spirit of independence and public virtue he likewise manifests, his attachment to tyrants from principle may justly be questioned. The truth seems to be, that having a turn to satire, the party he adhered to was as much owing to accident as to choice: whether such conduct is consistent with any valuable principle, is another question. Sir Francis Dashwood, since lord Le Despencer, became Mr Whitehead's patron; and when he rose to power under lord Bute, he procured a patent place of 800 l. a-year for his favourite bard, which he enjoyed to his death in 1774. He bestowed among other legacies, the uncommon one of his heart, to his noble friend; who deposited it in a solemn manner, in a mausoleum erected for that purpose in his garden at High Wycomb in Buckinghamshire. His principal writings are,

Whitlock
Whites.

Whiting
Wickliff.

Manners, a satire; Honour, a satire; the State Dunces, a satire; the Gymnasiad, a mock heroic poem; and an Epistle to Dr Thompson: his smaller pieces in prose and verse are numerous; but he could never be prevailed on to collect and publish them. He spent three days before his death in burning MSS.

WHITELOCKE (Bulstrode), an eminent politician, historian, and lawyer, was the son of Sir James Whitelocke, knight, one of the judges, and was born at London in 1605. He was educated in grammar-learning in Merchant-Taylors school, and became a gentleman-commoner in St John's college in Oxford; but before he had taken a degree, went to the Middle Temple, where he became eminent for his skill in the common law. In the beginning of the long parliament he was chosen a burgess for Marlow in Bucks, and was appointed chairman of the committee for drawing up the charge against the earl of Strafford, and one of the managers against him at his trial. He was appointed one of the lay-gentlemen to sit among the assembly of divines; in which he made a speech concerning the *ius divinum* of church government by presbytery. In 1648 he retired into the country, that he might not have any concern in the king's trial. In 1649 he was constituted keeper of the king's library and medals, which in 1647 he had hindered from being sold. In 1653 he went ambassador to Sweden. In 1656 he was chosen speaker of the house of commons *pro tempore*; and the year following was summoned by Oliver the Protector to sit in the other house, by the name of *Bulstrode lord Whitelocke*. In 1659 he was president of the council of state, and one of the *committees of safety*. He soon after retired into the country, where he spent the remainder of his days. He died in 1676. We are told that he acquitted himself with great success and reputation in all his employments, foreign and domestic. Several of his speeches were published; and beside his *Memorials of the English affairs*, he wrote many other pieces. Lord Clarendon has left this testimony in favour of Mr Whitelocke; whom, numbering among his early friends in life, he calls, "a man of eminent parts and great learning out of his profession, and in his profession of signal reputation. And though, (says the noble historian,) he did afterward bow his knee to Baal, and so swerved from his allegiance, it was with less rancour and malice than other men. He never led, but followed; and was rather carried away with the torrent than swam with the stream; and failed through those infirmities, which less than a general defection and a prosperous rebellion could never have discovered." Lord Clarendon has elsewhere described him, as from the beginning concurring with the parliament, without any inclinations to their persons or principles; and, says he, "he had the same reason afterwards not to separate from them. All his estate was in their quarters; and he had a nature that could not bear or submit to be undone: though to his friends, who were commissioners for the king, he used his old openness, and professed his detestation of all the proceedings of his party, yet could not leave them."

WHITENESS, the quality which denominates or constitutes a body white.

WHITES, or *FLUOR ALBUS*. See **MEDICINE**, n° 364.

WHITING, in ichthyology. See **GADUS**.

WHITSUNDAY, a solemn festival of the Christian church, observed on the fiftieth day after Easter, in memory of the descent of the Holy Ghost upon the apostles in the visible appearance of fiery cloven tongues, and of those miraculous powers which were then conferred upon them.

It is called *Whitsunday*, or *White-Sunday*; because this being one of the stated times for baptism in the ancient church, those who were baptised put on white garments, as types of that spiritual purity they received in baptism. As the descent of the Holy Ghost upon the apostles happened upon the day which the Jews called *Pentecost*, this festival retained the name of *Pentecost* among the Christians.

WHITSUNDAY ISLE, one of the New Hebrides, which lies about four miles to the south, runs in the same direction, and is of the same length, having more sloping exposures than Aurora: it appears to be better inhabited, and to contain more plantations.

WIBURG, a considerable town of Denmark, in North Jutland, with a bishop's see, remarkable for being the seat of the chief court of justice in the province. The hall where the council assemblies has the archives of the country, and escaped the terrible fire that happened in the year 1726, and which burned the cathedral-church, that of the Black Friars, the town-house, and the bishop's palace; but they have all been rebuilt more magnificent than before. It is seated on the lake Weter, in a peninsula, 25 miles north-west of Sleswick, and 110 north-by-west of Copenhagen. E. Long. 10. 16 N. Lat. 56. 50.

WICKER, a twig of the osier shrub single or wrought.

WICKET, a small door in the gate of a fortified place, &c. or a hole in a door through which to view what passes without.

WICKLIFF (John), the first divine in Europe who had the sense, honesty, and resolution, to attempt a reformation of religion, was born about the year 1324, in the parish of Wycliff, near Richmond, in Yorkshire. He was educated at Oxford, first in Queen's, and afterwards in Merton college, of which he was a probationer-fellow. Having acquired the reputation of a man of great learning and abilities, in 1361 he was chosen master of Baliol hall, and in 1365 constituted warden of Canterbury college, by the founder archbishop Simon de Lisle; but was, 1367, ejected by the regulars, together with three secular-fellows. He thought their proceedings arbitrary, and therefore appealed to the pope; but instead of obtaining redress, in 1370 the ejection was confirmed. This disappointment probably contributed somewhat towards his enmity to the see of Rome, or rather to confirm that enmity; for he had long before written against the pope's exactions and corruptions of religion. However, his credit in the university continued; for having taken the degree of doctor in divinity, he read public lectures with great applause; in which he frequently exposed the impositions of the Mendicant friars. About this time he published a defence of his sovereign Edward III. against the pope, who had insisted on the homage to which his predecessor king John had agreed. This defence was the cause of Wickliff's introduction at court, and of his being sent

sent one of the ambassadors in 1374, to Bruges where they met the pope's nuncios, in order to settle several ecclesiastical matters relative to the pope's authority. In the mean time Wickliff was presented by the king to the rectory of Lutterworth in Leicestershire, and in 1375 he obtained a prebend in the church of Westbury in Gloucestershire. Wickliff continued hitherto, without molestation, to oppose the papal authority; but in 1377 a bull was sent over to the archbishop of Canterbury, and to Courtney bishop of London, ordering them to secure this arch-heretic, and lay him in irons: at the same time the pope wrote to the king, requesting him to favour the bishops in the prosecution: he also sent a bull to Oxford, commanding the university to give him up. Before these bulls reached England Edward III. was dead, and Wickliff, protected by John duke of Lancaster, uncle to Richard II. favoured by the queen-mother, and supported by the citizens of London, eluded the persecution of pope Gregory IX. who died in 1378. In the following year this intrepid reformer presented to parliament a severe paper against the tyranny of Rome, wrote against the papal supremacy and infallibility, and published a book *On the truth of the scriptures*, intended to prepare the way for an English translation of them, in which he had made considerable progress. In 1381 he published *Sixteen Conclusions*; in the first of which he ventured to expose the grand article of transubstantiation. These conclusions being condemned by the chancellor of Oxford, Wickliff appealed to the king and parliament; but being deserted by his unsteady patron the duke of Lancaster, he was obliged to make a confession at Oxford; and by an order from the king was expelled the university. He now retired to his living of Lutterworth, where he finished his translation of the bible. This version of the bible, of which there are several manuscript copies in the libraries of the universities, British Museum, &c. is a very literal translation from the Latin vulgate. In 1383 he was suddenly struck with the palsy; a repetition of which put an end to his life in December 1384. He was buried in his own church, where his bones were suffered to rest in peace till the year 1428, when, by an order from the pope, they were taken up and burnt.— Besides a number of works that have been printed, he left a prodigious number of manuscripts; an accurate list of which may be seen in bishop Tanner's Bib. Brit. Hib. Some of them are in the Bodleian Lib. others in the Brit. Museum, &c.

Wickliff was doubtless a very extraordinary man, considering the times in which he lived. His natural sagacity discovered the absurdities and impositions of the church of Rome, and he had the honesty and resolution to promulgate his opinions, which a little more support would probably have enabled him to establish: they were evidently the foundation of the subsequent reformation.

WICKLOW, a county of Ireland, in the province of Lunsler, bounded by Wexford on the south; that of Dublin and part of Kildare on the north; St George's channel on the east; and Kildare and Catherlogh counties on the west. Its length, where longest, is 36 miles, and its greatest breadth 28. It is divided into six baronies. There are some pretty high mountains in this county; in one of which there

is a copper-mine, wrought at the expence of some English gentlemen. The lowlands are pretty well inhabited, enclosed and cultivated, the soil being good and the air wholesome. From the mountains in this county, one may see, in a clear day, very distinctly the mountains of Snowdon in North Wales. In the Wicklow mountains are also some of those deep dark vallies called *glyn*, very beautiful and picturesque, together with some grand and astonishing water-falls. Among the former, the dark glyn and the glyn of the mountains, are particularly remarkable. "The dark glyn," (says the author of the *Hibernia Curiosa*), is much visited in the summer-season by the gentry from Dublin, and most of the people of fortune that come to this city. It is equal, if not superior, to any of the kind in the kingdom, one of the deepest, and at the same time the narrowest and most irriguous vallies I remember to have seen. The sides of the hills which skirt it, adorned with trees to the very tops, and intermixed with rocky precipices, together with the murmuring of a little river at the bottom, that winds its way through this intricate valley over numberless little breaks and falls, that add greatly to the beauty of the scene, render it altogether a most pleasing summer recreation. The closeness of the lofty shading hills on the sides, at the same time that it affords a most delightful cool retreat from the heat of the sun, throws a kind of gloomy solemnity on the bottom of this deep valley; and from this circumstance it is very properly called the *dark glyn*. It is rather a deep chasm than a valley, extending about a mile through a lofty range of hills. At the very bottom of the glyn is a way cut out by the side of the stream, and adapted to the gloomy retirement of the place, where the lover, the poet, or philosopher, may wander, with every circumstance, every scene about him, calculated to warm his imagination, or produce the most serious reflections. The glyn of the mountains in this neighbourhood is a more open and spacious valley, but immensely deep, and skirted on either hand with the most enormous astonishing mountains, covered for the most part with trees from their bottoms to the very tops, presenting a prospect of the most horrible impending rocks. The bottom of the valley is just wide enough for a road and a river that runs through it. There is something inexpressible striking, beautiful, grand, and awful in this scene." These glys are not far from Powerscourt, a most beautiful seat, 14 miles from Dublin, belonging and giving the title of viscount to the family of Wingfield. Near this charming seat is one of the most beautiful water-falls in the world, called the *Fall of Powerscourt*; which, from the peculiarity of its situation, its prodigious height and singular beauty, well deserves the notice of every traveller. It is produced by a small river arising from springs and rains collected on the plains or shallow vallies, on the top of an adjacent range of mountains, and falls at least 300 feet, of which 200 are visible on the plain below. The only time to see this most beautiful and astonishing water-fall in its highest perfection is immediately after heavy rains on the mountains above. No description can then convey an adequate idea of the beauty and grandeur of the scene, or the transport of the spectator. The trees, which grow from the bottom to the top of the hill on the sides of this prodigious

water-

Widgeon
Wight.

water-fall, are an inexpressible addition to its charms. The whole scenery indeed, above and below, is the most extraordinary and entertaining of its kind that can be conceived. This county sends 10 members to parliament, viz. two for the shire, and two for each of these boroughs, Wicklow, Baltinglass, Carysfort, and Blessington.

Wicklow gives name to the county, and is its capital. This town is noted for the best ale in Ireland. It has barracks for three companies of foot, and a kind of castle and haven at the mouth of the river Leitrím; but most of its trade consists in carrying provisions in small vessels to Dublin. It gives the title of baron to lord Maynard.

WIDGEON, in ornithology. See ANAS.

WIDOW, a woman who has lost her husband.

WIFE, a married woman, or one joined with, and under the protection of an husband. See HUSBAND.

Isle of WIGHT, a part of the county of Southampton, separated from the rest by a channel about 20 miles long and 12 broad. It seems to have been called by the Britons *Uia*, the diminutive of *Uiz*, which signifies an island. Hence the Romans, imitating, as their custom was, the sound of the British word, styled it *Vidui*, *Vetui*, and *Veſta*. Diodorus Siculus, coming near to the British name, calls it *Via*. The Saxons, *Wibi*, or *White*, and *Wightland*, because possessed by the Jutes, called sometimes *Vita* and *Viti*, as well as *Juti*; whence, in the modern Welsh, it appears to be styled *Gauib*, which, because it signifies disjoined or divorced, some have thought a very significant appellation; but the former account, though more modern, is however more natural, and therefore seems to come nearer the truth.

It is separated from Hampshire by a small arm of the sea, called anciently the *Solent*, which is, in some places, 12, in others seven, in most about four miles broad, except at the strait between Sharpnor and Hurst castles, where it is not quite two. This island is, or rather was, of an oval form, and thence said to resemble an egg; and in length, from east to west, was anciently 30 miles, at present 23 at most; in breadth, from north to south, 12; in circumference, 60. The south side of the island, which is opposed to France, is naturally fortified by exceeding steep cliffs; and wherever these are wanting, forts and blockhouses have been built.

There are also large and dangerous banks of sand on the north side, called the *Horse*, *No Man's Land*, and the *Brambles*; on the west side a long ridge of rocks, and nearer the shore the needles; on the south Atherfield rocks, Challarme, and Done Moſs; to the east, the Black Rocks, the Mixon, and the White Cliff, afford a kind of natural and effectual barrier against all invaders.

It looks as if these rocks, shoals, and sands, were remnants of the land belonging to this island when 30 miles long, and shaped like an egg, as ancient authors describe it.

A long ridge of hills runs from west to east. The country on the south side is wonderfully rich and fertile, producing vast quantities of excellent corn; some say, in one good year as much as will serve the inhabitants seven. The middle and mountainous part of the island has some wood, and abundance of fine grass,

which nourishes a vast number of sheep; and their fleece is not inferior to any in Great Britain, except those of Cotswould and Lempster. Cattle, fowl, and fish, are equally good, and, except in time of war, when the island is crowded with people, cheap. There were likewise two parks, but one of these is now converted into arable land, and a forest stored with excellent venison; to which when we add, that the climate is so mild, that myrtles grow in the open air, and so wholesome (except towards the eastern extremity, where agues are very common) that the people are generally healthy, and live frequently to a great age, we may be justified in saying, that few places can boast of being more plentiful or more pleasant.

It is admirably watered in every part by springs, brooks, or rivers. The famous road of St Helens lies on the north-east side of the island, where the sea enters so deep, as almost to cut off one part; the most eastern promontory of which is Benbridge Point, and that extremity obtains the name of *Benbridge Isle*. There is another large opening about the middle, on the north side, where the river Cowes falls into the sea, and forms a harbour, defended formerly by two strong castles, called the *East* and *West Cowes*; but the latter only is now standing. About four miles up the river stands Newport, the capital of the isle, in which there are at present between 3000 and 4000 inhabitants: It is a neat town, built with stone, to which vessels of a small burden come up; and being called in Latin *Medena*, the island is on that account divided into the Hundreds of East Meden and West Meden. About a mile from thence stands Carebrook castle upon an high rock. To the west of Newport-haven lies that of Newton, which, notwithstanding it is now inconsiderable, was heretofore also a pretty good town; and still farther to the west lies the castle and town of South Yarmouth, where the sea enters again into the land, and penetrates within a mile of the south coast. The island being here as much intersected as at the eastern extremity, as that is styled *Benbridge*, so this is called *Freshwater Isle*.

WILDERNESS, in gardening, a kind of grove of large trees in a spacious garden, in which the walls are commonly made, either to intersect each other in angles, or have the appearance of meanders and labyrinth.

WILKINS (Dr John), a most ingenious and learned English bishop, was the son of a goldsmith of Oxford, and was born in 1614. He adhered to the parliament during the civil wars, by whom he was made warden of Wadham college in 1648: he married afterwards the sister of Oliver Cromwell, and procured a dispensation to retain his wardenship notwithstanding. Richard Cromwell made him master of Trinity college, Cambridge, from which he was ejected on the Restoration. He then became preacher to Gray's Inn, rector of St Laurence Jewry, London, dean of Rippon, and in 1668 was promoted to the bishopric of Chester: he died in 1672. Bishop Wilkins thought it prudent to submit to the powers in being; he therefore subscribed to the solemn league and covenant while it was enforced, and was equally ready to swear allegiance to king Charles when he was restored; this, with his moderate spirit toward dissenters, rendered him not very agreeable to churchmen. His mathematical

Wight
Wilkins

tical and philosophical works, which contain many ingenious and curious pieces, considering the time when they were wrote, have been collected in one vol. 8vo. He published also some theological tracts.

WILL, that faculty of the mind by which it embraces or rejects any thing offered to it. See METAPHYSICS, n^o 76, 78, 80.

WILL, or *Legg* WILL, in law, signifies the declaration of a man's mind and intent relating to the disposition of his lands, goods, or other estate, or of what he would have done after his death. In the common law there is a distinction made between a will and a testament: that is called a *will* where lands or tenements are given; and when the disposition concerns goods and chattels alone, it is termed a *testament*. See TESTAMENT.

WILL-with-a-whisp, or *Jack with-a-lantern*, two popular names for the meteor called *ignis fatuus*. See LIGHT, n^o 27.

WILLIAM of MALMSBURY, an historian of considerable merit in the reign of king Stephen; but of whose life few particulars are known. According to Bale and Pits, he was surnamed *Somersetus*, from the county in which he was born. From his own preface to his second book *De regibus Anglorum*, it appears that he was addicted to learning from his youth; that he applied himself to the study of logic, physics, ethics, and particularly to history. He retired to the Benedictine convent at Malmesbury, became a monk, and was made precentor and librarian; a situation which especially favoured his intention of writing the history of this kingdom. In this monastery he spent the remainder of his life, and died in the year 1142. He is one of our most ancient and most faithful historians. His capital work is that intitled *De regibus Anglorum*, in five books; with an Appendix, which he styles *Historia Novelle*, in two more. It is a judicious collection of whatever he found on record relative to England, from the invasion of the Saxons to his own times.

WILLIAM of Newbury, so called from a monastery in Yorkshire, of which he was a member, wrote a history which begins at the conquest, and ends at the year 1197. His Latin style is preferred to that of Matthew Paris; and he is intitled to particular praise, for his honest regard to truth, in treating the fables of Jeffery of Monmouth with the contempt they deserve; as well as for expressing his approbation of Henry II's design of reforming the clergy, by bringing them under the regulation of the secular power.

WILLIAM of Poitiers, chaplain to king William the Conqueror, wrote a fair account of the Norman revolution, that has found good credit with most of our historians.

WILLIAM, archbishop of Tyre, was a learned prelate, who in the reign of Henry II. was sent to explore all the powers of Europe to aid the Holy Land by a new crusade. He has left *A History of the Holy Wars*, from their commencement to the year 1183, which in matter and style is far superior to any other of that or many preceding ages.

WILLIAM of Wykeham, bishop of Winchester, was born in the village of Wykeham, in the county of Southampton, in 1324. He had his education at Winchester and Oxford. Having continued near six

years in the university, his patron Nicholas Wedal, governor of the province of Southampton, took him into his family, and appointed him his confessor and secretary. He could not have made choice of a fitter person for that employment, no man in that age writing or speaking more politely than Wykeham. For this reason Edington, bishop of Winchester, lord high-treasurer of the kingdom, appointed him his secretary three years after, and also recommended him to king Edward III. who took him into his service. Being skilled in geometry and architecture, he was appointed surveyor of the royal buildings, and also chief-justice in Eyre: he it was who superintended the building of Windsor-castle. He was afterward chief secretary of state, and keeper of the privy-seal; and in 1367 succeeded Edington in the see of Winchester. A little after he was appointed lord high-chancellor and president of the privy-council. That he might well discharge the several functions of his employments, both ecclesiastical and civil, he endeavoured, on one hand, to regulate his own life according to the strictest maxims, and to promote such parish-priests only as were able to give due instructions to their parishioners, and at the same time led exemplary lives: on the other hand, he did all in his power to cause justice to be exactly administered. In 1371 he resigned his chancellorship, and some time after the great seal. Edward being returned to England, after having carried on a very successful war in France, found his exchequer in great disorder. The duke of Lancaster, one of his sons, at the head of several lords, having brought complaints against the clergy, who then enjoyed most power in the kingdom, the king removed them from their employments. But the laymen, who were raised to them, behaved so ill, that the king was forced to restore the ecclesiastics. The duke of Lancaster showed strong animosity to the clergy, and set every engine at work to ruin Wykeham. He impeached him of extortion, and of disguising things, and obliged him to appear at the King's-bench. He got such judges appointed as condemned him; and not satisfied with depriving him of all the temporalities of his bishopric, he advised Edward to banish him: but this prince rejected the proposal, and afterward restored to Wykeham all that he had been divested of. Richard II. was but eleven years old when Edward died; whereby the duke of Lancaster had an easy opportunity of reviving the accusations against the bishop of Winchester: nevertheless Wykeham cleared himself. Then he founded two noble colleges, the one in Oxford, the other in Winchester. Whilst he was exerting his utmost endeavours to improve these two fine foundations, he was recalled to court, and in a manner forced to accept of the office of lord high-chancellor in 1389.—Having excellently discharged the duties of that employment for three years, he obtained leave to resign it, foreseeing the disturbances that were going to break out. Being returned to his church, he finished his college, and built there so magnificent a cathedral, that it almost equals that of St Paul's in London. He laid out several sums in things advantageous to the public and to the poor; notwithstanding which, in 1397 he was in great danger; for he and some others were impeached of high-treason in open parliament; however, he was again fully cleared. From that time

William
Willis.

till his death he kept quiet in his diocese, and there employed himself in all the duties of a good prelate. He died in 1404, in the 81st year of his age.

WILLIAM, the name of several kings of England. See ENGLAND, n° 86. 91. and BRITAIN, n° 280, &c.

WILLIAMSBURG, the capital of Virginia in North America, situated in James county, between James and York rivers. W. Long. 76. 30. N. Lat. 37. 20.

WILLIAM'S FORT, is a factory of Asia belonging to the East-India company, seated on one of the branches of the river Ganges, in the kingdom of Bengal. The fort was first built in the shape of an irregular tetragon of brick and mortar; and the town has nothing regular in it, because every one built a house as he liked best, and for his own convenience. The governor's house is within the fort, and is the best piece of architecture in these parts. Here there are also convenient lodgings for the factors and writers, with store-houses for the company's goods, and magazines for ammunition. About 50 yards from the fort is the church, built by the charity of merchants residing here. The town is called *Calcutta*, and has a pretty good hospital for the sick, though few come out of it alive. It is governed by a mayor and aldermen, as most of the company's factories in the East Indies now are. In 1757 it was surprised by the nabob of Bengal, who took it, and put most of those that had made resistance into a place called the *Black Hole*, where most of them were smothered. This nabob was afterwards killed, and another set up in his room, more friendly to the English; and the factory was re-established. E. Long. 86. 0. N. Lat. 22. 27.

WILLIAMSTADT, a sea-port town of Holland. It is a handsome strong place, and the harbour is well frequented. It was built by William prince of Orange in 1585; and in 1732 belonged to the stadtholder of Friesland. The river near which it is built is called *Butterfleet*, or *Holland Diep*; and is one of the bulwarks of the Dutch on the side of Brabant, where they always keep a garrison. E. Long. 4. 23. N. Lat. 51. 41.

WILLIS (Dr Thomas), a celebrated English physician, was born at Great Bodwin, in Wiltshire, in 1621, and studied at Christ-church college, Oxford. When that city was garrisoned for the king, he, among other scholars, bore arms for his Majesty, and devoted his leisure hours to the study of physic. The garrison of Oxford at length surrendering to the parliament, he applied himself to the practice of his profession; and soon rendered himself famous by his care and skill. He appropriated a room as an oratory for divine service according to the church of England, whither most of the loyalists in Oxford daily resorted. In 1660, he became Sedleian professor of natural philosophy, and the same year took the degree of doctor of physic. In 1664, he discovered the famous medicinal spring at Alstropp, near Brackley. He was one of the first members of the Royal Society, and soon made his name illustrious by his excellent writings. In 1666, after the fire of London, he removed to Westminster; and his practice became greater than that of any of the physicians his contemporaries. Soon after his settlement in London, his only son Thomas falling into a consumption, he sent him to Montpellier in

France for the recovery of his health; and it proved successful. His wife also labouring under the same disorder, he offered to leave the town; but she, not suffering him to neglect the means of providing for his family, died in 1670. He died at his house in St Martin's in 1675, and was buried near her in Westminster abbey. Dr Willis was extremely modest and unambitious, and refused the honour of knighthood. He was remarkably pious: As he rose early in the morning, that he might be present at divine service, which he constantly frequented before he visited his patients, he procured prayers to be read beyond the accustomed times while he lived; and at his death settled a stipend of 20*l. per annum* to continue them. He was a liberal benefactor to the poor wherever he came, having from his early practice allotted part of his profits to charitable uses. He was exact and regular in all his hours; and though his table was the resort of most of the great men of London, yet he was remarkable for his plainness, and his being a man of little discourse, complaisance, or society; but he was justly admired for his deep insight into natural and experimental philosophy, anatomy, and chemistry; for his successful practice; and for the elegance and purity of his Latin style. He wrote, 1. A treatise in English, intitled *A plain and easy Method for preserving those that are well from the Infection of the Plague, and for curing such as are infected.* 2. Several Latin works, which were collected and printed at Amsterdam, in 1682, in 2 vols, 4to.

WILLIS (Brown), grandson of the famous physician, and an eminent antiquary, was born in Dorsetshire in 1682. He was educated in Westminster school, where the solemnity of the adjoining abbey engaged his admiration, and impressed his mind with an early love of antiquities. From thence he removed to Christ-church, Oxford; and during the course of his life visited almost all the cathedrals in England and Wales; which journeys he used to call his *pilgrimages*. He published Surveys of them in 4 vols, 4to. He wrote also A History of the mitred Parliamentary Abbeys, 2 vols, 8vo; and *Notitia Parliamentaria*, 2 vols, 8vo; with some other things. He was chosen member for the town of Buckingham in 1705; was created doctor of laws at Oxford in 1749, and died in 1760.

WILLOUGHBY (Francis), a celebrated natural historian, was the only son of Sir Francis Willoughby, knight. He was fond of study from his childhood, and held idleness in abhorrence; he being so great an economist with regard to his time, as not willingly to lose or misapply the least part of it; by which means he attained great skill in all branches of learning, and particularly in the mathematics: but observing that the history of animals was in a great measure neglected by his countrymen, he particularly applied himself to that province; and for this purpose carefully read over what had been written on that subject by others. He then travelled several times over his native country; and afterwards into France, Spain, Italy, Germany, and the Low Countries, attended by his ingenious friend Mr John Ray. It is remarkable, that, notwithstanding the advantages of birth, fortune, and parts, he was as humble as any man of the meanest fortune; was sober, temperate, and chaste; scrupulously just; so true to his word and promise, that a

Willis
Willoughby.

man might venture his estate and life upon it; so faithful and constant to his friend, as never to desert him when fortune frowned upon him; and remarkably pious, patient, and submissive to the divine will. This is the character given of him by Mr Ray, whose veracity none will doubt. This ingenious and learned gentleman died in 1672, at 37 years of age; having impaired his health by his application. He wrote, 1. *Ornithologia libri tres*, folio, which was afterwards translated into English, with an Appendix by Mr Ray, in folio. 2. *Historia Piscium libri quatuor*, folio. 3. Letters of Francis Willoughby, Esq; added to Philosophical Letters between the learned Mr Ray and several of his correspondents, published, in 8vo, by William Derham. 4. Several ingenious papers in the Philosophical Transactions.

WILMOT (John), earl of Rochester, a great wit in the reign of Charles II. the son of Henry earl of Rochester, was born in 1648. He was taught grammar and classical learning at the free-school at Burford; where he obtained a quick relish of the beauties of the Latin tongue, and afterwards became well versed in the authors of the Augustine age. In 1659, he was admitted a nobleman of Wadham college, where he obtained the degree of master of arts. He afterwards travelled through France and Italy; and at his return was made one of the gentlemen of the bed-chamber to the king, and comptroller of Woodstock Park. In 1665, he went to sea, and was in the Revenge, commanded by Sir Thomas Tiddiman, when the attack was made on the port of Bergen in Norway; during the whole action he showed the greatest resolution, and gained a high reputation for courage; which he supported in a second expedition, but afterwards lost it in a private adventure with Lord Mulgrave.

Before the earl of Rochester travelled, he had given into the most disorderly and intemperate way of living; yet he had so far got the better of it at his return, that he hated nothing more. But falling into the company of the courtiers, who continually practised these excesses, he became so sunk in debauchery, that he was for five years together so given up to drinking, that during all that time he was never cool enough to be master of himself. His violent love of pleasure, and his disposition to extravagant mirth, carried him to great excesses. The first involved him in sensuality, and the other led him into many adventures and ridiculous frolics. Once disguising himself so that he could not be known by his nearest friends, he set up in Tower-street for an Italian mountebank, and there dispersed his nostrums for some weeks. He often disguised himself as a porter, or as a beggar, sometimes to follow a mean amour: at other times, he would go about merely for diversion, in odd shapes; and acted his part so naturally, that he could not be known even by his friends. In short, by his constant indulgence in wine, women, and irregular frolics, he entirely wore out an excellent constitution before he was 30 years of age. In October 1679, when recovering from a violent disease, which ended in a consumption, he was visited by Dr Burnet, upon an intimation that such a visit would be agreeable to him. Dr Burnet published an account of his conferences with Lord Rochester; in which it appears, that though he had lived the life of a libertine and atheist, yet he died the death of a penitent Christian.

His death happened in 1680; since which time his poems have been various times printed, both separately and together: but when once he obtained the character of a lewd and obscene writer, every thing in that strain was fathered upon him; and thus many pieces not of his writing have crept into the later editions of his works. The author of the Catalogue of Royal and Noble Authors, says, he was "a man whom the Muses were fond to inspire, and ashamed to avow, and who practised without the least reserve that secret which can make verses more read for their defects than their merits. Lord Rochester's Poems have much more obscenity than wit, more wit than poetry, and more poetry than politeness. One is amazed at hearing the age of Charles II. called polite; because the Presbyterians and religionists had affected to call every thing by a Scripture name. The court had no pretensions to politeness, but by its resemblance to another age, which called its own grossness polite, the age of Aristophanes. Would a Scythian have been civilized by the Athenian stage, or a Hottentot by the drawing-room of Charles II.? The characters and anecdotes being forgot, the state-poems of that time are a heap of senseless ribaldry, scarcely rhyme, and more seldom in metre. When Satyrs were brought to court, no wonder the Graces would not trust themselves there." His writings, besides those already mentioned, are, a Satyre against Mankind; Nothing, a poem; Valentinian, a tragedy; Fifty-four Letters to Henry Saville, and others; Seven more to his Wife and Son; a Letter on his deathbed to Dr Burnet. He also left behind him several other papers, and a History of the Intrigues of the Court of Charles II. but his mother, a very devout lady, ordered all his papers to be burned.

WILSON (Florence), known in the republic of letters by the name of *Florentius Volusinus*, was born at Elgin in the shire of Murray in Scotland, and educated in the university of Aberdeen. Travelling to England with an intention to improve his fortune, he had the felicity to be introduced to cardinal Wolsey, who appointed him tutor to one of his nephews. In that capacity he went to Paris, and continued there till the cardinal's death. During his residence in that city he became acquainted with the learned cardinal Bellai, archbishop of Paris, who allowed him a pension, and meant to have appointed him royal professor of the Greek and Latin languages in the university of Paris: but Bellai being disgraced, Wilson's prospects faded with the fortunes of his patron, whom nevertheless he attended on his journey to Rome. Wilson was taken ill at Avignon, and the cardinal proceeded without him. After his recovery, he paid a visit to the celebrated cardinal Sabote, the Mecenas of his time, who was also bishop of Carpentras, where he then resided. The cardinal was so charmed with his erudition, that he appointed him professor of the learned languages, with a stipend of 100 pistoles *per annum*.

During his residence at Carpentras, he wrote his celebrated treatise *De animi tranquillitate*. Mackenzie says that he afterwards taught philosophy in Italy; and that, being at length desirous of returning to Scotland; he began his journey homeward, was taken ill at Viene in Dauphiny, and died there in the year 1547. He was generally esteemed an accomplished linguist.

Wilmot,
Wilson.

Wilson.

Wife

an admirable philosopher, and an excellent Latin poet. He wrote, beside the above treatise, 1. *Poemata*. Lond. 1619, 4to. 2. *Commentatio quadam theologica in aphorismos dissecta, per Sebast. Gryph.* 3. *Philosophie Aristot. synopsis*, lib. iv.

WILSON (Thomas), lord bishop of Sodor and Man, was born in 1663, at Burton, in the county of Cheller. He received the rudiments of his education at the county town, and from thence was removed to the university of Dublin. His allowance at the university was 20l. a-year; a sum, small as it may now appear, which was in those days sufficient for a sober youth in to cheap a country as Ireland.

His first intention was to have applied to the study of physic; but from this he was diverted by archdeacon Hewetson, by whose advice he dedicated himself to the church. He continued at college till the year 1686, when, on the 29th of June, he was ordained deacon.

The exact time of Mr Wilson's leaving Dublin is not known: but on account of the political and religious disputes of those days, it was sooner than he intended. On the 10th of December in the same year, he was licensed to the curacy of New Church in Winkwick, of which Dr Sherlock, his maternal uncle, was rector. His stipend was no more than 30l. a-year; but being an excellent economist, and having the advantage of living with his uncle, this small income was not only sufficient to supply his own wants, but it enabled him to supply the wants of others; and for this purpose he set apart one-tenth of his income.

In 1692 he was appointed domestic chaplain to William earl of Derby, and tutor to his son James Lord Strange, with a salary of 30l. a-year. He was soon after elected master of the alms-house at Latham, which brought him in 20l. a-year more. Having now an income far beyond his expectations, or his wishes, except as it increased his ability to do good, he set apart one fifth of his income for pious uses, and particularly for the poor. In short, as his income increased, he increased the portion of it which was allotted to the purposes of charity. At first he set apart a tenth, then a fifth, afterwards a third, and lastly, when he became a bishop, he dedicated the full half of his revenues to pious and charitable uses.

He had not been long in the service of Lord Derby, before he was offered the valuable living of Buddsworth in Yorkshire; which he refused to accept, as being inconsistent with the resolves of his conscience against non-residence, Lord Derby choosing still to retain him as chaplain, and tutor to his son. In 1697 he was promoted, not without some degree of compulsion on the part of his patron, to the bishopric of the Isle of Man; a preferment which he held 58 years. In 1698 he married Mary, daughter of Thomas Patten, Esq; of Warrington. By this lady, who survived her marriage about six years, he had four children; none of whom are living except Dr Wilson, prebendary of Westminster.

"The annual receipts of the bishopric (says the author of his memoirs) did not exceed 300l. in money. Some necessaries in his house, as spices, sugar, wine, books, &c. must be paid for with money; distressed or shipwrecked mariners, and some other poor objects, required to be relieved with money; but the poor of the island were fed and clothed, and the house in general

supplied from his demesnes, by exchange, without money. The poor, who could weave or spin, found the best market at Bishop's-court, where they bartered the produce of their labour for corn. Taylors and shoemakers were kept in the house constantly employed, to make into garments or shoes that cloth or leather which his corn had purchased; and the aged and infirm were supplied according to their several wants. Mr Moore of Douglas informed the editor, that he was once witness to a pleasing and singular instance of the Bishop's attention to some aged poor of the island. As he was distributing spectacles to some whose eyesight failed them, Mr Moore expressed his surprise, as he well knew not one of them could read a letter.

"No matter, (said the Bishop with a smile) they will find use enough for them; these spectacles will help them to thread a needle, to mend their clothes, or, if need be, to keep themselves free from vermin."

The year 1720 brings us to a remarkable epocha in the life of this zealous and worthy Bishop; the history of which will be best related in the biographer's own words. "The suspended person alluded to in the Bishop's charge of June the 9th, 1720, was no less a person than Mrs Horn, wife of Captain Horn, governor of the island. In the year 1719, the accused Mrs Puller, a widow woman of fair character, of fornication with Sir James Pool; and from this story, to please Mrs Horn, archdeacon Horrobin refused Mrs Puller the sacrament. Uneasy under this restriction, she had recourse to the mode pointed out by the constitutions of the church to prove her innocence, namely, by oath; which she and Sir James Pool took before the Bishop, with purgators of the best character; and no evidence being produced to prove their guilt, they were by the Bishop cleared of the charge; and Mrs Horn was sentenced to ask pardon of the parties whom she had so unjustly traduced. This she refused to do; and treated the Bishop and his authority, as well as the ecclesiastical constitutions of the island, with contempt. For this indecent disrespect to the laws of the church, the ecclesiastical censure was pronounced, which banished her from the sacrament till atonement was made. The archdeacon, who was chaplain to the governor, out of pique to the Bishop, or from some unworthy motive, received her at the communion, contrary to the custom and orders of the church. An insult to himself the Bishop would have forgiven, but disobedience to the church and its laws he could not allow of. He considered it as the oblation of wrath, rather than the bond of peace, and at last suspended the archdeacon. The archdeacon in a rage, instead of applying to the archbishop of York as metropolitan, and consequently the proper judge to appeal to in matters relating to the church, threw himself on the civil power; and the governor, under pretence that the Bishop had acted illegally and extrajudicially, fined him 50l. and his two vicars-general, who had been officially concerned in the suspension, 20l. each. This fine they all refused to pay, as an arbitrary and unjust imposition: upon which the governor sent a party of soldiers; and they were, on the 29th of June 1722, committed to the prison of Castle Rushin, where they were kept closely confined, and no persons admitted within the walls to see or converse with them." The Bishop was confined in this prison two months, and

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shire, released at the end of that time upon his petition to the king and council."

So great was the Bishop's attachment to his flock, that no temptation could seduce him from their service. He more than once refused the offer of an English bishopric. There is an anecdote of his Lordship and cardinal Fleury, which does great credit to them both. The cardinal wanted much to see him, and sent over on purpose to inquire after his health, his age, and the date of his consecration, as they were the two oldest bishops, and he believed the poorest, in Europe; at the same time inviting him to France. The Bishop sent the cardinal an answer, which gave him so high an opinion of him, that the cardinal obtained an order that no French privateer should savage the Isle of Man.

This good prelate lived till the year 1755, dying at the advanced age of 93. His works have lately been published in 2 vols 4to.

WILTSHIRE, a county of England, bounded on the west by Somersetshire, on the east by Berkshire and Hampshire, on the north by Gloucestershire, and on the south by Dorsetshire and part of Hampshire. The length amounts to 39 miles; its breadth to 30; and its circumference to 140. It contains 29 hundreds, 23 market-towns, 304 parishes, and about 876,000 souls. Besides two members for the shire, and two for the city of Salisbury, each of the following towns sends two to parliament, viz. Wilton, Downton, Hindon, Heytesbury, Westbury, Cane, Devizes, Chippanham, Malmesbury, Cricklade, Great Bedwin, Ludgershall, Old Sarum, Wootton-Bassett, Marlborough.

The air of this county is very healthy, not only in the more low and level parts, but also on the hills. The soil of the vales is very rich, and produces corn and grass in great plenty. The beautiful downs in the south yield the finest pasture for sheep, with which they are overspread. The greatest disadvantage the county labours under is want of fuel, as there are no coal-pits, and but little wood. This county is noted for great quantities of very fine cheese, and for its manufacture of broad cloth, to which it was invited by the great plenty and fineness of its wool. Besides a number of lesser streams, it is watered by the rivers Isis, Kennet, Upper and Lower Avon, Willy, Burne, and Nadder, which are well stored with fish.

WINCHELSEA, a town in Suffex, which has no market, but has one fair on May 14, for cattle and pedlars-ware. It was an ancient place, at least the old town, which was swallowed up by the ocean in 1250. It is now dwindled to a mean place, though it retains its privileges, and sends two members to parliament. It is seated on a rocky cliff, on an inlet of the sea; and had a haven, now choked up. It had 18 parish-churches, now reduced to one. The market-house is in the middle of the town, from whence run four paved streets, at the end of which are four ways, which had formerly buildings on each side for a considerable distance. It is 2 miles south-west of Rye, and 71 south-east of London. It is governed by a mayor and jurats, though it has but about 70 houses. Three of the gates are still standing, but much decayed. E. Long. o. 45. N. Lat. 50 58.

WINCHELSEA (Anne countess of), a lady of excellent genius, especially in poetry, was maid of ho-

nour to the dukes of York, second wife to king James II. and was afterwards married to Heneage, second son of the earl of Winchelsea. One of the most considerable of the countess of Winchelsea's poems was that on the Spleen. A collection of her poems were printed at London in 1713, containing a tragedy never acted, intitled *Ariflomenee*. The countess died in 1720 without issue, as her husband did in 1726.

WINCHESTER, the capital of the county of Hampshire in England. It is a very ancient city, supposed to have been built several centuries before Christ. The Romans called it *Venta Belgarum*, the Britons *Caer Givent*, and the Saxons *Wittanceaster*; whence came the present name. It stands upon the river Itchin, in a bottom surrounded with chalky hills; and is generally allowed to have been a considerable place in the time of the Romans. Some of the first converts to Christianity are supposed to have lived here. In the castle, near the west-gate, many of the Saxon kings anciently kept their court. In the hall where the affizes are kept, is shown a round table of one piece of wood, which, it is pretended, is above 1200 years old, and was that at which king Arthur, with his knights, used to carouse; but Camden says it plainly appears to be of a much more modern date. There is an inscription in Saxon characters upon it, which is now illegible, said to be the names of his 24 knights. The cathedral was founded by Kenegulf, a king of the Mercians; but there were many Christians, and places for their worship here, long before that period. Kineval, or Kenwalchius, the son of Kenegulf, translated the see of Sherburn hither, and made Wina a Frenchman the first bishop; who falling afterwards under the displeasure of Kineval, purchased the see of London from Wulphire king of Mercia, and is reckoned the first simoniacal bishop in England. Here Egbert I. sole monarch of England, was crowned; and not long after Swithin, one of the bishops of this see, was canonized. Another of the bishops of this see was Deneulf, whom Alfred preferred to it, after he had acquired a sufficient stock of learning, though he had been a swine herd, as a reward for having concealed him from the Danes. A monastery was built here by Edward the Elder; and richly endowed by him and his successors. Edward the Confessor was crowned in this place by Edius, archbishop of Canterbury. At that time Alwyn was bishop of this see; but was confined to a monastery on suspicion of a criminal correspondence with queen Emma: from which he was discharged upon the queen's clearing herself by ordeal. By way of thanksgiving to St Swithin for her deliverance, the queen gave nine manors to his church. Walkelin, the next bishop, laid the foundation of the present cathedral. William the Conqueror kept his court here; and at this place he beheaded Waltheof, the great Saxon earl of Northumberland. He not only confined for life in the castle, but put out the eyes of Ederic, another Saxon earl, because he had delivered up the castle of York to Edgar Atheling. Giffard, the next bishop, to terminate the quarrels between the monks of the old and new minsters, removed the latter to Hyde, in this neighbourhood, where he had built an abbey for their reception. His successor was Henry of Blois, brother to king Stephen; who reduced the empress Maud to such straits in this city and castle,

was carried out in a coffin. The bishop after his return, founded and endowed the hospital of St Cross, about a mile to the south of this city, and built the bishop's palace called *Wolsesey*. Here Henry II. held a parliament, and was crowned with his queen. When Godfrey Lucy, son to Richard, lord chief justice of England and governor of the castle, was bishop, Richard II. granted a charter, with very ample privileges, to the citizens. King John resided in this city; and his son Henry III. was born there. Peter de la Roche, another of its bishops, was lord chief-justice and governor of the kingdom in the minority of Henry III. In his time Henry the Lion, duke of Bavaria, with his duchess Matilda, daughter of Henry II. resided at Winchester, where their son William, duke of Bavaria, was born. Hen. III. kept his Christmas here in 1239, when Raleigh was bishop. When the barons rose, the city was taken, and all the Jews in the town put to the sword; but the earl of Leicester, whose son had taken it, being slain, it was recovered by the king. After the murder of Edward II. his uncle, Edmund Plantagenet, was beheaded at the castle-gate of this city.

William Edendon, bishop of this see, being elected archbishop of Canterbury, refused it, saying, "If Canterbury is the higher rack, Winchester is the better manger." This bishop, who had been treasurer of England, was buried in an alabaster tomb on the south-side of the entrance into the choir. He was succeeded by the famous WILLIAM of WICKHAM, so denominated from a village near this place, who became prime minister to Edward III. He procured a charter, by which this city was made a staple for wool; and founded a college called *St Mary's*, which he endowed with a liberal maintenance for a warden, 10 fellows, 2 masters, 70 scholars, 3 chaplains, 3 clerks, an organist, and 16 choristers, to which he granted great privileges. The college consists of two courts, in which are lodgings for the masters and scholars, &c. a large hall, chapel, schools, and a library. After a certain time of continuance in the school, the scholars, if they choose to prosecute their studies, have exhibitions for that purpose in New-college, Oxford, which was also founded by Wickham. The same prelate built also the nave of the church, and obtained the offices of chancellor to the archbishop of Canterbury, and prelate of the garter, to be annexed to this see. Besides these donations, he expended 20,000 merks in the repair of houses, mended the highways from hence to London, built several free-schools and hospitals, both in this county and Surry; all which have his coat of arms on them, with this motto, "Manners make the man." Henry IV. was married in this city; and Henry V. gave audience in it to the French ambassadors who came to implore peace. The bishop at that time was Henry de Beaufort, uncle to the king, who was thrice chancellor of the kingdom, a cardinal, and general of the Pope's forces against the Bohemians. He founded an hospital here, left legacies to all the cathedrals of England, and lies buried in a fine tomb in the church; in which he is represented in his cardinal's robes and hat. Arthur, eldest son of Henry VII. was born in this city in 1486. Waynfleet, bishop of this see, founded Magdalen college in Oxford. One of his successors, Richard Fosse, collected the bones of Ken-

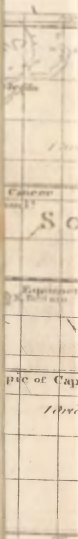
gulf, Kinolphus, Egbert, Edmund, Canute, queen Emma, William Rufus, and his brother Richard, which had been dispersed in the civil wars, deposited them in leaden chests, and interred them at the foot of the great wall of the choir. In 1554 queen Mary was married in this city to Philip of Spain, and the chair used on that occasion is still preserved. In her reign the persecuting Gardiner was bishop of this see. One of his successors was Cooper, author of the *Theaurus*, which bears his name. Morley, who was bishop of this see after the Restoration, built a new episcopal palace, and a college for 10 ministers widows, which he endowed with a good revenue. In his time a palace was begun and almost finished here by Charles II. which is now going to ruins. In the monastery at Hyde was a cross, the gift of Canute the Dane, which cost him one year's revenue of all England. When the monks were ejected out of the other convent dedicated to the Holy Trinity, they were succeeded by a dean and 12 prebendaries. The cathedral is a large pile, and has a venerable look, but is not very elegant. Besides the tombs, there are many curious pieces of workmanship in it; the chief of which are, 1. The font, erected in the time of the Saxons. 2. Copper statues of James I. and Charles I. 3. The bishop's throne. 4. The stalls of the dean and prebendaries. 5. The ascent to the choir and altar. 6. The pavement, inlaid with marble of diverse colours, in various figures. 7. The altarpiece, reckoned the noblest in England. 8. The paintings in the windows, especially the great east window. At the hospital of the Holy Cross mentioned above, every traveller that knocks at the door may claim a manchet of white bread and a cup of beer; of which a great quantity is provided every day for that purpose. This hospital was intended for the maintenance of a master and 30 pensioners, but only 14 are now maintained in it; and the master enjoys a revenue of 800l. a-year. This city is about a mile and a half in compass, and almost surrounded with a wall of flint, has six gates, large suburbs, broad clean streets; but the private houses are in general but ordinary, many of them being very old. The city is interspersed with a great many gardens, which contribute to its beauty and healthiness. There is a great deal of good company in the city and neighbourhood, and many clergymen, but little trade or manufacture. Many other public edifices, besides those we have mentioned, adorn this city; particularly an infirmary, an hospital called *St John's*, and the guildhall. The corporation consists of a mayor, high-steward, recorder, aldermen, two coroners, two bailiffs, 24 common-council-men, a town clerk, four constables, and four sergeants at mace; and the city gives title of *marquis* to the duke of Bolton. A Roman highway leads from hence to Alton; and went formerly, as it is thought, from thence to London. The charming downs in the neighbourhood contribute greatly to the health and pleasure of the inhabitants. The river Itchin is navigable for barges from hence to Southampton.

WIND. As the air is a fluid, subjected to the same laws of gravitation as other fluids, it necessarily has a constant tendency to preserve an equilibrium in every part; so that if, by any means whatever, it is rendered lighter in any one place than another, the weightier air will rush in from every side towards this place, till

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EXHIBIT

A View of the Climate and Climate Trade Winds, and MONSOONS of SOUTH AMERICA, and the

Effects of the Trade Winds, and the Monsoons, on the Climate of the Countries through which they pass.



By J. H. COLEMAN, Esq. of the Admiralty. London: Printed by J. H. COLEMAN, Esq. of the Admiralty. 1800.

A C H A R T,

E X H I B I T I N G

A View of the GENERAL and COASTING TRADE-WINDS, and MONSOONS or SHIFTING TRADE-WINDS, through the whole WORLD.

N. B. *The arrows among the lines, show the course of the winds. The double arrows, pointing different ways, in those places where the lines are thicker than usual, denote the monsoons, the darts always pointing the way that the wind blows in the months which are written by the darts.*



N. B. The exact point where the S. E. and N. E. trade-winds meet each other near the equator, in the Pacific Ocean, is not precisely ascertained. We have therefore discontinued the lines which denote the course of the wind on each side of the equator, at some distance from it. It is generally supposed that the south wind extends to the north of the line, as in the Atlantic Ocean: upon what authority we know not. It seems to us more probable, that this point varies according to the course of the sun; the south wind extending to the north of the line during our summer-season, and the north wind to the south of it in winter. But observations are wanting to confirm this.

Neither is it easy to ascertain with precision the exact boundaries between the invariable trade-winds and the monsoons in the Indian Ocean, near the line; or to say exactly, how far the monsoons, which take place to the south of the equator, extend west from Sumatra and Java.

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TRADE-WINDS, through the whole WORLD.

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n, near the line; or to say exactly, how far the monsoons, which take place

Wind. as much be there accumulated as makes it of an equal weight with the rest of the atmosphere: it is these currents of air which are called *winds*.

Many are the causes which may vary the weight of the atmosphere, and occasion particular tropical winds.

Although other causes may occasion winds in certain circumstances, yet their principal and most universal cause is the sun, which warmeth the air to a much greater degree in some places of the atmosphere than in others; and as the air is susceptible of a great degree of expansion by heat in those places where it is heated to any considerable degree, it is expanded so much as to become lighter than the air in those places where it is colder; so that the weightier cold air from all the circumjacent parts rushes towards this point to restore the equilibrium which had been destroyed. So that if there be any particular part upon the earth's surface where the sun acts constantly with greater force than on any other part, a current of air will constantly flow from there towards the warmer region: but the sun acts with greater force upon those parts of the earth which are nearest the equator, than those which approach towards either poles; so that we might naturally expect that a wind would constantly blow from the polar regions towards the equator; which is really found to be the case in the torrid zone, where the influence of the sun overcomes almost all the other lesser causes which produce the variable winds in our more northerly regions. However, even in the torrid zone, these north and south winds are varied in different ways.

Although the heat of the equatorial region is greater than any other, yet as the sun acts perpendicularly in his diurnal course upon one point of the equator only at one time, and immediately passes over it, and as the air retains the heat communicated to it by the sun but for a short time, cooling gradually as he retires, and continuing still to decrease till his influence again returns the following day; the degree of heat upon this great circle must be very different in different parts, and perpetually varying in every point; which must in some measure tend to disturb those winds coming from the polar regions, which we have already mentioned. To comprehend clearly what will be the effects of this rotation, let us consider what effect it would naturally produce upon the equator with regard to wind, supposing no other cause should interrupt it. And here we must observe, that as the point upon which the sun acts with the greatest power is constantly moving from east to west, the air to the east of that point over which the sun has more lately passed will be more rarified than that to the west, and will naturally flow towards that point from east to west with greater velocity than from west to east, as the cool air to the west of that point will be interrupted in its motion towards it by the motion of the sun meeting it. Hence therefore it follows, that from the diurnal motion of the earth from west to east a constant wind would always be produced, were it not obstructed by other causes. But as there is a constant stream of air flowing from the polar towards the equatorial regions, a composition of these two currents of air acting at the same time will produce a north-east wind in all parts of the northern hemisphere, and a south-east wind in all parts of the southern one. These winds are known

by the name of the *general trade winds*.

If there were no inequalities on the surface of our globe, and if it were composed of a substance perfectly homogeneous, this wind would invariably take place at all times on every part of the earth's surface: but as this is not the case, it is liable to several very considerable variations. In all those regions towards the poles, as the influence of the sun is there but weak, other lesser causes occasion particular winds, and disturb that regularity which at first view we might expect; so that the general trade wind does not invariably take place beyond the 28th or 30th degree of latitude; and the regions between that and the poles have nothing but variable winds. Even in the torrid zone, there are many causes which in particular places alter this direction of the wind; so that the genuine trade-winds do not take place except in the Atlantic and Pacific oceans on each side the equator to the distance of 28 or 30 degrees, and in the greatest part of the Indian ocean to the south of the equator, as appears more distinctly upon the Map, (Plate CCCXII.) where the course of the winds are marked by the direction of the strokes, the darts pointing in the same direction as the wind blows.

Having thus explained the nature and causes of the general trade-wind, we now proceed to take notice of the principal deviations which take place in the torrid zone. The general trade-wind, when thus altered at particular seasons, is known by the name of *monsoons*. There are other variations, which, although as general, are yet of smaller and more limited influence. These are known by the name of *breezes*; and as they blow periodically from the sea, they are denominated *sea or land breezes*, and take place more or less in every sea-coast within the tropics. As the causes of the monsoons will be more clearly comprehended after the nature of these breezes is explained, we shall first consider them.

The sea and land breezes of the torrid zone are gentle periodical winds regularly shifting twice every day, and blowing from the sea towards the land during the day time, and from the land towards the sea in the night. These breezes do not blow with an equal degree of force throughout the whole day and night, but are perpetually varying, being always strongest about mid-day and midnight, and becoming gradually weaker till the time of change in the evening and morning; about which time the air continues for a short space perfectly calm: but in a little the breeze begins to be felt on the side opposite to that from which it blew last, so faint at first as hardly to be perceived; but by degrees acquiring greater strength, it goes on increasing for five or six hours, after which it again as gradually sinks and dies away. They always blow directly off or towards the shore, and never extend their influence to a great distance from it, although this is varied by particular circumstances in different places; as they never extend so far from the points of capes and promontories, as in deep bays; nor upon the windward, as lee-shores.

These breezes are produced by the same cause which gives rise to the trade-wind, viz. the heat of the sun. In these warm regions the days and nights are nearly of an equal length throughout the whole year; the sun rising high in the day time, and descending almost perpendicularly at night; which occasions a much greater

Wind.

varia-

variation between the heat of the day and night than is experienced in the more temperate climates; and it is this great difference between the heat of the night and day which produces the breezes. For the rays of the sun are reverberated from the land during the day-time, much more powerfully than from the sea, whose surface is constantly evaporating; and the air above the land is rendered much warmer, and consequently more rarefied than above the sea; so that a current of air necessarily takes place at that time from the sea towards the land, increasing and diminishing in strength as the heat increases or declines. But when the sun descends below the horizon, the evaporation from the surface of the sea is stopped or greatly diminished, and the cold which it occasioned is of consequence removed: the reverberation of the sun's rays from the surface of the earth is likewise removed, and the air above the land quickly resumes its natural degree of cold, which is always greater than the sea when the influence of the sun is withdrawn: so that the air above the sea becomes warmer during the night than that above the land, and a current of air is of course established from the land to the sea, which forms the land-breeze, which acts as uniformly, although less powerfully, than the sea-breeze; blowing at first gently as the air begins to cool, and gradually gathering strength as the sun retires below the horizon; till his influence begins to be full again in the morning, when it gradually gives place to the more powerful influences of the sea-breeze. These breezes are not, however, entirely confined to the torrid zone. They are even felt in more northern regions; the sea-breeze in particular being almost as perceptible during the summer season along the coasts of the Mediterranean and the Levant, both on the African, European, and Asiatic shores, as within the tropics. Even in our own colder climate, the effects of this are often sensibly felt during the summer season; although, from the length of the day and shortness of the night, the difference between the heat of these is far less than in warmer climates. And although the shortness of our nights prevents us from feeling a nocturnal breeze, similar to the land-breezes of the torrid zone; yet in every serene evening, we have an opportunity of observing a phenomenon, proceeding from a similar cause with that which occasions them in warmer climates. For as the waters retain their heat longer than the earth after the sun withdraws, the moisture which was raised during the heat of the day to a small distance from the earth's surface is quickly condensed by the cold of the evening, and falls down in copious dews; whereas that which is above the surface of the water is more slowly condensed, by reason of the heat which that element retains longer, and hovers at a small distance above it in the form of a dense vapour, which slowly subsides as it loses its heat. This is the cause of those low mists which are so often seen hovering above the surface of rivers and other waters in the evenings towards the end of summer.

It was already observed, that in the Indian ocean the general trade-wind only took place in some parts to the south of the equator. To the north of the line, and in some places to the south of it in that ocean, the general trade-wind only blows regularly for six months; and during the other six months the wind blows in a direction entirely opposite. It is these winds, which

shift thus regularly, which are called *monsoons*, although they are also sometimes called *trade-winds*.

At the equator the days and nights are always of an equal length throughout the whole year; so that the heat being thus equally divided, it never arrives to such an intense degree as to be insupportable to the inhabitants. And as there is no vicissitude of seasons at the equator, so at the poles they never experience the more pleasing vicissitudes of day and night, the sun never setting during the summer season, nor rising above the horizon during the winter: and although the day decreases in length as we recede from the pole, from 6 months to 24 hours; yet in all high latitudes the sun descends for such a short space below the horizon, and in such an oblique direction, that the difference between the heat of the day and night is but very inconsiderable. From which it follows, that during this season, when the sun continues to act with such uninterrupted influence upon the surface of the earth, the air will then be rarefied more above the dry land than upon the surface of the water; so that a wind would naturally set in at that time from the sea towards the land, similar to the diurnal sea-breezes in the warmer climates; and on the contrary, during the winter season, the air in these northern regions being colder above the land than the water, the winds will naturally blow from the land towards the sea, similar to the land-breezes of the torrid zone. But as the influence of the sun, although of longer continuance, is in general more languid in climates of a high latitude than in those near the line, it is not to be expected that these effects will follow with the same regularity as in the torrid zone; being more apt to be interrupted by lesser causes which affect the atmosphere and produce winds in different directions. Yet these are not so totally interrupted but that we can easily trace their effects even in our own cold climate: for during the summer season, the large continent to the east of us, being more heated than the Atlantic ocean westward, produces a general tendency of the current of air towards the east, inasmuch that westerly winds are observed to prevail more than any other, not only here, but in all the frontier countries on the continent, during the summer season. And easterly winds become again more prevalent in the winter and spring. On the contrary, it is observed in North America, that the easterly winds prevail more in summer than at any other time; and the west winds always prevail during the cold months of winter. The same effects take place with a greater degree of constancy in other parts of Europe, particularly in Greece, and the countries in that neighbourhood; as the ancient Greeks have particularly remarked, that the winds blew from the south during the heat of summer, particularly about the dog-days, and from the north during the colder weather of winter.

Any attentive reader, who has accompanied us thus far, will readily see, that the monsoons which take place in the Indian ocean proceed from the same general cause. For when the sun, in his annual course, has crossed the line, and comes to act very strongly upon the extensive countries of Arabia, Persia, China, and the other parts of India, these become heated to a much higher degree than the ocean to the south of them; and the air above these extensive countries being so much rarefied, naturally draws the wind towards that place, which

Wind. which, by overcoming the general trade-wind, produces the southerly monsoons which take place in all those seas during the months of April, May, June, July, August, and September. But when the sun has again retreated towards the southern hemisphere, this great degree of heat in these countries subsides, and the genuine trade-wind again resumes its natural course; forming what they call the *northerly monsoon*, which blows in the months of October, November, December, January, February, and March: and as the continent of Asia now assumes a greater degree of cold than the Atlantic and Pacific oceans in the same latitude, it produces a brisker and more steady gale during the continuance of this monsoon, than is ever experienced in the general trade-wind.

Having thus explained the nature of the monsoons in general, we shall proceed to consider the particulars which influence the direction of these in those parts where they take place. In all that part of the Indian ocean which lies between the island of Madagascar and Cape Commarin, the wind blows constantly from the W. S. W. between the months of April and October; and in the opposite direction from the month of October till April, although with some variation in different places, as these winds are neither so strong nor constant in the bay of Bengal as in the Indian ocean. And it is likewise remarkable, that the S. W. winds in these seas are generally more southerly on the African side, and more westerly on the Indian, as appears distinctly in the map. But these variations are not repugnant to the general theory. For it is sufficiently known, that high lands in every part of the globe are much colder than low and flat countries; and as that part of Africa is very high and mountainous, the cold in these regions is much greater than in the more flat countries of Arabia and India; so that the wind naturally blows from these cold regions, in the summer season, towards the warmer continent of Asia; which occasions those inflexions of the wind to the eastward which take place in these seas during the summer months; and is still farther assisted by the peninsula of India, the kingdom of Siam, and the islands of Sumatra and Java, on the eastern part of this ocean, lying so much farther south than the kingdoms of Arabia and Persia; so that these, being more heated than the ocean to the westward, naturally draw the wind towards them, and produce the easterly variation of the monsoon which takes place in this part of the ocean, while the warm and sandy deserts of Arabia draw the winds more directly northward near the African coast.

In the eastern parts of the Indian ocean, beyond the island of Sumatra, through the gulph of Siam and bay of Tonquin, and along the southern parts of China, and among the Philippine islands, &c. to the north of the equator, the monsoons observe a different direction, blowing nearly due south and north. Here the greatest part of the warm continent is to the west of this district, which makes the wind naturally assume this direction. A little to the east of this, among the Marianné islands, the general trade-wind takes place, there being no continent to the north of them to occasion monsoons.

The monsoons are as regular in the eastern part of the Indian ocean to the south of the equator, as they

are to the north of it; as here a northern monsoon sets in from the month of October till April, and a southern from April to October. And here, as to the north of the line, we find the direction of the monsoons varying according to particular circumstances in different places: for about the island of Sumatra, and towards the west end of Java, the monsoons set in nearly from the north and south; but towards Celebes and Timur, they begin to tend a little more to the east and west, gradually declining as they approach the coast of New Guinea; near to which the northerly monsoon from October till April blows from the N. W. and the opposite monsoon from the S. E. between October and April. The reader will easily perceive that these monsoons are occasioned by the continent of New Holland and Guinea; which being heated by the sun when in the southern signs, draws the wind towards that in the summer season, in the same manner as the continent of Asia produces the monsoons to the north of the line. And it is likewise sufficiently plain, that the inflexion of these periodical winds about Celebes and Timur is occasioned by that part of the continent called *New Guinea* jutting out so near to the equator to the east of these, and drawing the wind toward that quarter.

These are the most general and extensive monsoons which take place in our globe. But there are other periodical winds, which occur in particular places in these warm regions, that deserves particular attention.

In the Red Sea, the monsoon shifts as regularly as in other places; but being influenced by the coasts, it tends a little more to the north and south than in the Indian ocean.

On the south coast of Africa, to the south of Cape Corientes, and about the southern parts of the island of Madagascar, the regular trade-wind from the S. E. takes place between October and April; but from April till October the wind blows from the W. or N. W. and is at that season exceedingly cold. This is evidently occasioned by a cause already taken notice of: for notwithstanding the high and cold nature of this continent, yet when the sun is to the south of the line, his powerful influence at that season so far abates their natural degree of cold, as not to interrupt the general trade-wind between the months of October and April: But when he returns to the northern hemisphere, the high mountains of Africa resume their native coldness, and repel the general trade-winds by their cold and more powerful blast, so as to produce the intemperate monsoon which here takes place between the months of April and October.

From Mozambique to Cape Guardafuy, at the mouth of the Red Sea, the monsoons are a little more irregular than in the other parts of the Indian ocean. For it is observed, that between October and January the winds are variable, although chiefly from the north. In January the N. E. monsoon sets in, and continues regular till the month of May. From May till October the winds again become variable, but blow chiefly from the southern points; but in the months of June, July, and August, there are frequent calms, especially about the bay of Melinda, which sometimes continue for several weeks together, and extend only about 100 leagues from shore.

Wind.

Wind.

Before we can explain the cause of this irregularity clearly, it will be necessary to attend to the direction of the wind on each side of this track at each particular season. In the months of October, November, and December, the winds are here variable, but chiefly from the north. Now during these three months, the wind to the south of this beyond Cape Corientes blows from the S. E. at the Red Sea, and all to the north of this the wind during this season of the year is from the N. E. And as the sun is then perpendicular to the bay of Melinda, these opposite winds here meeting and opposing one another, and being both of them stopped in their course westward by the cold regions of Africa near the Mountains of the Moon, will naturally produce the variable winds here observed, according as the one or the other of these three balancing powers shall predominate: although, as the coast here runs away towards the south-west, it is natural to expect that the northerly wind, which follows the same direction, should more frequently prevail than those which are opposed by it; especially when we consider, that the island of Madagascar, now beginning to be warmed by the influence of the sun, will concur in drawing the wind to the southward; and when the continent of Africa is more heated in the months of January and February, it does not oppose the easterly monsoon, so that the winds become then more fixed than before. But in the months of June, July, and August, the wind to the south of Cape Corientes is from the N. W.; and near the Red Sea, and throughout the northern part of the Indian ocean, the S. W. monsoon is then in its greatest vigour; so that on each end of this district the wind is blowing in an opposite direction; from which results these calms about Melinda, which we just now mentioned.

This much may suffice for the shifting winds on the African and Asiatic coasts. As to America, the only places where the wind shifts regularly are, the bays of Honduras and Campeachy on the east, and that of Panama and some parts on the coast of Mexico on the west, with a small track upon the coast of Brazil. In the south part of the bay of Honduras, between Cape Gracia de Dios and Cape la Bela, the common trade-wind between E. and N. E. blows between March and November; from October till March there are westerly winds, not constant or violent, but blowing moderately sometimes two or three days, or a week; and then the easterly breeze may again prevail for an equal length of time. The reason of the peculiarity here observed is this: During the summer season, the high land on the isthmus of Darien is so much warmed as not to interrupt the course of the general trade-winds; but when he retires to the southern hemisphere, the cold upon the isthmus at that season becomes so great, as to condense the air to such a degree as to repel the trade-wind for some time: but not being cooled to such an intense degree as in some of the larger continents, the trade-wind at times overcomes and repels these land-breezes in its turn, and produces the phenomena above described. And that this is really the case, appears evident from this circumstance, that the land breezes are most prevalent and of longest duration in the coldest months of December and January; before and after which two months, the trade-wind being generally checked only a day or two about the

full or change of the moon. As these western breezes on this coast take their rise from the same cause as the diurnal land-breeze in warm climates, they may be considered as land-breezes of two or three days continuance, and forming an intermediate step between the land-breezes and monsoons. Although the influence of these breezes is felt farther off at sea than the common diurnal breeze, yet they do not extend a great way, being seldom felt above 20, 30, or 40 leagues from shore; and about Cape La Vela, which is much exposed to the east wind, these breezes seldom extend above eight or ten leagues from shore. Land-breezes of the same nature, and proceeding from similar causes, are also experienced in the winter season in the bay of Campeachy, which are there known by the name of *Smafenta winds*. Beyond Cape la Vela these western breezes are not felt, which is undoubtedly occasioned by the whole of that coast as far as Cape St Augustine being so much exposed to the general trade-wind, which here sweeps along the coast with so much violence, as almost totally to repress the weaker influence of the breezes. But between Cape St Augustine and St Catharine's island, or a little farther, we again meet with a variation of the wind at different seasons, as it is here observed to blow in an E. or N. E. direction from September till April, and from April till September from the S. W. This variable wind, or monsoon, like the others on this coast, extends but for a very short way from shore, and is evidently occasioned by the same causes as the other periodical winds. For in the summer months (which in this climate is between September and April), the land of the continent being heated by the sun, draws the trade-wind from its common course of S. E. a little to the westward; and as the coast here tends towards the S. W. the wind in some measure (as it always does) follows the same direction, and produces this E. N. E. monsoon. But in the winter, when this region becomes more cool, the east wind is repelled by the dense cold air from the mountains; by which means it is bent to the northward, and is forced along the coast to Cape St Augustine; where, meeting with no further hindrance, it again falls in with the general trade-wind, and is carried along with it in its proper direction.

We have purposely omitted mentioning the winds on the west coasts of Africa and America till the others were explained, as the causes of the peculiarities here observed will be now more easily comprehended. On the coasts of Chili and Peru, in America, from 25° or 30° of south latitude to the line; and on the parallel coast of Angola, &c. in Africa, the wind blows all the year from the south, varying in its direction a little in different places according to the direction of the coast, towards which it always inclines a little. But whatever is the direction at any one place, it continues the same throughout the whole year without any variation, and always blows from some southerly point. But there is this difference between this wind upon the coasts of Chili and Angola, that it extends much farther out to sea upon the former than upon the latter.

In order to explain the cause of this singular phenomenon, it is necessary to recollect, that the general trade-wind is produced by the concurrence of two separate causes. One is the great heat of the equatorial region,

Wind.

Wind. region, by which alone would be produced a constant north or south wind. The other is the diurnal revolution of the earth, which would cause a perpetual tendency of the air in these warm regions from east to west. From the concurrence of these two causes result the general trade-wind, which would constantly blow from the S. E. or N. E. as we have already demonstrated. But if any one of these two causes, in any particular place, is prevented from producing its full effect, while the other continues to exert its influence, the general direction of the wind will be varied, and it will assume another. Thus, if the east wind was prevented from acting in any particular place, while nothing interrupted the south or north wind, it is evident that the air would rush towards the equator in that direction which was nearest and easiest, whether that should be pointing eastward or westward. Now as the high mountains in the internal parts of Africa and America interrupt the course of the east wind near the surface of the earth, while these coasts of which we now treat are entirely open to the south, the wind naturally rushes along the coasts of Chili and Angola from north to south; and as the low lands near the shore, in these warm regions, is generally warmer than the sea, the wind will naturally point in towards the shore, as is generally observed to happen.

This, then, is the obvious cause of the south wind which always prevails upon the coasts of Chili and Peru, as well as along the shores of Angola, Loango, &c. But it is only near the shore that this can take place; nor can it extend to a great height above these low and fertile regions. For as the internal parts of these countries are exceedingly high, but more especially the Andes of America, which experience a perpetual degree of cold more intense than some polar regions ever experience; the air must here be condensed to a very great degree, and send forth from these high regions a perpetual wind to every side, which occasions almost all the peculiarities that have been remarked in these climates: for by opposing the general current of the trade-wind upon the eastern part of these continents, they produce these deluges of rain which supply the immense rivers of the Amazons, La Plata, &c. these do not, like the Nile and Gambia, swell only at a particular season, and then shrink into a diminutive size again; but continue throughout the whole year, with less variation of size, to pour their immense floods of water into the ocean. These cold winds likewise stretching to the westward, at a considerable distance above the warmer regions of the sea-coast, at length descend as low as the ocean, and form the general trade-wind, and occasion that unusual degree of cold which mariners have so often complained of even under the line to the westward of America. To the same cause also must we attribute the thick fogs so common upon the southern parts of Chili and along the coasts of Peru, with the other peculiarities of that singular climate about Lima and the kingdom of Valles in South America; for the vapours which are exhaled in such great abundance in the warm regions on the sea-shore, are, at a little height above the earth, condensed by the cold winds which come from the mountains, and form these thick mists which are so often observed in this climate. The same effects are felt in some degree on the similar coast of Africa. But

as the mountains of Africa are not so high as the Andes of America, nor approach so near the western coast, the effects are less sensible here than in America. The great height of the Andes above the mountains of the similarly situated country of Africa, is the only reason why the effects on that coast are not felt to an equal degree, although similar in kind.

A more singular deviation from the general trade-wind is observed to take place on the African and American coasts to the north of the line, than those we have taken notice of to the south of it. For it is observed, that from California to the bay of Panama, all along the coasts of New Spain, the winds blow almost constantly from the west or S. W. nearly directly opposite to the trade-wind; and on the coast of Africa from Cape Bayador to Cape Verde, they blow chiefly from the N. W. standing in upon the shore; from thence the wind bends gradually more and more from the north to the west, and so round to the S. W. all along the coast of Guinea, as will be distinctly seen by the map. After what we have said of the winds on the southern parts of these regions, it will be unnecessary to spend much time in explaining the cause of these peculiarities, as it will evidently appear that they are nearly the same, the variations here observed being occasioned by the particular direction of the coast.— Thus, along the coast of New Spain, the wind blows nearly the same direction in every place, as there are no remarkable bendings on the coast; being uniformly drawn towards the shore by the great heat of the low part of the continent near the sea; which in these regions is always more heated than the water of the ocean, and occasions that inflection. But as the coast of Africa is more irregular, the winds also are found to be more different in their direction. To the north of Cape Verde, as the coast stretches nearly south and north, the wind, being drawn towards it a little, blows from the N. W. But beyond that, the coast bends more eastward to Cape Palmas; from which it runs E. or N. E. all along the coast of Guinea, the wind shifting gradually more and more to the west, still pointing in upon the coast. And as there is nothing to oppose the current of air, which comes from the south along the coast of Angola, it stretches forward till it comes within the influence of the coast of Guinea, and is there drawn in towards the shore in a S. W. direction. But as it is only the lower regions of the coast of Guinea which are so much warmed, the high mountains within continuing cold; the northerly wind coming from these meeting and opposing the southerly winds in the higher regions of the air, by their mutual conflicts occasion those incessant rains and tremendous thunder so remarkable along the whole of this uncomfortable coast.

It has been often observed by mariners, that there is a track of sea to the west of Guinea from five to ten degrees of north latitude, in which the trade-wind blows with less steadiness than in any other part of that ocean, being almost constantly troubled with calms and tornadoes; the cause of which the reader will perceive by inspecting the map, as he will easily see that the winds are drawn from this quarter almost in every direction: so that there can be here no constant wind; but being exhausted of its air, it must become lighter than the circumjacent parts, and must then be

Wind.

Wind.

supplied from either side, as chance or occasional circumstances may direct, which occasions those sudden furies and tornadoes here observed.

Before we take leave of this subject, it is necessary to observe, that in the bay of Panama the winds between September and March are easterly; but from March till September they blow chiefly from the S. S. W. that is, during the winter months, while the sun is far from them, the winds are off shore; and during the summer months, the land being heated to a considerable degree, they are drawn towards the shore as usual. It is remarkable, however, that this is the only part on the west of a large continent where the wind shifts regularly at different seasons; which seems to be occasioned by the great height of the isthmus of Darien, and the Terra Firma to the east of it, and the nearness of these to the sea, in comparison of the mountains near Benin on the similarly situated coast of Africa; which is greatly assisted by the deepness of the bay, which, by bending so much to the eastward from Cape Lorenzo, is in a great measure screened from the force of the south winds, which allows the winter breeze to extend itself upon the bay with more facility. We ought here also to remark, that along the coast of Mexico, between Cape Pelanco and Guatemala, there are land winds which blow in the months of May, June, and July, called by the Spaniards *Poppaiors*. They greatly resemble the Summalenta winds in the bay of Compeachy, as they blow both night and day a moderate breeze without intermission, sometimes three or four days or a week together. But as these blow from the land in summer only, whereas the Summalenta's blow only in winter, they must be occasioned by a different cause, which seems to be this: As the continent which divide the South Sea from the bay of Mexico and gulph of Honduras, is but of very small breadth, and in many places very high ground, the heat which it receives from the sun in summer is not so great as on the similar coast of Africa; and as the trade-wind coming from the great Atlantic ocean sweeps along the eastern part of the American coast from Cape St. Augustine to the bay of Honduras with very great violence at that season, the small heat of this narrow continent is not sufficient to stop it entirely during that season; so that at some times it blows for a short time quite across it, and occasions those winds called *Poppaiors*.

Besides these more general winds, there are likewise some particular winds which are only felt in particular places at certain times, whose effects are so singular as to merit attention; some of which we shall here take notice of. In the gulph of Persia, particularly at Ormuz, during the months of June and July, there sometimes blows from the west, for a day or two together, a hot suffocating fiery wind, which scorches up and destroys any animal that may be exposed to it; for which reason, almost every body leave their habitations at Ormuz during these two months, and retire to the mountains near Schiras in Persia, where they enjoy a more comfortable climate. To explain the cause of which, it is necessary to observe, that along all the coasts of Asia, to the north of the Indian ocean, the diurnal sea and land breezes take place, as in every part of the torrid zone; by means of which the monsoons are not felt close in upon the shores. But as the monsoon

continues to blow regularly at a small distance from shore, so in all probability it continues its course without interruption at a small distance above the surface of the earth. Now when the monsoon is in its greatest vigour, its influence will sometimes descend even as low as the surface of the earth, and, interrupting the course of the breezes, hurry along with it these warm vapours, which ought to have ascended upwards, and produced the salutary sea breeze; and as the earth is thus deprived of the refreshing influence and moisture of the sea-breeze, the air, by the strong reverberation of the sun-beams from such dry and sandy countries as Arabia, must soon be heated to an amazing degree, and produce these hot and suffocating winds. It is also remarkable, that these hot winds are more often experienced near headlands, where the sea-breezes are weakest, which seems to confirm this hypothesis.—Winds similar to these in kind, though not in degree, are felt upon the coast of Coromandel during the months of June, July, and August, while the west monsoon reigns; and on the Malabar coast they are likewise felt in the months of December and January, while the east monsoon reigns; but these are much less powerful than either of the others. As these hot winds always come from the land, they are known upon these coasts by the name of *Terren's*.

It has likewise been observed, that on the coast of Africa to the north of Cape Verde, during the months of December, January, and February, there sometimes blows, for a day or two together, an easterly wind, so very intensely cold as to be almost as destructive as the warm winds at Ormuz. We have already in some measure explained the cause of this phenomenon.—During these months, when the sun is far from them, his influence is less felt than at other seasons, and the northerly wind upon the coast is of course weakened, inso much that the cold produced by the mountains in the heart of the country being now in its greatest degree of force, bursts its usual confinement for a time, spreading to the west with great violence, and producing those uncommon effects already mentioned. Those who sail on these coasts, distinguish this particular wind by the name of *Harmattan*.

These are the principal winds, whether constant or periodical, that take place within the tropics; and thus simple are their causes.

The succession of sea and land breezes renders the torrid zone not only habitable but comfortable. Besides, as these currents of cold air, rushing from each side of the globe, and carrying along with them vast quantities of aqueous vapours which they collect from the surface of the earth in their course, meet and oppose one another at that part of the atmosphere where the influence of the sun is greatest at the time, the water is there forced from the clouds in such prodigious quantities, as to produce a diversity of seasons in the torrid zone, something similar to what is experienced in more temperate climates; with this difference, however, that whereas, in temperate climates, the warmest and most comfortable season is when the sun approaches nearest perpendicular to them, in these warmer climates the heavy rains which fall upon them at that season moderates the heat, and prevents the sun from having such an effect as at other times; so that their coldest and most inconstant weather, which they

Wind. they call *quinter*, is at that season, when, without this influence, they would be exposed to the sun's most powerful cause.

We shall only take notice of one other instance of the happy effects produced on our globe by the laws of nature with respect to winds. We have seen, that in the great Atlantic and Pacific oceans, the trade-wind blows constantly from the easterly points throughout the whole year, so that ships sail from east to west within the tropics with the utmost facility; but it is absolutely impossible in these seas to sail from west to east, as the wind would be constantly against them; so that ships bound for any port to the eastward in these regions, must stand to the north or south till they are beyond the limits of the trade-winds, where they meet with variable breezes, by the help of which they fail to the eastward. But if the same constant trade-wind had taken place in the northern part of the Indian ocean, it would have been impossible to have sailed to the eastward at all; because the continent of Asia would have prevented the ships from sailing far enough north to find the variable winds. But here, as in almost every case in which the operations of nature are concerned, we find, that what produceth the disease, at the same time furnisheth a remedy; for that very continent which would have stood in our way going northward, draws the wind towards itself at one season, which makes that course of navigation unnecessary, the shifting of the monsoons supplying a nearer and more commodious course. Thus we see, that wherever the sea is open to the south or north, near the tropics, so as that ships are at freedom to reach the variable winds, the trade-wind constantly blows in one direction; but, wherever there is any extent of continent within the verge of the torrid zone, so as that they could not be at liberty to reach the variable winds, there the course of the trade-wind is altered, being drawn towards it in summer, and from it in winter, forming that shifting wind called *monsoons*. From which we may naturally infer, that as there are no monsoons in the Pacific or Atlantic, or in the western part of the Indian ocean, to the south of the line, there are no extensive continents near the tropics in either of these places.

WIND-Flower. See ANEMONE.

WIND-Mill, a kind of mill, the internal parts of which are much the same with those of a water-mill: from which, however, it differs, in being moved by the impulse of the wind upon its sails or vanes, which are to be considered as a wheel in axes.

WIND-Gage. See Wind-GAGE.

WIND-Galls, in farricry. See there, § xxxii.

Instruments for measuring the strength, velocity, &c. of the WIND. See Wind-GAGE, ANEMOMETER, and ANEMOSCOPE.

The following ingenious method of measuring the velocity of the wind is extracted from a letter of the Rev. Mr Bryce of Kirknewton to the president of the Royal Society.

"The velocity of the wind near the earth is very unequal, upon account of the frequent interruptions it meets with from hills, trees, and houses, and even in open plains; the surface of the earth, though much smoother than it commonly is, must reflect and interrupt such a fluid as the air, and occasion great irregu-

larity in the velocity of its current: this is the reason when a feather is let fly with the wind, why it seldom, if ever, describes a straight line, but moves sometimes in a kind of spiral, now high; and then low, sometimes to the right, and then again to the left; and why two feathers let fly at once seldom, if ever, keep together, or describe similar lines.

"But at some considerable distance from the earth, the velocity of the wind seems to be regular and steady: nothing can be more uniform than the velocity of a cloud in the sky appears to be even in the greatest storm: it is like a ship carried away insensibly by a smooth and gentle current, passing over equal spaces in equal times. This suggested the thought, that the motion of a cloud, or its shadow over the surface of the earth, would be a much more proper measure of the velocity of the wind.

"In the end of March 1763, I had as favourable an opportunity of putting this method into practice as I could have wished for: the storm was exceeding high, and moved with vast velocity; the sun was bright, the sky clear, except where it was spotted with light floating clouds. I took my station in the north window of my dining room, near the clock, from which I had a free prospect of the fields: the sun was in the meridian, the wind due west intersecting his rays at right angles. I waited until the fore-part of the shadow of a cloud, that was distinct, and well defined, just touched a south and north line, which I had marked upon the ground: at that instant I began my reckoning, and followed the shadow with my eye in its progress, counting seconds all the while by the clock, until I had reckoned up 15 seconds; then I observed exactly where the fore-said edge of the shadow was.

"This experiment I repeated ten times in half an hour, and seldom found the difference of a second in the time which different clouds took to move over the same space. On the 5th of May current, I repeated the trial four different times, the sun being also near the meridian, the wind in the west, with light clouds floating in a clear sky as formerly; and found that the shadows of different clouds took some of them 44, and others 45 seconds, to pass over the same space which they had moved over in 15 seconds in the former trials.

Feet

This space measures exactly 1534 = space passed over in 15"

which multiplied by

4

gives 5536 = space passed over in 1 m.

which multiplied by

60

gives 332,160 = space passed over in 1 h.

"Which space is = 62.9 English miles per hour, the velocity of the wind in March 1763.

"One third of this (or 21 miles nearly) shows the velocity of the wind on May the 6th, when it blew a fresh gale.

"This day, May 12, there was a small westerly breeze, the velocity of which I measured upon the same line, the sun being 10 minutes past the meridian, and found that the shadow took 95 seconds to pass over the above space; which gives the velocity of the wind at the rate of 9.9 English miles per hour.

"Thus, by having several lines in different directions of a known length marked upon the ground, one may easily (and with great accuracy, I imagine) measure the velocity of the wind. If a person was provided

Wind
Window.

ded with an instrument for measuring the force of the wind, it would perhaps be worth while to observe whether, when the velocities of different winds were the same (or nearly so) the force of these winds did not vary with the seasons of the year, the points of the compass from which the wind blows, and also with the different state of the barometer and thermometer; since the momentum of the wind depends not only upon its velocity, but also upon its density."

WIND Sails, a fort of wide tube or funnel of canvas, employed to convey a stream of fresh air downward into the lower apartments of a ship.

This machine is usually extended by large hoops situated in different parts of its height. It is let down perpendicularly through the hatches, being expanded at the lower end like the base of a cone; and having its upper side open on the side which is placed to windward, so as to receive the full current of wind; which entering the cavity, fills the tube, and rushes downwards into the lower regions of the ship. There are generally three or four of these in our capital ships of war, which, together with the ventilators, contribute greatly to preserve the health of the crew.

WINDLASS, a machine used to raise huge weights withal, as guns, stones, anchors, &c.

It is very simple, consisting only of an axis or roller, supported horizontally at the two ends by two pieces of wood and a pulley: the two pieces of wood meet at top, being placed diagonally so as to prop each other; the axis or roller goes through the two pieces, and turns in them. The pulley is fastened at top where the pieces join. Lastly, there are two flaves or handpikes which go through the roller, whereby it is turned, and the rope which comes over the pulley is wound off and on the same.

WINDLASS, in a ship, is an instrument in small ships, placed upon the deck, just abaft the fore mast. It is made of a piece of timber six or eight feet square, in form of an axle-tree, whose length is placed horizontally upon two pieces of wood at the ends thereof, and upon which it is turned about by the help of handspikes put into holes made for that purpose. This instrument serves for weighing anchors, or hoisting of any weight in or out of the ship, and will purchase much more than any capstan, and that without any danger to those that heave; for if in heaving the windlasses about, any of the handspikes should happen to break, the windlasses would fall of itself.

WINDOW, an aperture or open place in the wall of a house, to let in the wind and light. See ARCHITECTURE, n^o 83.

The word is Welch, *Uynt Dor*, signifying the passage for the wind. Window is yet provincially denominated *windor* in Lancashire; i. e. *wind-door*, or the passage for air, as that for people was peculiarly called the *door*.

Before the use of glass became general, which was not till towards the end of the 12th century, the windows in Britain seem generally to have been composed of paper. Properly prepared with oil, this forms no contemptible defence against the intrusions of the weather, and makes no incompetent opening for the admission of the light. It is still used by our architects for the temporary windows of unfinished houses, and not unfrequently for the regular ones of our work-

shops. But some of the principal buildings we may reasonably suppose to have been windowed in a superior manner. They could however be furnished merely with lattices of wood or sheets of linen, as these two remained the only furniture of our cathedrals nearly to the eighth century. And the lattices continued in some of the meaner towns of Lancashire to the 18th; and in many districts of Wales, and many of the adjoining parts of England, are in use even to the present moment.—These seem all to have been fixed in frames that were called *casementa*, and now therefore *casements* in Wales and Lancashire.

WINDSOR, a borough-town of Berkshire, 20 miles west of London, most remarkable for the magnificent palace or castle situated there on an eminence, which commands the adjacent country for many miles, the river Thames running at the foot of the hill. The knights of the garter are installed in the royal chapel here. It sends two members to parliament.

WINDWARD, in the sea-language, denotes any thing towards that point from whence the wind blows, in respect of a ship: thus windward-tide, is the tide which runs against the wind.

WINE, a brisk, agreeable, spirituous, and cordial liquor, drawn from vegetable bodies, and fermented.

All sorts of vegetables, fruits, seeds, roots, &c. afford wine; as grapes, currants, mulberries, alder-berries, cherries, apples, pulse, beans, pease, turneps, radishes, and even grass itself. Hence under the class of wines, or vinous liquors, come not only wines absolutely so called, but also ale, cyder, &c.

Wine in France is distinguished, from the several degrees and steps of its preparation, into, 1. *Mere goute*, mother-drop, which is the virgin wine, or that which runs of itself out at the top of the vat wherein the grapes are laid, before the vintager enters to tread or stamp the grapes. 2. *Muſt*, *ſurmuſt*, or *ſlum*, which is the wine or liquor in the vat, after the grapes have been trod or stamped. 3. *Preſſed wine*, being that squeezed with a press out of the grapes half bruised by the treading. The hulks left of the grapes are called *rope*, *mark*, or *mark*; by throwing water upon which, and pressing them afresh, they make a liquor for servants use, answerable to our cyderkin, and called *biſſon*. 4. *Sweet wine*, is that which has not yet worked nor fermented. 5. *Bouru*, that which has been prevented working by casting in cold water. 6. *Worked wine*, that which has been let work in the vat, to give it a colour. 7. *Boiled wine*, that which has had a boiling before it worked, and which by that means still retains its native sweetness. 8. *Strained wine*, that made by steeping dry grapes in water, and letting it ferment of itself. Wines are also distinguished with regard to their colour into white wine, red wine, claret wine, pale wine, rose, or black wine; and with regard to their country, or the soil that produces them, into French wines, Spanish wines, Rhenish wines, Hungarian wines, Greek wines, Canary wines, &c. and more particularly into Port wine, Madeira wine, Burgundy wine, Champagne wine, Falernian wine, Tockay wine, Schiras wine, &c.

Method of Making, Fining, &c. WINE. In the southern parts of France, their way is with red wines to tread or squeeze the grapes between the hands, and to let the whole stand, juice and hulks, till the tincture be

Wind
Window.

fine. be to their liking; after which they press it. But for white wines, they press the grapes immediately; when pressed, they tun the must and stop up the vessel, only leaving the depth of a foot or more to give room for it to work. At the end of ten days they fill this space with some other proper wine, that will not provoke it to work again. This they repeat from time to time, new wine spending itself a little before it comes to perfection.

The usual method of fining down wines, so as to render them expeditiously bright, clear, and fit for use, is this: Take an ounce of isinglass, beat it into thin threads with a hammer, and dissolve it, by boiling, in a pint of water; this when cold becomes a stiff jelly. Whilk up some of this jelly into a froth with a little of the wine intended to be fined, then stir it well among the rest in the cask, and bung it down tight; by this means the wine will become bright in eight or ten days. This method, however, is found to be best suited to the white wines; for the red ones, the wine-coopers commonly use the whites of eggs beat up to a froth, and mixed in the same manner with their wines.

They fine it down also by putting the shavings of green beech into the vessel, having first taken off all the rind, and boiled them an hour in water to extract their rankness, and afterwards dried them in the sun, or in an oven. A bushel of these serve for a tun of wine; and being mashed, they serve again and again, till almost quite consumed.

For English wine, the method recommended by Mortimer, is first to gather the grapes when very dry, to pick them from the stalks, then to press them, and let the juice stand 24 hours in a vat covered. Afterwards to draw it off from the gross lees, and then put it up in a cask, and to add a pint or quart of strong red or white port to every gallon of juice, and let the whole work, bunging it up close, and letting it stand till January; then bottle it in dry weather. Bradley chooses to have the liquor when pressed, stand with the hulks and stalks in the vat, to ferment for 15 days. The method of converting white-wine into red, so much practised by the modern wine-coopers, Dr Shaw observes is this: Put four ounces of turnsole rags in to an earthen vessel, and pour upon them a pint of boiling water; cover the vessel close, and leave it to cool; strain off the liquor, which will be of a fine deep red, inclining to purple. A small portion of this colours a large quantity of wine. This tincture might be either made in brandy, or mixed with it, or else made into a syrup, with sugar, for keeping. A common way with the wine-coopers is to infuse the rags cold in wine for a night or more, and then wring them out with their hands; but the inconvenience of this method is, that it gives the wine a disagreeable taste, or what is commonly called the *taste of the rag*; whence the wines thus coloured usually pass among judges for pressed wines, which have all this taste from the canvas rags in which the lees are pressed. The way of extracting the tincture, as here directed, is not attended with this inconvenience, but it loads the wine with water; and if made into a syrup, or mixed in brandy, it would load the wine with things not wanted, since the colour alone is required. Hence the colouring of wines has always its inconveniencies. In those countries which do not produce the tinging grape, which affords a blood-red

Wine. juice, wherewith the wines of France are often stained, in defect of this, the juice of alder-berries is used, and sometimes logwood is used at Oporto.

The colour afforded by the method here proposed, gives wine the tinge of the Bourdeaux red, not the port; whence the foreign coopers are often distressed for want of a proper colouring for red wines in bad years. This might perhaps be supplied by an extract made by boiling slick-lack in water. The skins of tinging grapes might also be used, and the matter of the turnsole procured in a solid form, not imbibed in rags.

Stahl observes, that it is a common accident, and a disease in wines, to be kept too hot; which is not easy to cure when it has been of any long continuance, otherwise it may be cured by introducing a small artificial fermentation, that new ranges the parts of the wine, or rather recovers their former texture: but the actual exposing of wine to the fire, or the sun, presently disposes it to turn eager; and the making it boiling hot, is one of the quickest ways of expediting the process of making of vinegar.

On the other hand, wine kept in a cool vault, and well secured from the external air, will preserve its texture entire in all the constituent parts, and sufficiently strong for many years, as appears not only from old wines, but other foreign fermented liquors, particularly those of China, prepared from a decoction of rice; which being well closed down in a vessel, and buried deep under ground, will continue for a long series of years rich, generous, and good, as the histories of that country universally agree in assuring us.

The most general remedy hitherto known for all the diseases of wines, is a prudent use of tartarized spirit of wine, which not only enriches, but disposes all ordinary wines to grow fine.

If either by fraud or accident a larger portion of water is mixed with wine than is proper for its consistence, and no way necessary or essential, this superfluous water does not only deprave the taste, and spoil the excellence of the wine, but also renders it less durable; for humidity in general, and much more a superfluous aqueous humidity, is the primary and restless instrument of all the changes that are brought on by fermentation. It may doubtless therefore be useful, and sometimes absolutely necessary, to take away this superfluous water from the other part which strictly and properly constitutes the wine. This has been agreed upon all hands as a thing proper, but the manner of doing it has not been well agreed on: some have proposed the sucking it by means of heat and evaporation, others by percolation, and others by various other methods, all found unsuccessful when brought to the trial; but the way proposed by Dr Shaw from Stahl, is the most certain and commodious; this is done by a concentration of the wine, not by means of heat, but of cold.

If any kind of wine, but particularly such as has never been adulterated, be in a sufficient quantity, as that of a gallon or more, exposed to a sufficient degree of cold in frosty weather, or be put into any place where ice continues all the year, as in our ice-houses, and there suffered to freeze, the superfluous water that was originally contained in the wine will be frozen into ice, and will leave the proper and truly essential part of the wine unfrozen, unless the degree of cold should

Wine. should be very intense, or the wine but weak and poor. This is the principle on which Stahl founds his whole system of condensing wines by cold. When the froit is moderate, the experiment has no difficulty, because not above a third or a fourth part of the superfluous water will be froze in a whole night; but if the cold be very intense, the best way is, at the end of a few hours when a tolerable quantity of ice is formed, to pour out the remaining fluid liquor, and set it in another vessel to freeze again by itself. If the vessel, that thus by degrees receives the several parcels of the condensed wine, be suffered to stand in the cold freezing place where the operation is performed, the quantity lying thin in the pouring out, or otherwise, will be very apt to freeze anew; and if it be set in a warm place, some of this aqueous part thaws again, and so weakens the rest. The condensed wine therefore should be emptied in some place of a moderate degree as to cold or heat, where neither the ice may dissolve, nor the vinous substance mixed among it be congealed. But the best expedient of all is to perform the operation with a large quantity of wine, or that of several gallons, where the utmost exactness, or the danger of a trifling waste, need not be regarded.

By this method, when properly performed, there first freezes about one third part of the whole liquor; and this is properly the more purely aqueous part of it, inasmuch that when all the vinous fluid is poured off to be again exposed to a concentration, the ice remaining behind from this first freezing being set to thaw in a warm place, dissolves into a pure and tasteless water. The frozen part, or ice, consists only of the watery part of the wine, and may be thrown away, and the liquid part retains all the strength, and is to be preserved. This will never grow four, musty, or mouldy afterwards, and may at any time be reduced to wine of the common kind again, by adding to it as much water as will make it up to the quantity that it was before.

Wines in general may by this method be reduced to any degree of vinosity or perfection.

The benefit and advantage of this method of congelation, if reduced to practice in the large way in the wine countries, must be evident to every body. Concentrated wines in this manner might be sent into foreign countries instead of wine and water, which is what is usually now sent, the wines they export being loaded, and in danger of being spoiled by three or four times their own quantity of unnecessary, superfluous, and prejudicial water.

An easy method of recovering pricked wines may be learned from the following experiment: Take a bottle of red port that is pricked, add to it half an ounce of tartarized spirit of wine, shake the liquor well together, and set it by for a few days, and it will be found very remarkably altered for the better.

This experiment depends upon the useful doctrine of acids and alkalies. All perfect wines have naturally some acidity, and when this acidity prevails too much, the wine is said to be pricked, which is truly a state of the wine tending to vinegar: but the introduction of a fine alkaline salt, such as that of tartar, imbibed by spirit of wine, has a direct power of taking off the acidity, and the spirit of wine also contributes to this, as a great preservative in general of wines. If this ope-

ration be dexterously performed, pricked wines may be absolutely recovered by it, and remain saleable for some time; and the same method may be used to malt liquors just turned sour.

The age of wine is properly reckoned by leaves; thus they say wine of two, four, or six leaves, to signify wine of two, four, or six years old; taking each new leaf put forth by the vine since the wine was made for a year.

WINE is also a denomination applied in medicine and pharmacy to divers mixtures and compositions, wherein the juice of the grape is a principal ingredient. See the article VINUM.

With regard to the medical uses of wines, it is observed, that among the great variety of wines in common use among us, five are employed in the shops as menstrua for medicinal simples; that is, the *vinum album hispanicum*, or Mountain wine; the *vinum album gallicum*, or French white wine; the Canary wine, or sack, the Rhenish wine, and the red port. The effects of these liquors on the human body are, to cheer the spirits, warm the habit, promote perspiration, render the vessels full and turgid, raise the pulse, and quicken the circulation. The effects of the full-bodied wines are much more durable than those of the thinner: all sweet wines, as Canary, abound with a glutinous, nutritious substance, whilst the others are not nutritive, or only accidentally so, by strengthening the organs employed in digestion. Sweet wines, in general, do not pass off freely by urine; and they heat the constitution more than an equal quantity of any other, though containing full as much spirit: red port, and most of the red wines, have an astringent quality, by which they strengthen the tone of the stomach, and thus prove serviceable for restraining immoderate secretions; those which are of an acid nature, as Rhenish, pass freely by the kidneys, and gently loosen the belly. It is supposed that these last exasperate and occasion gouty calculous disorders, and that new wines of every kind have this effect.

WINE Spirit, a term used by our distillers, and which may seem to mean the same thing with the phrase of spirit of wine: but they are taken in very different senses in the trade.

Spirit of Wine is the name given to the common malt spirit when reduced to an alcohol or totally inflammable state; but the phrase *wine-spirit* is used to express a very clean and fine spirit, of the ordinary proof strength, and made in England from wines of foreign growth.

The way of producing it is by simple distillation, and it is never rectified any higher than common bubble proof. The several wines of different natures yield very different proportions of spirit; but, in general, the strongest yield one fourth, the weakest in spirits one eighth, part of proof spirit; that is, they contain from a sixteenth to an eighth part of their quantity of pure alcohol.

Wines that are a little four serve not at all the worse for the purposes of the distiller; they rather give a greater vinosity to the produce. This vinosity is a thing of great use in the wine-spirit, whose principal use is to mix with another that is tartarized, or with a malt-spirit, rendered alkaline by the method of rectification. All the wine-spirits made in England, even

even those from the French wines, appear very greatly different from the common French brandy; and this has given our distillers a notion that there is some secret art practised in France, for the giving the agreeable flavour to that spirit: but this is without foundation.

WING, that part of a bird, insect, &c. whereby it is enabled to fly. See BIRD and ORNITHOLOGY.

WINGS, in military affairs, are the two flanks or extremes of an army, ranged in form of a battle; being the right and left sides thereof.

WINTER, one of the four seasons or quarters of the year. See SEASON, &c.

Winter commences on the day when the sun's distance from the zenith of the place is greatest, and ends on the day when its distance is at a mean between the greatest and least.

Under the equator, the winter as well as other seasons return twice every year; but all other places have only one winter in the year; which in the northern hemisphere begins when the sun is in the tropic of Capricorn, and in the southern hemisphere when in the tropic of Cancer; so that all places in the same hemisphere have their winter at the same time.

WIRE, a piece of metal drawn through the hole of an iron into a thread of a fineness answerable to the hole it passed through.

Wires are frequently drawn so fine as to be wrought along with other threads of silk, wool, flax, &c.

The metals most commonly drawn into wire, are gold, silver, copper, and iron. Gold-wire is made of cylindrical ingots of silver, covered over with a skin of gold, and thus drawn successively through a vast number of holes, each smaller and smaller, till at last it is brought to a fineness exceeding that of a hair. That admirable ductility which makes one of the distinguishing characters of gold, is no where more conspicuous than in this gilt wire. A cylinder of 48 ounces of silver, covered with a coat of gold, only weighing one ounce, as Dr Halley informs us, is usually drawn into a wire, two yards of which weigh no more than one grain; whence 98 yards of the wire weigh no more than 49 grains, and one single grain of gold covers the 98 yards; so that the ten thousandth part of a grain is above one-eighth of an inch long.

WIRE of Lapland. The inhabitants of Lapland have a sort of shining slender substance in use among them on several occasions, which is much of the thickness and appearance of our silver-wire, and is therefore called, by those who do not examine its structure or substance, *Lapland wire*. It is made of the sinews of the rein-deer; which being carefully separated in the eating, are, by the women, after soaking in water and beating, spun into a sort of thread, of admirable fineness and strength, when wrought to the smallest filaments; but when larger, is very strong, and fit for the purposes of strength and force. Their wire, as it is called, is made of the finest of these threads, covered with tin. The women do this business; and the way, they take is to melt a piece of tin, and placing at the edge of it a horn, with a hole through it, they draw these sinewy threads, covered with the tin, through the hole, which prevents their coming out too thick covered. This drawing is performed with their teeth; and there is a small piece of bone placed at the top of the hole, where the wire is made flat; so that we al-

ways find it rounded on all sides but one, where it is flat.

This wire they use in embroidering their cloaths as we do gold and silver; they often sell it to strangers, under the notion of its having certain magical virtues.

WISDOM, usually denotes a higher and more refined notion of things immediately presented to the mind, as it were, by intuition, without the assistance of ratiocination.

Sometimes the word is more immediately used, in a moral sense, for what we call *prudence*, or *discretion*, which consists in the soundness of the judgment, and a conduct answerable thereto.

WIT is a quality of certain thoughts and expressions: the term is never applied to an action nor to a passion, and as little to an external object.

However difficult it may be, in every particular instance, to distinguish a witty thought or expression from one that is not so; yet in general it may be laid down, that the term *wit* is appropriated to such thoughts and expressions as are ludicrous, and also occasion some degree of surprise by their singularity. Wit also, in a figurative sense, expresses that talent which some men have of inventing ludicrous thoughts or expressions: we say commonly, a *witty man*, or a *man of wit*.

Wit, in its proper sense, as explained above, is distinguishable into two kinds; wit in the thought, and wit in the words or expression. Again, wit in the thought is of two kinds; ludicrous images, and ludicrous combinations of things that have little or no natural relation.

Ludicrous images that occasion surprise by their singularity, as having little or no foundation in nature, are fabricated by the imagination: and the imagination is well qualified for the office; being of all our faculties the most active, and the least under restraint. Take the following example.

Shylock. You knew (none so well, none so well as you) of my daughter's flight.

Salino. That's certain. I, for my part, knew the taylor that made the wings she flew withal.

Merchant of Venice, act 3. sc. 1.

The image here is undoubtedly witty. It is ludicrous: and it must occasion surprise; for having no natural foundation, it is altogether unexpected.

The other branch of wit in the thought, is that only which is taken notice of by Addison, following Locke, who defines it "to lie in the assemblage of ideas; and putting those together, with quickness and variety, wherein can be found any resemblance or congruity, thereby to make up pleasant pictures and agreeable visions in the fancy." It may be defined more curiously, and perhaps more accurately, a junction of things by distant and fanciful relations, which surprise because they are unexpected." The following is a proper example:

We grant although he had much wit,
H' was very shy of using it,
As being loth to wear it out;
And therefore bore it not about,
Unless on holidays, or so,
As men their best apparel do.

Hudibras, canto 1.

Wit is of all the most elegant recreation: the image enters the mind with gaiety, and gives a sudden flash which is extremely pleasant. Wit thereby gently ele-

valates

Wisdom,
Wit.

Wit. vates without flaining, raises mirth without dissolute-
ness, and relaxes while it entertains.

Wit, in the expression, commonly called a *play of words*, being a baftard sort of wit, is reserved for the last place. We proceed to examples of wit in the thought; and first of ludicrous images.

Falstaff, speaking of his taking Sir John Coleville of the Dale:

Here he is, and here I yield him; and I beseech your grace, let it be book'd with the rest of this day's deeds; or, by the Lord, I will have it in a particular ballad else, with mine own picture on the top of it, Coleville kissing my foot: to the which course if I be enforced, if you do not all shew like gilt twopences to me; and I, in the clear sky of fame, o'ershine you as much as the full moon doth the cinders of the element, which shew like pins' heads to her: believe not the word of the noble. Therefore let me have right, and let desert mount.

Second Part, Henry IV. act 4. sc. 6.

I knew, when seven justices could not take up a quarrel, but when the parties were met themselves, one of them thought but of an *if*; as, if you had said so, then I said so; and they hook hands, and fwoe brothers. Your *if* is the only peace-maker; much virtue is in *if*. *Shakespeare.*

For there is not through all nature another so callous and insensible a member as the world's posteriors, whether you apply to it the toe or the birch.

Preface to a Tale of a Tub.

The other branch of wit in the thought, viz. ludicrous combinations and oppositions, may be traced through various ramifications. And, first, fanciful causes assigned that have no natural relation to the effects produced.

Lancaster. Fare you well, Falstaff; I, in my condition, shall better speak of you than you deserve. *[Exit.]*

Falstaff. I would you had but the wit; 'twere better than your dukedom. Good faith, this same young sober-blooded boy doth not love me; nor a man cannot make him laugh: but that's no marvel, he drinks no wine. There's never any of these demure boys come to any proof; for thin drink doth so overcool their blood, and making many fish-meals, that they fall into a kind of male green-sickness; and then, when they marry, they get wenches. They are generally fools and cowards; which some of us should be too, but for inflammation. A good therris-sack hath a twofold operation in it: it ascends me into the brain; dries me there all the foolish, dull, and crudy vapours which environ it; make it apprehensive, quick, forgetive, full of nimble, fiery, and delectable shapes; which delivered o'er to the voice, the tongue, which is the birth, becomes excellent wit. The second property of your excellent therris is, the warming of the blood; which before cold and settled, left the liver white and pale; which is the badge of pusillanimity and cowardice; but the therris warms it, and makes it course from the inwards to the parts extreme; it illuminateth the face, which, as a beacon, gives warning to all the rest of this little kingdom, man, to arm; and then the vital commoners and inland petty spirits muster me all to their captain, the heart; who, great and

puffed up with his retinue, doth any deed of courage: and thus valour comes of therris. So that skill in the weapon is nothing without sack, for that sets it a-work; and learning a mere hoard of gold kept by a devil, till sack commences it, and sets it in act and use. Hereof comes it that Prince Harry is valiant; for the cold blood he did naturally inherit of his father, he hath, like lean, sterile, and bare land, manured, husbanded, and till'd with excellent endeavour of drinking good and good store of fertile therris, that he is become very hot and valiant. If I had a thousand sons, the first human principle I would teach them, should be to forswear thin potations, and to add themselves to sack.

Second Part of Henry IV. act 4. sc. 7.

The trenchant blade, toledo trusty,
For want of fighting was grown rusty,
And ate into itself, for lack
Of some body to hew and hack.
The peaceful scabbard where it dwelt
The rancor of its edge had felt:
For of the lower end two handful
It had devoured, 'twas so manifold;
And so much scorn'd to lurk in case,
As if it durst not shew its face.

Hudibras, canto 1.

To account for effects by such fantastical causes, being highly ludicrous, is quite improper in any serious composition. Therefore the following passage from Cowley, in his poem on the death of Sir Henry Wootton, is in a bad taste.

He did the utmost bounds of knowledge find,
He found them not so large as was his mind.
But, like the brave Pellean youth, did moan,
Because that art had no more worlds than one.
And when he saw that he through all had pass'd,
He dy'd, lest he should idle grow at last.

Fanciful reasoning:

Falstaff. Imbowell'd!—if thou imbowel me to-day, I'll give you leave to powder me, and eat me to-morrow! S'blood, 'twas time to counterfeit, or that hot termagant Scot had paid me scot and lot too. Counterfeit? I lie, I am no counterfeit: to die is to be a counterfeit; for he is but the counterfeit of a man, who hath not the life of a man; but to counterfeit dying, when a man thereby liveth, is to be no counterfeit, but the true and perfect image of life indeed.

First Part Henry IV. act 1. sc. 10.

Clown. And the more pity that great folk should have countenance in this world to drown or hang themselves, more than their even Christians.

Hamlet, act 5. sc. 2.

Pedro. Will you have me, Lady?

Beatrice. No, my Lord, unless I might have another for working days. Your Grace is too costly to wear every day.

Much ado about Nothing, act 2. sc. 5.

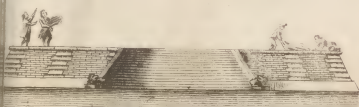
Jessica. I shall be saved by my husband; he hath made me a Christian.

Launcelot. Truly the more to blame he; we were Christians enough before, e'en as many as could well live by one another: this making of Christians will raise the price of hogs; if we grow all

Montgolfier's B.
Fausbourg St. Antoine?



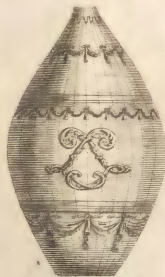
Blanchard's B.



Verfailles
B.



Montgolfier's B.
Fausbourg St. Germain?



Charles' & Roberts' B.
Champ de Mars.





all to be pork-eaters, we shall not have a rather on the coals for money.

Merchant of Venice, act 3. sc. 6.

But Hudibras gave him a twitch,
As quick as lightning, in the breech,
Just in the place where honour's lodg'd,
As wise philosophers have judg'd;
Because a kick in that part, more
Hurts honour, than deep wounds before.

Hudibras, canto 3.

Indicrous junction of small things with great, as of equal importance :

This day black omens threat the brightest fair
That e'er deserv'd a watchful spirit's care :
Some dire disaster, or by force or flight :
But what, or where, the fates have wrapt in night :
Whether the nymph shall break Diana's law ;
Or some frail china jar receive a flaw :
Or stain her honour, or her new brocade ;
Forget her pray'rs, or miss a masquerade ;
Or lose her heart, or necklace, at a ball ;
Or whether Heaven has doom'd that Shock must fall.

Rape of the Lock, canto ii. 101.

One speaks the glory of the British Queen,
And one describes a charming Indian screen.

Ibid. canto iii. 13.

Then flash'd the living lightning from her eyes,
And screams of horror rend th' affrighted skies.
Not louder shrieks to pitying heav'n are cast,
When husbands, or when lap-dogs, breathe their last ;
Or when rich china vessels, fall'n from high,
In glittering dust and painted fragments lie !

Ibid. canto iii. 155.

Not youthful kings in battle seiz'd alive,
Not scornful virgins who their charms survive,
Not ardent lovers robb'd of all their bliss,
Not ancient ladies when refus'd a kiss,
Nor tyrants fierce that unrepenting die,
Nor Cynthia when her manteau's pinn'd awry,
E'er felt such rage, resentment, and despair,
As thou, sad virgin ! for thy ravish'd hair.

Ibid. canto iv. 3.

Joining things that in appearance are opposite. As for example, where Sir Roger de Coverley, in the Spectator, speaking of his widow,

That he would have given her a coal-pit to have kept her in clean linen ; and that her finger should have sparkled with one hundred of his richest acres.

Premises that promise much and perform nothing. Cicero upon this article says,

Sed scitis esse notissimum ridiculi genus, cum aliud expectamus, aliud dicitur : hic nobismetipsis noliter risum movet.

De oratore, l. 2. c. 63.

Beatrice.—With a good leg and a good foot, uncle, and money enough in his purse, such a man would win any woman in the world, if he could get her good will.

Much ado about Nothing, act. 2. sc. 1.

Beatrice. I have a good eye, uncle, I can see a church by day-light.

Having discuss'd wit in the thought, we proceed to what is verbal only, commonly call'd a *play of words*. This sort of wit depends, for the most part, upon choosing a word that hath different significations : by

this artifice, hocus-pocus tricks are played in language ; and thoughts plain and simple take on a very different appearance. Play is necessary for man, in order to refresh him after labour ; and accordingly man loves play : he even relishes a play of words : and it is happy for us, that words can be employed, not only for useful purposes, but also for our amusement. This amusement accordingly, though humble and low, is relished by some at all times, and by all at some times, in order to unbend the mind.

It is remarkable, that this low species of wit has, at one time or other, made a figure in most civilized nations, and has gradually gone into disrepute. So soon as a language is formed into a system, and the meaning of words is ascertained with tolerable accuracy, opportunity is afforded for expressions, which, by the double meaning of some words, give a familiar thought the appearance of being new ; and the penetration of the reader or hearer is gratified, in detecting the true sense disguised under the double meaning.—That this sort of wit was in England deem'd a reputable amusement, during the reigns of Elizabeth and James I. is vouch'd by the works of Shakespear, and even by the writings of grave divines. But it cannot have any long endurance : for as language ripens, and the meaning of words is more and more ascertained, words held to be synonymous diminish daily ; and when those that remain have been more than once employed, the pleasure banisheth with the novelty.

We proceed to examples, which, as in the former case, shall be distributed into different classes.

A seeming resemblance from the double meaning of a word :

Beneath this stone my wife doth lie ;
She's now at rest, and so am I.

A seeming contrast from the same cause, termed a *verbal antithesis*, which hath no depicable effect in ludicrous subjects :

Whilst Iris his cosmetic wash would try
To make her bloom revive, and lovers die.
Some ask for charms, and others philters chuse,
To gain Corinna, and their quartans lose.

Dispensary, canto 2.

And how frail nymphs, oft, by abortion, aim
To lose a substance, to preserve a name.

Ibid. canto 3.

While nymphs take treats, or assignations give.

Rape of the Lock.

Other seeming connections from the same cause :

Will you employ your conqu'ring sword,
To break a fiddle and your word ?

Hudibras, canto 2.

To whom the knight with comely grace
Put off his hat to put his case.

Hudibras, part 3. canto 3.

Here Britain's statesman oft the fall foredoom
Of foreign tyrants, and of nymphs at home ;
Here thou, great Anna ! whom three realms obey,
Dost sometimes counsel take—and sometimes tea.

Rape of the Lock, canto 3. l. 5.

O'er their quietus where fat judges dose,
And lull their cough and conscience to repose.

Dispensary, canto 1.

Wit. Speaking of Prince Eugene :

This general is a close taker of snuff as well as of towns. *Pope, Key to the Lock.*

Exul mentisque domusque.

Metamorphoses, lib. ix. 439.

A seeming opposition from the same cause :

Hic quiescit qui nunquam quievit.

Again,

So like the chances are of love and war,

That they alone in this distinguish'd are ;

In love the victors from the vanquish'd fly,

They fly that wound, and they pursue that die.

Waller.

What new-found witchcraft was in thee,

With thine own cold to kindle me ?

Strange art ; like him that should devise

To make a burning-glass of ice. *Cowley.*

Wit of this kind is unsuitable in a serious poem ; witness the following line in Pope's *Elegy* to the memory of an unfortunate lady :

Cold is that breath which warm'd the world before.

This sort of writing is finely burlesqued by Swift :

Her hands, the softest ever felt,

Though cold would burn, though dry would melt.

Strepson and Chloe.

Taking a word in a different sense from what it meant, comes under wit, because it occasions some slight degree of surprise :

Beatrice. I may sit in a corner, and cry *Heigh ho !* for a husband.

Pedro. Lady Beatrice, I will get you one.

Beatrice. I would rather have one of your father's getting. Hath your Grace ne'er a brother like you ? Your father got excellent husbands, if a maid could come by them.

Much ado about Nothing, act 1. sc. 5.

Falstaff. My honest lads, I will tell you what I am about.

Pistol. Two yards and more.

Falstaff. No quips now, Pistol : indeed I am in the waste two yards about : but I am now about no waste ; I am about thrift.

Merry Wives of Windsor, act 1. sc. 7.

Lo. Sands.—By your leave, sweet ladies, If I chance to talk a little wild, forgive me : I had it from my father.

Anne Bullen. Was he mad, Sir ?

Sands. O, very mad, exceeding mad, in love too ? But he would bite none— *K. Henry VIII.*

An assertion that bears a double meaning, one right, one wrong, but so connected with other matters as to direct us to the wrong meaning, is a species of *balard wit* which is distinguished from all others, by the name *pun*. For example,

Paris.—Sweet Helen, I must woo you

To help unarm our Hector : his stubborn buckles,

With these your white enchanting fingers touch'd,

Shall more obey, than to the edge of steel,

Or force of Greekish sinews ; you shall do more

Than all the island kings, disarm great Hector.

Trilulus and Cressida, act 3. sc. 2.

The pun is in the close. The word *disarm* has a double meaning : it signifies to take off a man's armour, and also to subdue him in fight. We are directed to the latter sense by the context ; but with regard to Helen, the word holds only true in the former sense. We go on with other examples :

Esse nihil dicis quicquid petis, improbe Cinna :

Si nil, Cinna, petis, nil tibi, Cinna, nego.

Martial, l. 3. epigr. 61.

Chief Justice. Well ! the truth is, Sir John, you live in great infamy.

Falstaff. He that buckles him in my belt cannot live in less.

Chief Justice. Your means are very slender, and your waite is great.

Falstaff. I would it were otherwise : I would my means were greater, and my waite slenderer.

Second Part Henry IV. act 1. sc. 5.

Celia. I pray you bear with me, I can go no further.

Clown. For my part, I had rather bear with you than bear you : yet I should bear no cross if I did bear you ; for I think you have no money in your purse.

As you like it, act 2. sc. 4.

He that imposes an oath makes it,

Not he that for convenience takes it.

Then how can any man be said :

To break an oath he never made ?

Hudibras, part 2. canto 2.

The seventh satire of the first book of Horace is purposely contrived to introduce at the close a most execrable pun. Talking of some infamous wretch whose name was *Rex Rupilius*,

Perseus exclamat, Per magnos, Brute, deos te

Oro, qui reges confusis tollere, cur non

Hunc regem jugulas ? Operum hoc, mihi crede, tuorum est.

Though playing with words is a mark of a mind at ease, and disposed to any sort of amusement, we must not thence conclude that playing with words is always ludicrous. Words are so intimately connected with thought, that if the subject be really grave, it will not appear ludicrous even in this fantastic dress. We are, however, far from recommending it in any serious performance : on the contrary, the discordance between the thought and expression must be disagreeable : witness the following specimen :

He hath abandoned his physicians, Madam, under whose practices he hath persecuted time with hope ; and finds no other advantage in the process, but only the losing of hope by time.

All's well that ends well, act 1. sc. 1.

K. Henry. O my poor kingdom, sick with civil broils !

When that my care could not withhold thy riots, What wilt thou do when riot is thy care ?

Second part Henry IV.

If any one shall observe, that there is a third species of wit, different from those mentioned, consisting in sounds merely, we are willing to give it place. And indeed it must be admitted, that many of *Hudibras's* double rhymes come under the definition of wit given in the beginning of this article : they are ludicrous, and

and their singularity occasions some degree of surprise. Swift is not less successful than Butler in this sort of wit; witness the following instances: *Goddesse—Bodice. Pliny—Nicolini. Icaristi—Chariots. Mitre—Nitre. Dragon—Suffragan.*

A repartee may happen to be witty: but it cannot be considered as a species of wit; because there are many repartees extremely smart, and withal extremely serious. We give the following example: A certain petulant Greek, objecting to Anacharsis that he was a Scythian: "True (says Anacharsis) my country disgraces me, but you disgrace your country." This fine turn gives surprise; but it is far from being ludicrous.

WIT (John de), a celebrated pensioner of Holland, and one of the greatest politicians of his time, was the son of Jacob de Wit, burgomaster of Dort, and was born in 1625. He became well skilled in civil law, politics, mathematics, and other sciences; and wrote a treatise on the Elements of Curved Lines, published by Francis Schooten. Having taken his degree of doctor of law, he travelled into foreign courts, where he became esteemed for his genius and prudence. At his return to his native country in 1650, he became pensionary of Dort, then counsellor-pensionary of Holland and West-Friesland, intendant and register of the siefs, and keeper of the great seal. He was thus at the head of affairs in Holland; but his opposition to the re-establishment of the office of stadtholder, which he thought a violation of the freedom and independence of the republic, cost him his life, when the prince of Orange's party prevailed. He and his brother Cornelius were assassinated by the populace at the Hague in 1674, aged 47.

WITCHCRAFT, a kind of sorcery, especially in women. See SORCERY.

WITENA MOT, or WITENA Gemot, among the Anglo Saxons, was a term which literally signified the assembly of the wise men; and was applied to the great council of the nation, of latter days called the *parliament*.

WITHERS of a HORSE, the juncture of the shoulder-bones at the bottom of the neck and mane, towards the upper part of the shoulder.

WITNESS, in law, a person who gives evidence in any cause, and is sworn to speak the truth, the whole truth, and nothing but the truth.

Trial by WITNESSES, a species of trial without the intervention of a jury. This is the only method of trial known to the civil law, in which the judge is left to form in his own breast his sentence upon the credit of the witnesses examined: but it is very rarely used in our law, which prefers the trial by jury before it in almost every instance. Save only that when a widow brings a writ of dower, and the tenant pleads that the husband is not dead; this being looked upon as a dilatory plea, is in favour of the widow, and for greater expedition allowed to be tried by witnesses examined before the judges: and so, faith Finch, shall no other case in our law. But Sir Edward Coke mentions some others: as to try whether the tenant in a real action was duly summoned, or the validity of a challenge to a juror: so that Finch's observation must be confined to the trial of direct and not collateral issues. And in every case Sir Edward Coke lays it down, that the affirmative must be proved by two witnesses at the least.

WITSIUS (Herman), a learned and eminent divine of North Holland, born at Enckhuisen in 1626. He was professor of divinity successively at Franeker, Utrecht, and Leyden; and applied himself successfully to oriental learning, of which his capital work *Ægyptiaca* affords sufficient proof. His Oeconomy of the Covenants between God and Man, is warmly recommended by Mr Hervey in his *Theron* and *Alpasio*. He died in 1708.

WITTENBERG, a city of Germany, capital of the circle of Upper Saxony, 50 miles north of Dresden. It is under immediate vassalage, and the seat of an aulic judicatory, a general superintendency, an inspection and consistory. The town is not large; but is well fortified, and contains a famous university, in which Melancthon was a professor. In this place Martin Luther first began to preach against the pope's indulgences; and in the cathedral of All Saints he is said to have been buried. In the old citadel of this town the ancient Saxon electors used to reside. Besides the university, there is a Latin school in the town, with six masters. The library belonging to the university is said to be very valuable. In 1756 the Prussians being masters of the town, destroyed a part of its fortifications.

WOAD, in botany. See ISATIS.

Woad not only affords a lasting and substantial blue, which, according to the scale of the dyers, may be reduced into many different shades, but is also of great use in dyeing and fixing many other colours. But notwithstanding this, and its being a commodity of our own, the use of it is very much declined since the introduction of indigo; for the purchase of which large sums go annually out of the nation. The reason of this is, that indigo affords a more lively and pleasing colour, is managed with more ease by the dyers, and does their business more expeditiously. Yet with all these advantages, it is universally acknowledged, that the colour which indigo affords is inferior to that of woad in many respects, and particularly in permanency: for which reason, they are frequently used in conjunction; woad to give solidity and substance, and indigo to give brightness and colour. But the worst consequence that has attended the use of indigo, is not barely lessening the consumption, but abating the price and depreciating the intrinsic value of woad; so that less care is taken in the management of it; to which in a great measure the inferiority of its colour, at least in some places, is at present owing. The declension in its consumption is not the case here only, but also in other countries; for it was once the great staple of Languedoc, and was cultivated also in Normandy, and in other provinces of France; as it also is in Spain, Portugal, the Azores, and Canary islands, Switzerland, in the neighbourhood of Geneva, in different parts of Germany, and in Sweden.

Our own woad was allowed to be superior to any that we imported; and yet before indigo had so great an ascendancy, it was thought necessary to lay high duties upon foreign woad, for the encouragement of the growing and manufacturing it here; which duties still subsist. If we consider, that this is a commodity in which agriculture is as much interested as our manufacturers, one cannot well doubt that the preserving and restoring it deserves great attention here, as well

CORALLINES.

VESICULATED.

Fig. 1.

Fig. 2.

Fig. 3.



Fig. 4.
TUBULAR



CALCIPHYTES

Fig. 5.



of Ball's

Fig. 6.
ARTICULATED.

EUCHARA.

Fig. 9.



P.L.



RHIZOPHYTA.

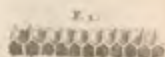
Fig. 7.



Fig. 8.



Fig. 10.



attacked by the university, in defence of Edward earl of Clarendon, lord high-chancellor of England, and chancellor of the university, and was likewise animadverted upon by bishop Burnet; upon which he published a Vindication of the Historiographer of the University of Oxford. He died at Oxford of a retention of urine in 1695.

WOOD, a solid substance, whereof the trunks and branches of trees consist. The wood is all that part of a tree included between the bark and the pith. For the structure of the pith, bark, and wood of plants, see the article PLANT.

Composition for preserving Wood. See CHEMISTRY, n° 112, 149.

Staining or Dyeing of Wood for inlaying, &c. Red, is done by boiling the wood in water and alum; then taking it out, adding brazil to the liquor, and giving the wood another boil in it. Black, by brushing it over with logwood boiled in vinegar, hot; then washing it over with a decoction of galls and coppers till it be of the hue required. Any other colour may be given by squeezing out the moisture of horse-dung through a sieve, mixing it with dissolved rock-alum and gum arabic; and to the whole adding green, blue, or any other colour designed. After standing two or three days, pear-tree or other wood, cut to the thickness of half a crown, is put into the liquor boiling hot, and suffered to remain till it be sufficiently coloured.

WOOD, (*Silva*), in geography, a multitude of trees extended over a large continued track of land, and propagated without culture. The generality of woods only consist of trees of one kind.

The ancient Saxons had such a veneration for woods, that they made them sanctuaries.

It is ordained, that none shall destroy any wood, by turning it into tillage or pasture, &c. where there are two acres or more in quantity, on pain of forfeiting 40s. an acre, by 35 Henry VIII. c. 17. All woods that are felled at 14 years growth, are to be preserved from destruction for eight years; and no cattle put into the ground till five years after the felling thereof, &c. 13 Eliz. c. 25. The burning of woods, or underwood, is declared to be felony; also those persons that maliciously cut or spoil timber-trees, or any fruit-trees, &c. shall be sent to the house of correction, there to be kept three months, and whipt once a month.

Wood-Cock, in ornithology. See SCOLOPAX.

Wood-Louse. See ONISCUS.

Wood-Pecker. See PICUS.

WOODSTOCK, a town of Oxfordshire, in England, pleasantly seated on a rising ground, and on a rivulet; a well compacted borough-town, and sends two members to parliament; but is chiefly noted for Blenheim-house, a fine palace, built in memory of the victory obtained by the duke of Marlborough over the French and Bavarians in August 1704. It was erected at the public expence, and is one of the noblest seats in Europe. One of the passages to it is over a bridge with one arch, 190 feet in diameter, resembling the Rialto at Venice. The gardens take up 100 acres of ground; and the offices, which are very grand, have room enough to accommodate 300 people. The apartments of the palace are magnificently furnished; and the staircases, statues, paintings, and tapestry, surpris-

singly fine. The town is about half a mile from the palace, having several good inns; and a manufacture of steel chains for watches, and excellent gloves. It is 8 miles north of Oxford, and 60 west-north-west of London. W. Long. 1. 17. N. Lat. 51. 50.

WOODWARD (Dr John), was born in 1665, and educated at a country school, where he learned the Latin and Greek languages, and was afterwards sent to London, where he is said to have been put apprentice to a linen-draper. He was not long in that station, till he became acquainted with Dr Peter Barwick, an eminent physician, who took him under his tuition and into his family. Here he prosecuted with great vigour and success the study of philosophy, anatomy, and physic. In 1692, Dr Stillingfleet quitting the place of professor of physic in Gresham college, our author was chosen to succeed him, and the year following was elected F. R. S. In 1695 he obtained the degree of M. D. by patent from archbishop Tennison; and the same year he published his Essay toward a natural History of the Earth. He afterward wrote many other pieces, which have been well received by the learned world. He founded a lecture in the university of Cambridge, to be read there upon his Essay, &c. and handsomely endowed it. He died in 1728.

WOOF, among manufacturers, the threads which the weavers shoot across with an instrument called the *shuttle*. See CLOTH.

WOOL, the covering of sheep. See OVIS.

While the wool remains in the state it was first shorn off the sheep's back, and not sorted into its different kinds, it is called *fleece*.

Each fleece consists of wool of divers qualities and degrees of fineness, which the dealers therein take care to separate.

The French and English usually separate each fleece into three sorts, viz. 1. Mother-wool, which is that of the back and neck. 2. The wool of the tails and legs. 3. That of the breast and under the belly.

The Spaniards make the like division into three sorts, which they call *prime*, *second*, and *third*; and for the greater ease, denote each bale or pack with a capital letter, denoting the sort. If the triage or separation be well made, in 15 bales there will be 12 marked R, that is, refine, or prime; two marked F, for fine, or second; and one S, for thirds.

The wools most esteemed are the English, chiefly those about Leominster, Cotswold, and the Isle of White; the Spanish, principally those about Segovia; and the French, about Berry: which last are said to have this peculiar property, that they will knot or bind with any other sort; whereas the rest will only knot with their own kind.

Among the ancients, the wools of Attica, Megara, Laodicea, Apulia, and especially those of Tarentum, Parma, and Altino, were the most valued. Varro assures us, the people there used to clothe their sheep with skins, to secure the wool from being damaged.

WOOLSTON (Thomas), an English divine, was born at Northampton in 1669, and educated at Cambridge. His first appearance in the learned world was in 1705, in a work intitled, The old Apology for the Truth of the Christian Religion against the Jews and Gentiles

Gentiles revived. He afterward wrote many pieces: but what made the most noise, are his Six Discourses on the Miracles of Christ; which occasioned a great number of books and pamphlets upon the subject, and raised a prosecution against him. At his trial in Guildhall, before the lord chief-justice Raymond, he spoke several times himself; and urged, that "he thought it very hard that he should be tried by a set of men, who, though otherwise very learned and worthy persons, were no more judges of the subjects on which he wrote, than himself was a judge of the most crabbed points of the law." He was sentenced to a year's imprisonment, and to pay a fine of 100*l*. He purchased the liberty of the rules of the King's-bench, where he continued after the expiration of the year, being unable to pay the fine. The greatest obstruction to his deliverance from confinement was, the obligation of giving security not to offend by any future writings, he being resolved to write again as freely as before. He died in 1733.

WOOLWICH, a town in Kent, with a market on Fridays, but no fair. It is seated on the river Thames, and of great note for its fine docks and yards, where men of war are built; as also for its vast magazines of great guns, mortars, bombs, cannon-balls, powder, and other warlike stores. It has likewise an academy, where the mathematics are taught, and young officers instructed in the military art. It is nine miles east of London. E. Long. *o*. 10. N. Lat. 51. 30.

WORCESTER, in Latin *Wigornia*, the capital of a county of England of the same name, stands on the river Severn, but so low that it can hardly be seen till one is close upon it. It is supposed to be the *Brannonium* of Antoninus, the *Branogenium* of Ptolemy, and to have been built by the Romans to awe the Britons on the other side of the Severn. It was made an episcopal see about the year 680 by Sexulphus bishop of the Mercians; but the present cathedral was begun by Wulstun in the year 1084. The town hath been several times burnt down: first, in 1041, by Hardicanute, who also massacred the citizens; secondly, not long after William Rufus's time; and a third time, when king Stephen besieged and took it. Here, in latter times, was fought that battle, in which Charles II. with his Scots army, was defeated by Cromwell. In a garden, near the south gate of the city, where the action was hottest, the bones of the slain are often dug up. It had formerly strong walls and a castle; but these have been demolished long ago. It is now a large city, the streets broad and well paved, and some of them very regular and well built, particularly Foregate-street; so that in general it is a very agreeable place. The cathedral is a stately edifice, and among other monuments in it are those of king John, of Arthur, elder brother to Henry VIII. and of the countess of Salisbury, who gave occasion to the institution of the order of the Garter. There are seven or eight hospitals in and about the city; of which that built and endowed by Robert Berkeley of Spetchley, esq; is a very noble one. There is a school founded by Henry VIII. three other schools, and six charity schools. The Guildhall, and the workhouse, are stately structures. The churches, St Nicholas and All-Saints, have been lately rebuilt, and are very hand-

some edifices. The city carries on a great trade; for which it is chiefly indebted to its situation upon the Severn. A prodigious number of people are employed in and about it in the manufacture of broad-cloth and gloves. The Welch inhabit a part of it, and speak their own language. Its market is well supplied with provisions, corn, and cattle, and its quay is much frequented by ships. By a charter from James I. it is governed by a mayor, six aldermen, who are justices of the peace, and chosen out of 24 capital citizens, a sheriff, the city being a county of itself, a common council, consisting of 48 other citizens, out of which two chamberlains are yearly chosen, a recorder, town-clerk, two coroners, a sword bearer, 13 constables, and four serjeants at mace. Of the bishops of this see, there have been, it is said, one pope, four saints, seven lord high-chancellors, 11 archbishops, two lord treasurers, one chancellor to the queen, one lord president of Wales, and one vice-president. The city at present gives title of earl and marquiss to the duke of Beaufort.

WORCESTERSHIRE, a county of England, bounded by Warwickshire on the east, by Gloucestershire on the south, by the counties of Hereford and Salop on the west, and on the north by Staffordshire. According to Templeman, it is 36 miles in length, 28 in breadth, and about 130 in circumference, within which it contains 700, and a part of two others, 11 market towns, of which three are boroughs, one city, namely *Worcester*, 152 parishes, about 540,000 acres, and 103,000 inhabitants.

This being an inland county, well cultivated, and free from lakes, marshes, or stagnant waters, the air is very sweet and wholesome all over it. The soil in general is very rich, producing corn, fruit, especially pears, of which they make a great deal of perry, hops, and pasture. The hills are covered with sheep, and the meadows with cattle. Hence they have wool, cloth, fluffs, butter, and cheese in abundance. They are also well supplied with fuel, either wood or coal, and salt from their brine pits and salt springs. Of the last they have not only enough for themselves, but export large quantities by the Severn; which noble river, to the great convenience and emolument of the inhabitants, runs from north to south through the very middle of the county, enriching the soil, and yielding it plenty of fish, and an easy expeditious conveyance of goods to and from it. The other rivers by which it is watered are the Stour, Avon, Teme, &c. It sends nine members to parliament, viz. two for the county, two for the city of Worcester, two for Droitwich, two for Evesham, and one for Bewdley; and lies in the diocese of Worcester, and Oxford circuit.

WORD, in language, an articulate sound designed to represent some idea. See GRAMMAR and LANGUAGE. See also LOGIC, Part I. chap. 1.

WORD, or *Watch-Word*, in military affairs, is some peculiar word or sentence, by which the soldiers know and distinguish one another in the night, &c. and by which spies and designing persons are discovered. It is used also to prevent surprises. The word is given out in an army every night to the lieutenant, or major-general of the day, who gives it to the majors of the brigades, and they to the adjutants; who give it first to the field-officers, and afterwards to a serjeant of each

Worcester-
shire,
Word.

Word
Worm.

each company, who carry it to the subalterns. In garrisons it is given after the gate is shut to the town-major, who gives it to the adjutants, and they to the serjeants.

Words of Command. See EXERCISE and MANUAL.

Signals by the Drum, made use of in exercising of the Army, instead of the Word of Command, viz.

Signals by the drum.

Operations.

A short roll,

To caution.

A flam,

To perform any distinct thing.

To arms,

To form the line or battalion.

The march,

To advance, except when intended for a salute.

The quick march,

To advance quick.

The point of war,

To march and charge.

The retreat,

To retreat.

Drum ceasing,

To halt.

Two short rolls,

To perform the flank firing.

The dragon march,

To open the battalion.

The grenadier march,

To form the column.

The troop,

To double divisions.

The long roll,

To form the square.

The grenadier march,

To reduce the square to the column.

The preparative,

To make ready and fire.

The general,

To cease firing.

Two long rolls,

To bring or lodge the colours.

WORLD, the assemblage of parts which compose the globe of the earth. See GEOGRAPHY and ASTRONOMY.

WORM, in gunnery, a screw of iron, to be fixed on the end of a rammer, to pull out the wad of a firelock, carbine, or pistol, being the same with the wad-hook, only the one is more proper for small arms, and the other for cannon.

WORM, in chemistry, is a long, winding pewter pipe, placed in a tub of water, to cool and condense the vapours in the distillation of spirits.

Blind-Worm, or Slow-Worm. See ANGUIS, n° 2.

Earth-Worm. See LUMBRICUS.

Glow-Worm. See GLOW-Worm.

Silk-Worm. See SILK-Worm.

WORMS, VERMES, in natural history. See ZOOLOGY.

WORMS in the human body. See MEDICINE, n° 493, and p. 4868.

WORMS in horses. See FARRIERY, § xv. and the article BLATTA.

WORMS, in dogs. See DOG, art. 4.

WORMS for bait. See FISHING.

WORMS, an ancient, large, and famous city of Germany, in the palatinate of the Rhine, with a bishop's see, whose bishop is a sovereign and prince of the empire. It is a free and imperial city, and the inhabitants are protefstants. In the war of 1689, it was taken by the French, who almost reduced it to ashes.—The bishop lately built a new palace in it; and it is famous for a diet held here in 1521, at which Luther assisted in person. The Protefstants have lately built a handsome church, where Luther is represented as appearing at the diet. It is noted for the excellent wine that grows in the neighbourhood, which they call *our Lady's milk*. In the campaign of 1743, king Geo. II. took up his quarters in this city, and lodged at the bishop's palace after the battle of Dettingen. It is

seated on the western bank of the Rhine, 14 miles N. W. of Heidelberg, 20 S. E. of Mentz, and 32 S. W. of Frankfurt. E. Long. 8. 27. N. Lat. 40. 34.

WORMING of dogs. All spaniels have certain strings under their tongues, by most called a *worm*; this must be taken out when they are about two months old, with the help of a sharp knife to slit it, and a shoemaker's awl to raise it up; you must be careful to take all out, or else your pains is to little purpose; for till then he will be hardly ever fat and right, in regard the worm or string will grow foul and troublesome, and hinder his rest and eating. This operation is generally recommended as a preventative of madness in dogs, or at least as disabling them, if mad, from biting in that condition.

WORMIUS (Olaus), a learned Danish physician, born in 1588 at Arhusen in Jutland. After beginning his studies at home, he studied at several foreign universities, and travelled to various parts of Europe for improvement. He returned to his native country in 1613, and was made professor of the belles lettres in the university of Copenhagen. In 1615, he was translated to the chair of the Greek professor; and in 1624 to the professorship of physic, which he held to his death. These occupations did not hinder him from practising in his profession, and from being the fashionable physician: the king and court of Denmark always employed him; and Christian IV. as a recompense for his services, conferred on him a canonry of Lunden. He published some pieces on subjects relating to his profession, several works in defence of Aristotle's philosophy, and several concerning the antiquities of Denmark and Norway; for which latter he is principally regarded, as they are very learned, and contain many curious particulars. He died in 1654.

WORMWOOD, in botany. See ARTEMISIA.

WORSHIP, the offering up of adoration, prayer, praise, thanksgiving, and confession to God, as our Creator, Benefactor, Lawgiver, and Judge. See MORALS, n° 174—176.

WORT, the infusion of malt, of which beer is made.—The uses of this infusion in common affairs is well known. By Dr M'Bride it has lately been found to have a strong antiseptic virtue, and to be useful in preventing the scurvy and other diseases to which sailors are liable; which was confirmed by capt. Cook in his late voyages. See *Means of preserving the health of SEAMEN*.

WOTTON (Sir Henry), an eminent writer, was the son of Thomas Wotton, esq; and was born in 1568. He studied for some time at New-college, Oxford, whence he removed to Queen's-college, where he made a great progress in logic and philosophy; wrote a tragedy for the use of that college, called *Tancred*; and afterwards received the degree of master of arts. After this, leaving the university, he travelled into France, Germany, and Italy; and having spent about nine years abroad, he returned to England, and became secretary to Robert earl of Essex, with whom he continued till that earl was apprehended for high-treason. He then retired to Florence, where he became known to the grand duke of Tuscany, who sent him privately with letters to James VI. king of Scotland, under the name of *Octavio Baldi*, to inform that king of a design against his life. Some months

Worm
Wotte

otton. months after, he went back to Florence; but king James coming to the possession of the crown of England, Mr Wotton returned home, was knighted by his majesty, and sent ambassador to the republic of Venice; and afterwards was employed in many other embassies to that and other courts; but the only reward he obtained for these services was his having the provostship of Eton conferred upon him about the year 1623, which he kept till his death, which happened in 1639. After his decease some of his manuscripts and printed tracts were published together in a volume, intitled, *Reliquiæ Wottonianæ*.

WOTTON (Dr William), a very learned divine and writer, was the son of Mr Henry Wotton, B. D. rector of Wrentham, in Suffolk, where he was born in 1666. He was educated by his father, a gentleman well skilled in the learned languages; under whom he made such amazing proficiency, that at five years of age he could render several chapters in the gospels out of Latin and Greek, and many psalms in Hebrew into his mother tongue. When he was very young, he remembered the whole of almost every discourse he had heard, and often surprised a preacher by repeating his sermon to him. He was admitted into Catharine-hall in Cambridge some months before he was ten years old; when the progress he made in learning in that university engaged Dr Duport, then master of Magdalen college, and dean of Peterborough, to write an elegant copy of Latin verses in his praise. In 1679 he took the degree of bachelor of arts when he was but twelve years and five months old; and the winter following he was invited to London by Dr Gilbert Burnet, then preacher at the Rolls, who introduced him to most of the learned men in this city, and particularly to Dr William Lloyd, bishop of St Asaph; to whom he recommended himself by repeating to him one of his sermons, as Dr Burnet had engaged he should. In 1691 he commenced bachelor of divinity. The same year bishop Lloyd gave him the sinecure of Llandrillo, in Denbighshire. He was afterwards made chaplain to the earl of Nottingham, then secretary of state, who presented him to the rectory of Middleton Keynes, in Bucks, and to whom he dedicated his *Reflections upon ancient and modern Learning*. In 1705, bishop Burnet gave him a prebend in the church of Salisbury; and in 1707, archbishop Tenison presented him with the degree of doctor of divinity: but in 1714, the difficulties he laboured under with respect to his private fortune, obliged him to retire into South Wales, where he was treated with great kindness and humanity by the gentlemen of that country; and wrote there the "*Memoirs of the Cathedral Churches of St David's and of Landaff*," and his "*Miscellaneous Discourses relating to the Traditions and Usages of the Scribes and Pharisees*;" which were afterwards printed. He died in 1726. This great man was remarkable for his humanity and friendliness of temper; the narrowness of a party-spirit never broke in upon any of his friendships; and his time and abilities were at the service of any person who was making advances in real learning. He wrote, besides the

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above works, 1. *A History of Rome*. 2. *A Defence of his Reflections upon ancient and modern Learning*. 3. *A Discourse concerning the Languages of Babel*. 4. *Advice to a young Student, with a Method of Study for the first four Years; and other learned pieces*.

WOUNDS. See SURGERY, Part II. sect. i. ii.

WOUNDS, in farriery. See there, § xvv.

WRASSE, or old wife, in ichthyology. See LABRUS.

WREATH, in heraldry, a roll of fine linen or silk (like that of a Turkish turban), consisting of the colours borne in the escutcheon, placed in an achievement between the helmet and the crest, and immediately supporting the crest.

WRECK, or SHIPWRECK, the destruction of a ship by rocks or shallows at sea.

By the ancient common law, where any ship was lost at sea, and the goods or cargo were thrown upon the land, these goods, so wrecked, were adjudged to belong to the king: for it was held, that, by the loss of the ship, all property was gone out of the original owner. But this was undoubtedly adding sorrow to sorrow, and was consonant neither to reason nor humanity. Wherefore it was first ordained by king Henry I. that if any person escaped alive out of the ship it should be no wreck; and afterwards king Henry II. by his charter, declared, that if on the coasts of either England, Poitou, Oleron, or Gascony, any ship should be distressed, and either man or beast should escape or be found therein alive, the goods should remain to the owners, if they claimed them within three months; but otherwise should be esteemed a wreck, and should belong to the king, or other lord of the franchise. This was again confirmed with improvements by king Richard I.; who, in the second year of his reign, not only established these concessions, by ordaining that the owner, if he was shipwrecked and escaped, *omnes res suas liberas et quietas haberet*, but also, that if he perished, his children, or in default of them his brethren and sisters, should retain the property; and in default of brother or sister, then the goods should remain to the king (A). And the law, as laid down by Bracon in the reign of Henry III. seems still to have improved in its equity. For then, if not only a dog (for instance) escaped, by which the owner might be discovered, but if any certain mark were set on the goods, by which they might be known again, it was held to be no wreck. And this is certainly most agreeable to reason; the rational claim of the king being only founded upon this, that the true owner cannot be ascertained. Afterwards, in the statute of Westminster the first, the time of limitation of claims, given by the charter of Henry II. is extended to a year and a day, according to the usage of Normandy: and it enacts; that if a man, a dog, or a cat, escape alive, the vessel shall not be adjudged a wreck. These animals, as in Bracon, are only put for examples; for it is now held, that not only if any live thing escape, but if proof can be made of the property of any of the goods or lading which come to

Wounds
||
Wreck.

45 E

shore,

(A) In like manner Constantine the Great, finding that by the imperial law the revenue of wrecks was given to the prince's treasury or *fiscus*, refrained it by an edict (Cod. 11. 5. 1.), and ordered them to remain to the owners; adding this humane expostulation: "*Quod enim jus habet fiscus in aliena calamitate, ut de re tam luculenta com, indigne scietur?*"

Wreck.

shore, they shall not be forfeited as wreck. The statute further ordains, that the sheriff of the county shall be bound to keep the goods a year and a day (as in France for one year, agreeably to the maritime laws of Oleron, and in Holland for a year and a half), that if any man can prove a property in them, either in his own right or by right of representation, they shall be restored to him without delay; but if no such property be proved within that time, they then shall be the king's. If the goods are of a perishable nature, the sheriff may sell them, and the money shall be liable in their stead. This revenue of wrecks is frequently granted out to lords of manors as a royal franchise; and if any one be thus intitled to wrecks in his own land, and the king's goods are wrecked thereon, the king may claim them at any time, even after the year and day.

It is to be observed, that in order to constitute a legal wreck, the goods must come to land. If they continue at sea, the law distinguishes them by the barbarous and uncouth appellations of *jetfam*, *stotfam*, and *ligan*. *Jetfam* is where goods are cast into the sea, and there sink and remain under water: *stotfam* is where they continue swimming on the surface of the waves: *ligan* is where they are sunk in the sea, but tied to a cork or buoy, in order to be found again. These are also the king's, if no owner appears to claim them; but if any owner appears, he is intitled to recover the possession. For even if they be cast overboard, without any mark or buoy, in order to lighten the ship, the owner is not by this act of necessity construed to have renounced his property: much less can things *ligan* be supposed to be abandoned, since the owner has done all in his power to assert and retain his property. These three are therefore accounted so far a distinct thing from the former, that by the king's grant to a man of wrecks, things *jetfam*, *stotfam*, and *ligan* will not pass.

Wrecks, in their legal acceptance, are at present not very frequent: for if any goods come to land, it rarely happens, since the improvement of commerce, navigation, and correspondence, that the owner is not able to assert his property within the year and day limited by law. And in order to preserve this property entire for him, and if possible to prevent wrecks at all, our laws have made many very humane regulations; in a spirit quite opposite to those savage laws, which formerly prevailed in all the northern regions of Europe, and a few years ago were still said to subsist on the coasts of the Baltic sea, permitting the inhabitants to seize on whatever they could get as lawful prize; or, as an author of their own expresses it, "*in naufragorum miseria et calamitate tanquam vultures ad prædæ currere.*" For by the statute 27 Edw. III. c. 13. if any ship be lost on the shore, and the goods come to land (which cannot, says the statute, be called *wreck*), they shall be presently delivered to the merchants, paying only a reasonable reward to those that saved and preserved them, which is intitled *salvage*. Also by the common law, if any persons (other than the sheriff) take any goods so cast on shore, which are not legal wreck, the owners might have a commission to inquire and find them out, and compel them to make restitution. And by statute 12 Ann. §. 2. c. 18. confirmed by 4 Geo. I. c. 12. in order to

assist the distressed, and prevent the scandalous illegal practices on some of our sea coasts (too similar to those on the Baltic), it is enacted, that all head-officers and others of towns near the sea, shall, upon application made to them, summon as many hands as are necessary, and send them to the relief of any ship in distress, on forfeiture of 100l. and in case of assistance given, salvage shall be paid by the owners, to be assessed by three neighbouring justices. All persons that secret any goods shall forfeit their treble value: and if they wilfully do any act whereby the ship is lost or destroyed, by making holes in her, stealing her pumps, or otherwise, they are guilty of felony, without benefit of clergy. Lastly, by the statute 26 Geo. II. c. 19. plundering any vessel, either in distress or wrecked, and whether any living creature be on board or not (for whether wreck or otherwise, it is clearly not the property of the populace), such plundering, or preventing the escape of any person that endeavours to save his life, or wounding him with intent to destroy him, or putting out false lights in order to bring any vessel into danger, are all declared to be capital felonies; in like manner as the destroying of trees, steeples, or other stated sea-marks, is punished by the statute 8 Eliz. c. 13. with a forfeiture of 100l. or outlawry. Moreover, by the statute of Geo. II. pilfering any goods cast ashore is declared to be petty larceny; and many other salutary regulations are made, for the more effectually preserving ships of any nation in distress.

By the civil law, to destroy persons shipwrecked, or prevent their saving the ship, is capital. And to steal even a plank from a vessel in distress, or wrecked, makes the party liable to answer for the whole ship and cargo. The laws also of the Wisigoths, and the most early Neapolitan constitutions, punished with the utmost severity all those who neglected to assist any ship in distress, or plundered any goods cast on shore.

WREN, in ornithology. See MOTACILLA.

WREN (Sir Christopher), a great philosopher, and one of the most learned and most eminent architects of his age, was the son of Christopher Wren dean of Windsor, and was born in 1632. He studied at Wadham college in Oxford; where he took the degree of master of arts in 1653, and was chosen fellow of All-Souls college there. When very young, he discovered a surprising genius for the mathematics; in which science he made great advances before he was sixteen years old. In 1657, he was made professor of astronomy at Gresham college, London; which he resigned in 1660, on his being chosen to the Savilian professorship of astronomy in Oxford: he was the next year created doctor of laws, and in 1663 was elected fellow of the Royal Society. He was one of the commissioners for the reparation of St Paul's; and in 1665 travelled into France, to examine the most beautiful edifices there, when he made many curious observations. At his return to England, he drew a noble plan for rebuilding the city of London after the fire, which he presented to parliament; and upon the decease of Sir John Denham in 1668, was made surveyor-general of his majesty's works; and from this time had the direction of a great number of public edifices, by which he acquired the highest reputation. He built the magnificent theatre at Oxford:

Wreck.
Wren.

St Paul's cathedral, the churches of St Stephen Walbrook, and St Mary-le-Bow, the Monument, the modern part of the palace of Hampton-Court, Chelsea college, one of the wings of Greenwich hospital, and many other beautiful edifices. He was president of the Royal Society, one of the commissioners of Chelsea college, and twice member of parliament, first for Plymouth in Devonshire, and then for Melcomb Regis in the same county; but in 1718 was removed from his place of surveyor-general. He died in 1723, and was interred in the vault under St Paul's.

This great man also distinguished himself by many curious inventions and discoveries in natural philosophy; and, among many others, contrived an instrument for measuring the quantity of rain that falls on any space of land for a year; invented many ways of making astronomical observations more accurate and easy; and was the first author of the anatomical experiment of injecting liquors into the veins of animals, &c. He translated into Latin Mr Oughtred's *Horologigraphica Geometrica*; and wrote a Survey of the cathedral church of Salisbury, and other pieces. Since his death his posthumous works and draughts have been published by his son.

WRESTLING, a kind of combat or engagement between two persons unarmed, body to body, to prove their strength and dexterity, and try which can throw his opponent to the ground.

Wrestling is an exercise of very great antiquity and fame. It was in use in the heroic age; witness Hercules, who wrestled with Antaeus.

It continued a long time in the highest repute, and had considerable rewards and honours assigned it at the Olympic games. It was the custom for the Athletæ to anoint their bodies with oil, to give the less hold to their antagonist.

Lycurgus ordered the Spartan maids to wrestle in public, quite naked, in order, as it is observed, to break them of their too much delicacy and nice-ness, to make them appear more robust, and to familiarize the people, &c. to such nudities.

WRIST, in anatomy. See there n° 53.

WRIT, in law, signifies, in general, the king's precept in writing under seal, issuing out of some court, directed to the sheriff, or other officer, and commanding something to be done in relation to a suit or action, or giving commission to have the same done. And, according to Fitzherbert, a writ is said to be a formal letter of the king in parchment, sealed with his seal, and directed to some judge, officer, or minister, &c. at the suit of a subject, for the cause briefly expressed, which is to be determined in the proper court according to law.

WRITS, in civil actions, are either original or judicial: original, are such as are issued out of the court of chancery for the summoning of a defendant to appear, and are granted before the suit is commenced, in order to begin the same; and judicial writs issue out of the court where the original is returned, after the suit is begun. See **PROCESS**.

The original writ is the foundation of the suit. See **SUIT**.

When a person hath received an injury, and thinks it worth his while to demand a satisfaction for it, he is to consider with himself, or take advice, what

redress the law has given for that injury; and thereupon is to make application or suit to the crown, the fountain of all justice, for that particular specific remedy which he is determined or advised to pursue. As for money due on bond, an action of debt; for goods detained without force, an action of *detinue or trover*; or, if taken with force, an action of *trespass vi et armis*; or, to try the title of lands, a writ of entry or action of trespass in ejectment; or, for any consequential injury received, a special action on the case. To this end he is to sue out, or purchase by paying the stated fees, an *original* or original writ, from the court of chancery, which is the *officina justitie*, the shop or mint of justice, wherein all the king's writs are framed. It is a mandatory letter from the king in parchment, sealed with his great seal, and directed to the sheriff of the county wherein the injury is committed, or supposed so to be, requiring him to command the wrong-doer or party accused, either to do justice to the complainant, or else to appear in court, and answer the accusation against him. Whatever the sheriff does in pursuance of this writ, he must return or certify to the court of common pleas, together with the writ itself: which is the foundation of the jurisdiction of that court, being the king's warrant for the judges to proceed to the determination of the cause. For it was a maxim introduced by the Normans, that there should be no proceedings in common-pleas before the king's justices without his original writ; because they held it unfit that those justices, being only the substitutes of the crown, should take cognizance of any thing but what was thus expressly referred to their judgment. However, in small actions, below the value of forty shillings, which are brought in the court-baron or county court, no royal writ is necessary; but the foundation of such suits continue to be (as in the times of the Saxons) not by original writ, but by plaint; that is, by a private memorial tendered in open court to the judge, wherein the party injured sets forth his cause of action: and the judge is bound of common right to administer justice therein, without any special mandate from the king. Now indeed even the royal writs are held to be demandable of common right, on paying the usual fees: for any delay in the granting them, or setting an unusual or exorbitant price upon them, would be a breach of magna carta, c. 29. "nulli vendemus, nulli negabimus, aut differemus justitiam vel rectum."

Original writs are either optional or peremptory; or, in the language of our law, they are either a *præcipe*, or a *si te fecerit securum*. The *præcipe* is in the alternative, commanding the defendant to do the thing required, or show the reason wherefore he hath not done it. The use of this writ is where something certain is demanded by the plaintiff, which is in the power of the defendant himself to perform; as, to restore the possession of land, to pay a certain liquidated debt, to perform a specific covenant, to render an account, and the like: in all which cases the writ is drawn up in the form of a *præcipe* or command, to do thus, or show cause to the contrary; giving the defendant his choice, to redress the injury or stand the suit. The other species of original writs is called a *si fecerit te securum*, from the words of the writ; which directs the sheriff to cause the defendant to appear in court,

Writing,
Wurttem-
burg.

without any option given him, provided the plaintiff gives the sheriff security effectually to prosecute his claim. This writ is in use where nothing is specifically demanded, but only a satisfaction in general; to obtain which, and minister complete address, the intervention of some judicature is necessary. Such are writs of trespass, or on the case, wherein no debt or other specific thing is used for in certain, but only damages to be assailed by a jury. For this end the defendant is immediately called upon to appear in court, provided the plaintiff gives good security of prosecuting his claim. Both species of writs are tested, or witnessed, in the king's own name; "witnesses ourself at Westminster," or wherever the chancery may be held.

The security here spoken of, to be given by the plaintiff for prosecuting his claim, is common to both writs, though it gives denomination only to the latter. The whole of it is at present become a mere matter of form; and John Doe and Richard Roe are always returned as the standing pledges for this purpose.—The ancient use of them was to answer for the plaintiff, who in case he brought an action without cause, or failed in the prosecution of it when brought, was liable to an amercement from the crown for raising a false accusation; and so the form of the judgment still is. In like manner, as by the Gothic constitutions no person was permitted to lay a complaint against another, *nisi sub scriptura aut specificatione trium testium, quod actionem vellet persequi*: and, as by the laws of Sancho I, king of Portugal, damages were given against a plaintiff who prosecuted a groundless action.

The day on which the defendant is ordered to appear in court, and on which the sheriff is to bring in the writ, and report how far he has obeyed it, is called the *return of the writ*; it being then returned by him to the king's justices at Westminster. And it is always made returnable at the distance of at least 15 days from the date or teste, that the defendant may have time to come up to Westminster, even from the most remote parts of the kingdom; and upon some day in one of the four terms, in which the court sits for the dispatch of business.

WRITING, the art or act of signifying and conveying our ideas to others, by letters or characters visible to the eye. See COMPOSITION, GRAMMAR, and LANGUAGE.

WURTEMBERG, or WIRTEMBERG, a sovereign duchy of Germany, in Suabia; bounded on the north by Franconia, the archbishopric of Mentz, and the palatinate of the Rhine; on the east by the county of Oeting, the marquise of Burgau, and the territory of Ulm; on the south by the principality of Hohen-Zollern, Furstburg, and the marquise of Hohenburg; and on the west by the palatinate of the Rhine, the marquise of Baden, and the Black Forest. It is 65 miles in length, and as much in breadth, and the river Neckar runs almost through the middle of it from S. to N. Though there are many mountains and woods, yet it is one of the most populous and fertile countries in Germany, producing plenty of pastures, corn, fruits, and a great deal of wine towards the confines of the palatinate. There are also mines, and salt springs, with plenty of game and fish. It

contains 645 villages, 88 towns, and 26 cities, of which Stuttgart is the capital.

WURTSBURG, the bishopric of a large country of Germany, comprehending the principal part of Franconia. It is bounded by the county of Henneburg, the duchy of Coburg, the abbey of Fulda, the archbishopric of Mentz, the marquise of Anspach, the bishopric of Bamberg, and the county of Wertheim; being about 65 miles in length, and 50 in breadth, and divided into 50 bailiwicks. The soil is very fertile, and produces more corn and wine than the inhabitants consume. The territories of the bishop comprehend above 400 towns and villages, of which he is sovereign, being one of the greatest ecclesiastical princes of the empire.

WURTZBURG, a large and handsome city of Germany, and one of the principal in the circle of Franconia. It is defended with good fortifications, and has a magnificent palace. There is a handsome hospital, in which are generally 400 poor men and women. The castle is at a small distance from the city, and commands it, as it stands upon an eminence. It communicates with the city by a stone-bridge, on which are 12 statues, representing as many saints.—The arsenal and the cellars of the bishops deserve the attention of the curious. There is also an university, founded in 1403. It is seated on the river Maine, E. Long. 10. 5. N. Lat. 49. 44.

WYAT (Sir Thomas), an accomplished writer in the reign of Henry VIII. was the son of Sir Henry Wyatt of Allington castle in Kent. He was born in the year 1503, and educated at St John's college, Cambridge. He then visited foreign countries, and probably spent some years abroad; for, at his return to England, he was exceedingly accomplished, and perfectly acquainted with the languages, and polite literature of those times. King Henry VIII. charmed with his abilities, and delighted with his vivacity and wit, immediately took him into favour, honoured him with knighthood, gave him lands, and employed him in several embassies. Nevertheless Wyatt fell into disgrace, and was twice imprisoned. It is evident, however, that he regained the favour and confidence of the king; for he was afterwards sent ambassador to the emperor, and died in the execution of his majesty's commission. The nature of this commission is differently related. Be it what it might, it proved fatal. Riding post in the heat of summer, he was attacked by a violent fever, and died at Shirebourn, in Dorsetshire, in 1541. Sir Thomas Wyatt was cotemporary with Henry Howard, earl of Surrey, and his intimate friend, with whom he shares the honour of polishing our language, and of introducing the numbers used by the Italian poets. Camden calls him *splendide doctus*; and Acliam says, he was one of the best translators of the Latin poets. His oration on his trial (lately published in Miscellaneous Antiquities) shows him to have been a man of considerable ability, and an orator. Leland published a collection of elegies on his death, under the title *Nenia*; which Cibber, in his *Lives of the Poets*, mistakes for a collection of his works. To this book there is prefixed a portrait of Sir Thomas, with a long beard, from a painting of Holbein. His Songs and Poems, among the sonnets of the earl of Surrey, were printed in 1565; 1587, 8vo.

WYCHER-

Wycherley.

WYCHERLEY (William), an eminent English comic poet, was born about 1640. A little before the restoration of king Charles II. he became a gentleman commoner of Queen's-college Oxford, where he was reconciled by Dr Barlow to the protestant religion, which he had a little before abandoned in his travels. He afterward entered himself in the Middle-temple, but soon quitted the study of the law for pursuits more agreeable to his own genius, as well as to the taste of the age: Upon writing his first play, intitled, *Love in a Wood, or St James's Park*, which was acted in 1672, he became acquainted with several of the celebrated with both of the court and town, and likewise with the duchess of Cleveland. Some time after appeared his comedies, called *The Gentleman-Dancing-Master*, his *Plain Dealer*, and his *Country Wife*; all which were acted with applause. George duke of Buckingham had a very high esteem for him, and bestowed on him several advantageous posts.—King Charles also showed him signal marks of favour; and once gave him a proof of his esteem, which perhaps never any sovereign prince before had given to a private gentleman. Mr Wycherley being ill of a fever, at his lodgings in Bow-street, the king did him the honour of a visit. Finding him extremely weakened, he commanded him to take a journey to the south of France, and assured him, at the same time, that he would order him 500*l.* to defray the charges of the journey. Mr Wycherley accordingly went into France; and having spent the winter there, returned to England entirely restored to his former vigour. The king, shortly after his arrival, told him, that he had a son, who he was resolved should be educated like the son of a king, and that he could not choose a more proper man for his governor than Mr Wycherley; for which service 1500*l.* per annum should be settled upon him.

Mr Wycherley, however, such is the uncertain fate of all human affairs, lost the favour of the king by the following means: Immediately after he had received the gracious offer above mentioned, he went down to Tunbridge, where, walking one day upon the Wells-walk, with his friend Mr Fairbeard of Gray's Inn, just as he came up to the bookfeller's shop, the countess of Drogheda, a young widow, rich, noble, and beautiful, came there to inquire for *The Plain Dealer*; "Madam," says Mr Fairbeard, "since you are for the Plain Dealer, there he is for you;" pushing Mr Wycherley towards her. "Yes," says Mr Wycherley, "this lady can bear plain dealing; for she appears to be so accomplished, that what would be a compliment to others, would be plain dealing to her." "No, truly, Sir," said the countess, "I am not without my faults, any more than the rest of my sex; and yet, notwithstanding, I love plain dealing, and am never fond of it than when it tells me of them." "Then, madam," says Mr Fairbeard, "you and the Plain Dealer seem designed by Heaven for each other."—In short, Mr Wycherley walked a turn or two with the countess, waited upon her home, visited her daily at her lodgings while she laid at Tunbridge, and at her lodgings in Hatton-garden after she went to London; where in a little time he married her, without acquainting the king. By this step, which was looked upon as a contempt of his majesty's orders, he

forfeited the royal favours. The countess of Drogheda first led her whole fortune upon him; but his title being disputed after her death, he was so reduced by the expences of the law, and other incumbrances, as to be unable to satisfy the impatience of his creditors, who threw him into prison; and the bookfeller who printed his Plain Dealer, by which he got almost as much money as the other gained reputation, was so ungrateful as to refuse to lend him 20*l.* in his extreme necessity. In that confinement he languished seven years; but at length king James going to see the above play, was so charmed with it, that he gave immediate orders for the payment of his debts, and even granted him a pension of 200*l.* per annum. But that prince's bountiful intentions were in a great measure defeated merely through Mr Wycherley's modesty, he being ashamed to tell the earl of Mulgrave, whom the king had sent to demand it, a true state of his debts. He laboured under the weight of these difficulties till his father died, who left him 600*l.* a-year. But this estate was under uneasy limitations, he being only a tenant for life, and not being allowed to raise any money for the payment of his debts. However, he took a method of doing it which few suspected to be his choice; and this was making a jointure. He had often declared, that he was resolved to die married, though he could not bear the thoughts of living in that state again: accordingly, just at the eve of his death, he married a young gentlewoman with 1500*l.* fortune, part of which he applied to the uses he wanted it for. Eleven days after the celebration of these nuptials, in December 1715, he died, and was interred in the vault of Covent-garden church.

Besides his plays above mentioned, he published a volume of poems in folio. In 1728 his posthumous works in prose and verse were published by Mr Theobald. He was intimate with Mr Pope, Mr Gay, and the other great poets of his time.

WYNDHAM (Sir William), descended of an ancient family, was born about the year 1687, and succeeded young to the title and estate of his father. On his return from his travels, he was chosen member for the county of Somerset; in which station he served in the three last parliaments of queen Anne, and as long as he lived: after the change of the ministry in 1710, he was appointed secretary at war; and in 1713, was raised to be chancellor of the exchequer. Upon the breach between the earl of Oxford and lord Bolingbroke, he adhered to the interests of the latter. He was removed from his employment on the accession of George I. and falling under suspicion on the breaking out of the rebellion in 1715, was apprehended. He made his escape; a reward was published for apprehending him; he surrendered, was committed to the Tower, but never brought to a trial. After he regained his liberty, he continued in opposition to the several administrations under which he lived; and died in 1740.

WYKEHAM (William) of. See WILLIAM.

WYE, a river of Wales, which rising on the confines of Cardiganhire, and running south-east, divides the counties of Radnor and Brecknock; then crossing Herefordshire, it runs south and falls into the mouth of the Severn at Chepstow.

Wycherley

Wyc.

X.

X
Xebec.

X, or **x**, is the 22d letter of our alphabet, and a double consonant. It was not used by the Hebrews or ancient Greeks; for as it is a compound letter, the ancients, who used great simplicity in their writings, made use of, and expressed this letter by its component letters *cs*. Neither have the Italians this letter, but express it by *ss*. **X** begins no word in our language but such as are of Greek original; and is in few others but what are of Latin derivation; as *perplex*, *reflexion*, *defluxion*, &c. We often express this sound by single letters, as *ch*, in *backs*, *necks*; by *ks*, in *books*, *breaks*; by *cc*, in *access*, *accident*; by *ct*, in *action*, *unction*, &c. The English and French pronounce it like *cs* or *ks*; the Spaniards like *c* before *a*, viz. *Alexandro*, as if it were *Alecandro*. In numerals it expresseth 10, whence in old Roman manuscripts it is used for *denarius*; and as such seems to be made of two *V*'s placed one over the other. When a dash is added over it, thus **X̄**, it signifies 10,000.

XANTHIUM, *Ditch Bur*; a genus of the pentandria order, belonging to the monœcia class of plants. There are three species; of which the most remarkable is the strumarium, or lesser burdock, growing naturally on dunghills in many places of Britain. The leaves are bitter and astringent. A decoction of the whole plant affords a showy yellow colour, but it is better if only the flowers are used. Horses and goats eat it; cows, sheep, and swine refuse it.

XANTHOXYLUM. See **ZANTHOXYLUM**.

XEBEC, a small three-masted vessel, navigated in the Mediterranean Sea, and on the coasts of Spain, Portugal, and Barbary. See **PLATE CCLXV**.

The sails of the xebec are in general similar to those of the poleacre, but the hull is extremely different from that and almost every other vessel. It is furnished with a strong prow; and the extremity of the stern, which is nothing more than a sort of railed platform or gallery, projects further behind the counter and buttock than that of any European ship.

Being generally equipped as a corsair, the xebec is constructed with a narrow floor, to be more swift in pursuit of the enemy; and of a great breadth, to enable her to carry a great force of sail for this purpose without danger of overturning. As these vessels are usually very low built, their decks are formed with a great convexity from the middle of their breadth towards the sides, in order to carry off the water which falls aboard more readily by their scuppers. But as this extreme convexity would render it very difficult to walk thereon at sea, particularly when the vessel rocks by the agitation of the waves, there is a platform of grating extending along the deck from the sides of the vessel towards the middle, whereon the crew may walk dry-footed whilst the water is conveyed through the grating to the scuppers.

When a xebec is equipped for war, she is occasion-

ally navigated in three different methods, according to the force or direction of the wind.

Thus, when the wind is fair, and nearly stern, it is usual to extend square-sails upon the main-mast; and indeed frequently on the fore-mast: and as those sails are rarely used in a scant wind, they are of an extraordinary breadth.

When the wind is unfavourable to the course, and yet continues moderate, the square yards and sails are removed from the masts, and laid by, in order to make way for the large lateen yards and sails, which soon after assume their place: but if the foul wind increases to a storm, these latter are also lowered down and displaced; and small lateen yards with proportional sails are extended on all the masts.

The xebecs, which are generally armed as vessels of war by the Algerines, mount from 16 to 24 cannon, and carry from 300 to 450 men, two thirds of whom are generally soldiers.

By the very complicated and inconvenient method of working these vessels, it will be readily believed what one of their captains of Algiers acquainted Mr Falconer, viz. That the crew of every xebec has at least the labour of three square-rigged ships, wherein the standing sails are calculated to answer every situation of the wind.

XENOCRATES, one of the most illustrious philosophers of ancient Greece, was born in Chalcedon, and became early a disciple of Plato. He studied under this great master at the same time with Aristotle, but was not possessed of the same talents; he wanting a spur, and the other a bridle. However, if Xenocrates, by the heaviness of his genius, was greatly inferior to Aristotle, he excelled him very much in practical philosophy. There was something extraordinary in the sagacity of his morals. He was absolute master of his passions; and was not fond of pleasure, riches, or applause. So great was his reputation for sincerity and probity, that he was the only person whom the magistrates of Athens dispensed from confirming his testimony with an oath. There was nothing graceful in the behaviour of Xenocrates, but a seriousness and severity were always seen in his deportment; for which reason Plato frequently exhorted him to sacrifice to the Graces. Notwithstanding this severe cast of mind, he yet was extremely compassionate. He was fond of the mathematics; and permitted none of his scholar's to be ignorant of them. It is surprising that a philosopher of so much merit should have been so ill treated by the Athenians, as to be sold because he could not pay the poll-tax laid on foreigners. Demetrius Phalereus bought Xenocrates, set him immediately at liberty, and paid the Athenians the debt. Xenocrates died 314 B. C. at about 90 years of age, by accidentally striking his forehead against a kettle in the night. He composed, at Alexander's

Xebec,
Xenocrates.

ander's desire, a Treatise on the Art of Reining; fix books on Nature; six books on Philosophy; one on Riches, &c. but none of these works have been handed down to us. Our philosopher's theology was but poor stuff: Cicero refutes him in the first book of the Nature of the Gods.

XENOPHANES, a Greek philosopher, born in Colophon, was, say some authors, the disciple of Archelaus; according to which he must have been contemporary with Socrates. Others relate, that he taught himself all he knew, and that he lived at the same time with Anaximander. By this account he must have flourished before Socrates, and about the 60th Olympiad, as Diogenes Laertius affirms. He wrote several poems on philosophical subjects; as also a great many on the foundation of Colophon, and on that of the colony of Elea. His opinion with regard to the nature of God does not differ much from that of Spinoza. He wrote against Homer and Hesiod. When he saw the Egyptians pour forth lamentations during their festivals, he thus advised them: "If the objects of your worship are Gods, do not weep; if they are men, offer not sacrifices to them." He was banished from his country, withdrew to Sicily, and lived in Zanche and Catana. He founded the Eleatic sect. The answer Xenophanes made to a man, with whom he had refused to play at dice, is highly worthy of a philosopher. This man calling him a coward, "Yes," (replied he) I am excessively so with regard to all shameful actions.

XENOPHON, a celebrated general, philosopher, and historian, was born at Athens, and became early a disciple of Socrates, who is said by Strabo to have saved his life in battle. About the 50th year of his age he engaged in the expedition of Cyrus, and accomplished his immortal retreat in the space of 15 months. The jealousy of the Athenians banished him from his native city for engaging in the service of Sparta and Cyrus. On his return therefore he retired to Scillus, a town of Elis, where he built a temple to Diana, which he mentions in his Epistles, and devoted his leisure to philosophy and rural sports. But commotions arising in that country, he removed to Corinth, where he is supposed to have written his Grecian History, and to have died at the age of 90, in the year 360 before Christ. By his wife Phileia he had two sons, Diodorus and Gryllus. The latter rendered himself immortal by killing Epaminondas in the famous battle of Mantinea, but perished in that exploit, which his father lived to record. The best editions of his works are those of Franckfort in 1674, and of Oxford, in Greek and Latin, in 1703, 5 vols, 8vo. Separately have been published his *Cyropædia*, Oxon 1727, 4to, and 1736, 8vo. *Cyri Anabasis*, Oxon 1735, 4to, and 1747, 8vo. *Memorabilia Socratis*, Oxon 1741, 8vo. His *Cyropædia* has been admirably translated into English by Mr Spelman.

XENOPHON the Younger, a Greek writer, so called to distinguish him from the celebrated Xenophon, was born at Ephesus, and lived, according to some authors, before Heliodorus, that is, about the beginning of the 4th century. He is only known by his *Ephesiaca*, a Greek romance, in five books, which is effeminate, and contains the amours or adventures of Abracomes and Anthia. This romance was printed at London, in

Greek and Latin, in 1724, 4to.

XERXES I. the fifth king of Persia, memorable for the vast army he is said to have carried into the field against Leonidas king of Sparta; consisting, according to some historians, of 800,000 men, while others make it amount to 3,000,000, exclusive of attendants. The fleet that attended this prodigious land force is likewise made to consist of 2000 sail; and all the success they met with was the taking and burning the city of Athens; for the army was shamefully repulsed near the Straights of Thermopylæ by Leonidas, with only 4000 chosen Spartans, and the fleet was dispersed and partly destroyed by Themistocles at the Straights of Salamis, who had only 380 sail under his command. Xerxes was assassinated by Artabanus, chief captain of his guards, and his distinguished favourite.

XIMENES (Francis), a justly celebrated cardinal, bishop of Toledo, and prime minister of Spain, was born at Torrelaguna, in Old Castile, in 1437, and studied at Alcalá and Salamanca. He then went to Rome; and being robbed on the road, brought nothing back but a bull for obtaining the first vacant prebend: but the archbishop of Toledo refused it him, and threw him in prison. Being at length restored to liberty, he obtained a benefice in the diocese of Sigüenza, where cardinal Gonzales de Mendoza, who was the bishop, made him his grand vicar. Ximenes some time after entered among the Franciscans of Toledo; but being there troubled with visits, he retired to a solitude named *Casafiel*, and applied himself to the study of divinity and the Oriental tongues. At his return to Toledo, queen Isabella of Castile chose him for her confessor, and afterwards nominated him archbishop of Toledo; which, next to the papacy, is the richest dignity in the church of Rome. "This honour (says Dr Robertson) he declined with a firmness, which nothing but the authoritative injunction of the pope was able to overcome. Nor did this height of promotion change his manners. Though obliged to display in public that magnificence which became his station, he himself retained his monastic severity. Under his pontifical robes he constantly wore the coarse frock of St Francis, the rents of which he used to patch with his own hands. He at no time used linen; but was commonly clad in hair-cloth. He slept always in his habit, most frequently on the floor, or on boards, and rarely in a bed. He did not taste any of the delicacies which appeared at his table, but satisfied himself with that simple diet which the rule of his order prescribed. Notwithstanding these peculiarities, so opposite to the manners of the world, he possessed a thorough knowledge of its affairs, and discovered talents for business which rendered the fame of his wisdom equal to that of his sanctity." His first care was to provide for the necessities of the poor; to visit the churches and hospitals; to purge his diocese of usurers and places of debauchery; to degrade corrupt judges, and place in their room persons whom he knew to be distinguished by their probity and disinterestedness. He erected a famous university at Alcalá; and in 1499 founded the college of St Ildephonso. Three years after he undertook the Polyglot Bible; and for that purpose sent for many learned men to come to him at Toledo, purchased seven copies in Hebrew for 4000 crowns, and gave a great price for Latin and Greek manuscripts. At this

Ximenes.

Ximenes.

Bible they laboured above 12 years. It contains the Hebrew text of the Bible; the version of the Septuagint, with a literal translation; that of St. Jerom, and the Chaldee paraphrases of Onkelos; and Ximenes added to it a dictionary of the Hebrew and Chaldee words contained in the Bible. This work is called *Ximenes's Polyglot*. In 1507 pope Julius II. gave him the cardinal's hat, and king Ferdinand the Catholic entrusted him with the administration of affairs. Cardinal Ximenes was from this moment the soul of every thing that passed in Spain. He distinguished himself at the beginning of his ministry by discharging the people from the burdensome tax called *acavale*, which had been continued on account of the war against Granada; and laboured with such zeal and success in the conversion of the Mahometans, that he made 3000 converts, among whom was a prince of the blood of the kings of Granada. This great multitude he baptized in a spacious square; where having made them bring all the books of the Koran, he had them publicly burnt. The day in which this was performed is annually solemnized as a festival in Spain. In 1509 cardinal Ximenes extended the dominions of Ferdinand, by taking the city of Oran in the kingdom of Algiers. He undertook this conquest at his own expence, and marched in person at the head of the Spanish army clothed in his pontifical ornaments, and accompanied by a great number of ecclesiastics and monks. Some time after, foreseeing an extraordinary scarcity, he erected public granaries at Toledo, Alcalá, and Torrelaguna, and had them filled with corn at his own expence; which gained the people's hearts to such a degree, that to preserve the memory of this noble action they had an elogium upon it cut on marble, in the hall of the senate-house at Toledo, and in the market-place. King Ferdinand dying in 1516, left cardinal Ximenes regent of his dominions; and the archduke Charles, who was afterwards the emperor Charles V. confirmed that nomination. The cardinal immediately made a reform of the officers of the supreme council and of the court, and put a stop to the oppression of the grandees. He vindicated the rights of the people against the nobility; and as by the feudal constitution the military power was lodged in the hands of the nobles, and men of inferior condition were called into the field only as their vassals, a king with scanty revenues depended on them in all his operations. It was with their forces he attacked his enemies, and with them he defended his own kingdom; and while at the head of troops attached only to their own lords, and accustomed to obey no other command, his authority was precarious, and his efforts feeble. From this state Ximenes resolved to deliver the crown; and issued a proclamation, commanding every city in Castile to enroll a certain number of its burgesses, and teach them military discipline, he himself engaging to provide officers to command them at the public expence. This was vigorously opposed by the nobles; but by his integrity and superior address he carried his point. He then endeavoured to diminish the possessions of the nobility, by reclaiming all the crown lands, and putting a stop to the pensions granted by the late king Ferdinand. This addition made to the revenues enabled him to discharge all the debts of Ferdinand, and to establish magazines of warlike stores. The nobles,

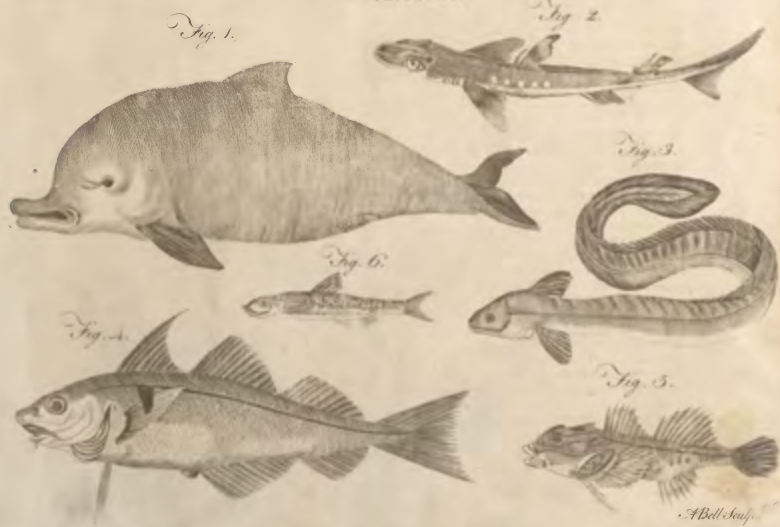
alarmed at these repeated attacks, uttered loud complaints; but before they proceeded to extremities, appointed some grandees of the first rank to examine the powers, in consequence of which he exercised acts of such high authority. Ximenes received them with cold civility, produced the testament of Ferdinand, by which he was appointed regent, together with the ratification of that deed by Charles. To both these they objected; and he endeavoured to establish their validity. As the conversation grew warm, he led them insensibly to a balcony, from which they had a view of a large body of troops under arms, and of a formidable train of artillery. "Behold (says he, pointing to these, and raising his voice) the powers which I have received from his Catholic majesty. With these I govern Castile; and with these I will govern it, till the king, your master and mine, takes possession of his kingdom." A declaration so bold and haughty silenced them, and astonished their associates. They saw that he was prepared for his defence, and laid aside all thoughts of a general confederacy against his administration. He also founded two magnificent monasteries; one for the pious education of a great number of ladies of quality, who had no fortunes, and the other an asylum for poor girls. He was at great expence in embellishing his native town Torrelaguna, with a fountain of running water, which he caused to be brought through rocks and mountains, and with several other public works. At length, from the repeated entreaties of Ximenes, and the impatient murmurs of the Spanish ministry, Chas. V. embarked and landed in Spain, accompanied by his favourites. Ximenes, who considered the presence of the king as the greatest blessing to his dominions, was advancing to the coast to meet him; but at Bos Equilos was seized with a violent disorder, which his followers considered as the effects of poison, but could not agree whether the crime ought to be imputed to the hatred of the Spanish nobles, or to the malice of the Flemish courtiers. This accident obliging Ximenes to stop, he wrote to the king, and with his usual boldness advised him to dismiss all the strangers in his train, whose number and credit already gave offence to the Spaniards, and earnestly desired to have an interview with him, that he might inform him of the state of the nation, and the temper of his subjects. To prevent this, not only the Flemings, but the Spanish grandees, employed all their address to keep Charles at a distance from Aranda, the place to which the cardinal had removed. His advice was now slighted and despised. Ximenes, conscious of his own integrity and merit, expected a more grateful return from a prince, to whom he delivered a kingdom more flourishing than it had been in any former age, and a more extensive authority than the most illustrious of his ancestors had ever possessed; and lamented the fate of his country, about to be ruined by the rapaciousness and insolence of foreign favourites. While his mind was agitated by these passions, he received a letter from the king; in which, after a few cold and formal expressions of regard, he was allowed to retire to his diocese; and he expired a few hours after reading it, in 1517, in the 81st year of his age.

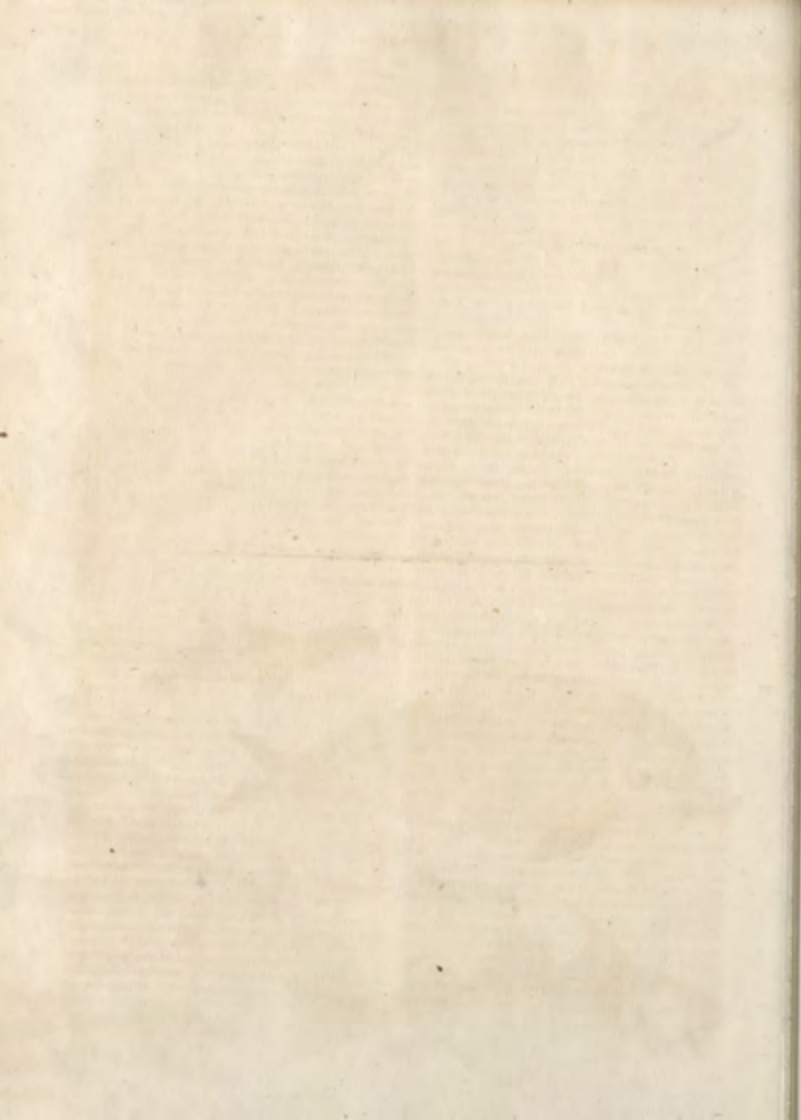
This famous cardinal ought not to be confounded with

Roderic XIMENES, archbishop of Toledo, in the



ICHTHYOLOGY.





13th century, who wrote a History of Spain in nine books; nor with several other Spanish writers of the name of *Ximenes*.

XIPHIAS, the SWORD-FISH; a genus belonging to the order of apodes. The upper jaw terminates in a long sword-shaped rostrum, from which it is called the *sword-fish*: there are no teeth in the mouth; the gill-membrane has eight rays; and the body is somewhat cylindrical. There is but one species, viz. the gladius, found in the European ocean.

This fish sometimes frequents our coasts, but is much more common in the Mediterranean sea, especially in the part that separates Italy from Sicily, which has been long celebrated for it: the promontory Pelorus, now Capo di Faro, was a place noted for the resort of the xiphias, and possibly the station of the speculators, or the persons who watched and gave notice of the approach of the fish.

The ancient method of taking them is particularly described by Strabo, and agrees exactly with that practised by the moderns.

A man ascends one of the cliffs that overhangs the sea: as soon as he spies the fish, he gives notice, either by his voice or by signs, of the course it takes. Another, that is stationed in a boat, climbs up the mast, and on seeing the sword-fish, directs the rowers towards it. As soon as he thinks they are got within reach, he descends, and taking a spear in his hand, strikes it into the fish; which, after wearying itself with its agitation, is seized and drawn into the boat. It is much esteemed by the Sicilians, who buy it up eagerly, and at its first coming into season give about sixpence English *per* pound. The season lasts from May till August. The ancients used to cut this fish into pieces, and salt it; whence it was called *Tonus Thurianus*, from Thurii, a town in the bay of Tarentum, where it was taken and cured.

The sword-fish is said to be very voracious, and that it is a great enemy to the tunny, who (according to Belon) are as much terrified with it as sheep are at the sight of a wolf. It is a great enemy to the whales, and frequently destroys them. See **BALÆNA**.

XYLO-ALOES, or **ALOE-WOOD**. See **ALOE**.

This drug is distinguished into three sorts; the calambac, the common lignum aloes, and calambour.

The calambac, or finest aloes-wood, called by authors *lignum aloes præstantissimum*, and by the Chinese *sukiang*, is the most refinous of all the woods we are acquainted with: it is of a light spongy texture, very porous, and its pores so filled up with a soft and fragrant resin, that the whole may be pressed and dented by the fingers like wax, or moulded about by chewing in the mouth, in the manner of mastic. This kind, laid on the fire, melts in great parts like resin, and burns away in a few moments, with a bright flame and perfumed smell. Its scent, while in the mass, is very fragrant and agreeable; and its taste acrid and bitterish, but very aromatic and agreeable: it is so variable in its colour, that some have divided it into three kinds; the one variegated with black and purple; the second, with the same black, but with yellowish instead of purple; and the third, yellow alone like the yolk of an egg: this last is the least scented of the three; the substance, however, in them all, is the same in every respect, except their colour. It is brought from Cochinchina.

The lignum aloes vulgare is the second in value. This is of a more dense and compact texture, and consequently less refinous than the other; there is some of it, however, that is spongy, and has the holes filled up with the resin refinous matter; and all of it, when good, has the veins of the same resin in it. We meet with it in small fragments, which have been cut and split from larger: these are of a tolerably dense texture in the more solid pieces, and of a dusky brown colour, variegated with resinous black veins. It is in this state very heavy, and less fragrant than in those pieces which show a multitude of little holes, filled up with the same blackish matter that forms the veins in others. The woody part of these last pieces is somewhat darker than the other, and is not unfrequently purplish, or even blackish. The smell of the common aloes-wood is very agreeable, but not so strongly perfumed as the former. Its taste is somewhat bitter and acrid, but very aromatic. This wood is also brought from Cochinchina, and sometimes from Sumatra.

The calambour, or, as some write it, calambouc, is also called *agallochum sylestre*, and *lignum aloes mexicanum*. It is a light and friable wood, of a dusky and often mottled colour, between a dusky green black and a deep brown. Its smell is fragrant and agreeable, but much less sweet than that of either of the others; and its taste bitterish, but not so much acrid or aromatic as either of the two former. We meet with this very frequent, and in large logs; and these sometimes entire, sometimes only the heart of the tree, the cortical part being separated. This is brought from the island of Timor, and is the aloes-wood used by the cabinet-makers and inlaiders.

The Indians use the calambac by way of incense, burning small pieces of it in the temples of their gods; and sometimes their great people burn it in their houses in times of feasting. It is esteemed a cordial taken inwardly; and they sometimes give it in disorders of the stomach and bowels, and to destroy the worms. A very fragrant oil may be procured from it by distillation; which is recommended in paralytic cases, from five to fifteen drops. It is at present, however, but little used; and would scarce be met with any where in the shops, but that it is an ingredient in some of the old compositions.

XYNOECIA, in Grecian antiquity, an anniversary feast, observed by the Athenians in honour of Minerva, upon the sixteenth of Hecatombæon, in memory that, by the persuasion of Theseus, they left their country-seats, in which they lay dispersed here and there in Attica, and united together in one body.

XYSTARCHA, in antiquity, the master or director of the xylus. In the Greek gymnasium, the xylarcha was the second officer, and the gymnasiarcha the first; the former was his lieutenant, and presided over the two xylis, and all exercises of the athletes therein.

XYSTUS, among the Greeks, was a long portico, open or covered at the top, where the athletes practised wrestling and running; the gladiators, who practised therein, were called *xystici*.

Among the Romans, the xylus was only an alley, or double row of trees, meeting like an arbour, and forming a shade to walk under.

Y.

Y
Yards.

Y or y, the 23d letter of our alphabet: its sound is formed by expressing the breath with a sudden expansion of the lips from that configuration by which we express the vowel *u*. It is one of the ambigienal letters, being a consonant in the beginning of words, and placed before all vowels, as in *yard*, *yield*, *young*, &c. but before no consonant. At the end of words it is a vowel, and is substituted for the sound of *i*, as in *try*, *defery*, &c. In the middle of words it is not used so frequently as *i* is, unless in words derived from the Greek, as in *chyle*, *emphyreal*, &c. though it is admitted into the middle of some pure English words, as in *dying*, *flying*, &c. The Romans had no capital of this letter, but used the small one in the middle and last syllables of words, as in *corymbus*, *onyx*, *martyr*. **Y** is also a numeral, signifying 150, or, according to Baronius, 159; and with a dash a-top, as **Y**, it signifies 150,000.

YACHT, a vessel of state, usually employed to convey princes, ambassadors, or other great personages from one kingdom to another.

As the principal design of a yacht is to accommodate the passengers, it is usually fitted with a variety of convenient apartments, with suitable furniture, according to the quality or number of the persons contained therein.

The royal yachts are commonly rigged as ketches, except the principal one reserved for the sovereign, which is equipped with three masts like a ship. They are in general elegantly furnished, and richly ornamented with sculpture; and always commanded by captains in his majesty's navy.

Besides these, there are many other yachts of a smaller kind, employed by the commissioners of the excise, navy, and customs; or used as pleasure-boats by private gentlemen.

YAMS. See **DIOSCOREA**.

YAMBOO. See **EUGENIA**.

YARDS of a **SHIP**, a long piece of timber suspended upon the masts of a ship, to extend the sails to the wind. See **MAST** and **SAIL**.

All yards are either square or lateen; the former of which are suspended across the masts at right angles; and the latter obliquely.

The square yards (fig. 1. Plate CCLX.) are nearly of a cylindrical surface. They taper from the middle, which is called the *flings*, towards the extremities which are termed the *yard arms*; and the distance between the flings and the yard-arms on each side, is, by the artificers, divided into quarters, which are distinguished into the first, second, third quarters, and yard-arms. The middle quarters are formed into eight squares, and each of the end parts is figured like the fruitum of a cone. All the yards of a ship are square except that of the mizen.

The proportions for the length of yards, according

to the different classes of ships in the British navy, are as follows:

		Guns.
	{ 560 : }	main-yard-express { 100
	{ 559 : }	fed by <i>d, d</i> , fig. 1 { 90 80
	{ 570 : }	Plate CCLX. { 70
1000 : gun-deck :	{ 576 : }	Note, the figures { 60
	{ 575 : }	represents the { 50
	{ 561 : }	yard and falls of { 44
	{ 880 : }	a ship of 74 guns. { 100 90 80
1000 : main-yard :	{ 874 : }	fore yard. { all the rest.

To apply this rule to practice, suppose the gun-deck 144 feet. The proportion for this length is as 1000 is to 575, so is 144 to 83; which will be the length of the main-yard in feet, and so of all the rest.

		Guns.
1000 main-yard :	{ 820 : }	mizen-yd. { 100 90 80 60 44
	{ 847 : }	{ 70
	{ 840 : }	{ 24
1000 : main-yard :	{ 726 : }	main top-fail-yard { 24
	{ 720 : }	{ all the rest.
1000 : fore-yard :	{ 719 : }	fore top-fail-yard { 70
	{ 726 : }	{ 24
	{ 715 : }	{ all the rest.
1000 : main top-fail-yard :	{ 690 : }	main top-gall-yard { all the rest.
1000 fore top-fail-yard :	{ 696 : }	fore top-gall-yard { 70
	{ 690 : }	{ all the rest.
1000 : fore top-fail-yard :	{ 768 : }	mizen top-fail-yard { 70
	{ 750 : }	{ all the rest.

Cross-jack and sprit-fail yards equal to the fore top-fail-yard.

Sprit-top-fail-yard equal to the fore top-gallant-yard.

The diameters of yards are in the following proportions to their length.

The main and fore yards five sevenths of an inch to one yard. The top-fail, cross-jack, and sprit-fail yards, nine fourteenths of an inch to one yard. The top-gallant, mizen top-fail, and sprit-fail top-fail yards, eight thirteenths of an inch to one yard.

The mizen-yard five ninths of an inch to one yard.

All studding-fail booms and yards half an inch to one yard in length.

The lifts of the main-yard are exhibited in the above figure, by *g*; the horses and their stirrups, by *b, i*; the reef-tackles and their pendants, by *k, l*; and the braces and brace-pendants, by *m, n*.

The lateen-yards evidently derive their names from having been peculiar to the ancient Romans. They are usually composed of several pieces fastened together by woodings, which also serve as steps whereby the sailors climb to the peak or upper extremity, in order to furl or cast loose the sail.

The mizen-yard of a ship, and the main-yard of a bilander, are hung obliquely on the mast, almost in the same manner as the lateen-yard of a xebec, settee, or polacre.

YARD,

Yard
wining.

YARD, a measure of length used in Britain and Spain, consisting of three feet, chiefly to measure cloth, stuffs, &c.

YARD-Arm is that half of the yard that is on either side of the mast, when it lies athwart the ship.

YARDS also denotes places belonging to the navy, where the ships of war, &c. are laid up in harbour.—There are belonging to his majesty's navy six great yards, viz. Chatham, Deptford, Woolwich, Portsmouth, Sheerness, and Plymouth; these yards are fitted with several docks, wharfs, lanches, and, graving places, for the building, repairing, and cleaning of his majesty's ships; and therein are lodged great quantities of timber, masts, planks, anchors, and other materials: there are also convenient store-houses in each yard, in which are laid up vast quantities of cables, rigging, sails, blocks, and all other sorts of stores needful for the royal navy.

YARE, among sailors, implies ready or quick: as, be yare at the helm; that is, be quick, ready, and expeditious at the helm. It is sometimes also used for bright by seamen: as, to keep his anns yare; that is, to keep them clean and bright.

YARE, a river of Norfolk, which runs from west to east through that county, passing by Norwich, and falling into the German sea at Yarmouth.

YARMOUTH, a sea-port town of Norfolk, with a market on Wednesdays and Saturdays, and a fair on Friday and Saturday in Easter-week for petty chapmen. It is situated on the river Yare, where it falls into the sea, and is a place of great strength, both by art and nature, being almost surrounded with water; and there is a draw-bridge over the river. It is esteemed the key of this coast, and is a clean handsome place, whose houses are well built, it being a considerable town for trade. It has one large church, and a neat chapel, and the steeple of St Nicholas's is so high, that it serves for a sea-mark. It is governed by a mayor. The harbour is a very fine one, though it is very dangerous for strangers in windy weather; and it has for its security a pretty strong fort. It is 27 miles east of Norwich, and 123 north-east of London. E. Long. 2. o. N. Lat. 52. 45.

YARMOUTH, a town of the Isle of Wight, in Hampshire, with a market on Fridays, and one fair on July 25th for toys. It is seated on the western part of the island, on the sea-shore, and is encompassed with water; for not many years ago a channel was cut through the peninsula, over which there is a draw-bridge, and it is defended by a strong castle on the quay. It is a handsome place, whose houses are chiefly built with stone, and covered with slate; and it sends two members to parliament. The market is now dissolved.

YARN, wool or flax spun into thread, of which they weave cloth. See CLOTH.

YAWNING, an involuntary opening of the mouth, occasioned by a vapour or ventosity endeavouring to escape, and generally witnessing an irksome weariness, or an inclination to sleep. Yawning, according to Boerhaave, is performed by expanding at one and the same time all the muscles capable of spontaneous motion; by greatly extending the lungs; by drawing in gradually and slowly a large quantity of air; and gradually and slowly breathing it out, after it has been retained for some time and rarified; and then restoring the muscles to their natural state. Hence the effect

of yawning is to move, accelerate, and equally distribute all the humours through all the vessels of the body, and consequently to qualify the muscles and organs of sensation for their various functions.

Sanctorius observes, that a great deal is insensibly discharged, when nature endeavours to get rid of the retained perspirable matter, by yawning and stretching of the limbs. To these a person is most inclined just after sleep, because, a greater quantity going off by the pores of the skin than at other times, whensoever a person wakes, the increased contraction that then happens closes a great deal of the perspirable matter in the cutaneous passages, which will continually give such irritations as excite yawning and stretching; and such motions, by shaking the membranes of the whole body, and shifting the contacts of their fibres, and the inclosed matter, by degrees throw it off. Hence we see the reason why healthful strong people are most inclined to such motions, because they perspire most in time of sleep, and therefore have more of the perspirable matter to lodge in the pores, and greater irritations thereunto. The advantages of some little exercise just after waking in a morning are considerable, as it throws off all the perspirable matter that is ready for its exit out of the body. When yawning is troublesome, Hippocrates says, that long deep respiration, or drawing in the air at long intervals, cures it.

YEAR, in astronomy and chronology. See ASTRONOMY, n° 289—296.

YELL, one of the islands of Shetland, lying north-east from the main land, and divided from it by an arm of the sea, called *Yell-Sound*. By some it is thought to have been the *Thule* of the ancients. In the old descriptions it is said to be 20 miles long, and eight broad. It is very mountainous and full of moss; but there are pretty considerable pastures in which they feed a great many sheep; and it also affords plenty of peat. It has eight large harbours, which would not be thought despicable in other countries. Anciently it seems to have been pretty populous, since there are in it three churches, 20 chapels, and many brughs or Pictish forts.

YELLOW, one of the original colours of light.

YELLOW-Colour for House-painting. See CHEMISTRY, n° 148.

Naples YELLOW, a beautiful colour much used by painters, formerly thought to be prepared from arsenic, but now discovered to have lead for its basis.

YELLOW-Hammer, in ornithology. See FRINGILLA.

YELLOW-Fever. See MEDICINE, n° 416, 417, 434.

YEOMAN, the first or highest degree among the plebians of England, next in order to the gentry.

The Yeomen are properly freeholders, who having land of their own, live on good husbandry.

YEOMAN is also a title of office in the king's household, of a middle place or rank between an usher and a groom.

YEOMAN of the Guard were anciently 250 men of the best rank under gentry, and of larger stature than ordinary, each being required to be six feet high.

At present there are but 100 yeomen in constant duty, and 70 more not in duty; and as any of the 100 dies, his place is supplied out of the 70.

They go dressed after the manner of king Henry VIII's

Year
Yeoman.

Yeovil
York.

VIII's time. They formerly had diet as well as wages when in waiting; but this was taken off in the reign of queen Anne.

YEOVIL, a market-town of Somersetshire, situated 18 miles south of Wells.

YEST, a head or scum rising upon beer or ale, while working or fermenting in the vat. See BREWING.

It is used for a leaven or ferment in the baking of bread, as serving to swell or puff it up very considerably in a little time, and to make it much lighter, softer, and more delicate. See BAKING, BREAD, and BARM.

The making of yeast was formerly a great desideratum in the arts; but of late Mr Henry has published a process, by which he says it can be originally produced without any previous fermentation. The process consists in impregnating a mixture of molasses and flour with fixed air; and this mixture is afterwards found to act as a ferment to other substances.

YEW, in botany. See TAXUS.

YLA, one of the western islands of Scotland, situated in the Irish sea, west of Cantire. See ILLA.

YNCA, an appellation anciently given to the kings of Peru, and the princes of their blood; the word literally signifying lord, king, emperor, and royal blood.

YOAK, or YOKE, in agriculture, a frame of wood, fitted over the necks of oxen, whereby they are coupled together, and harnessed to the plough.

YOAK of land in our ancient customs, was the space which a yoke of oxen, that is, two oxen, may plow in one day.

YOLK, the yellow part in the middle of an egg. See EGG. The yolk is endued with an anodyne, maturing, digesting, and relaxing virtue. Hence it is very often an ingredient in clysters, and mixed with a little fat, is commonly applied, in a walnut shell, to the navels of infants, in order to loosen the belly.

YONNE, a river in France, which rising in Burgundy, and running north through Nivernois and Champaign, falls into the Seyne at Montereau fur Yonne.

YORK, in Latin *Eboracum*, the capital of Yorkshire in England. This city is so ancient that the origin of it is uncertain. In the time of the Romans a legion was stationed here, it being then the capital of the Brigantes; and here died the emperor Severus, and Flavius Valerius Constantius Chlorus, father of Constantine the Great. There was then also a temple of Bellona here, and no less than three military ways went from hence. In the time of the Saxons it was erected into an archbishopric by pope Honorius, to which are now subject the bishoprics of Chester, Durham, Carlisle, and the Isle of Man; though anciently 12 bishoprics in England, and all Scotland, were. A horn is still kept in theminster, by which Ulphius, one of the Saxon princes, bestowed all his lands and revenues upon the church.

This city suffered very much during the ravages of the Danes; but, after the conquest, it began to flourish again. The cathedral, which cost a long time and a great deal of money in building, is a most stately Gothic pile. Its chapter-house is particularly admired for its painted glass, its fine marble stalls, its pil-

lars of alabaster, and curious contrivance. In it is the following line in gold letters:

Ut Rosa, flos florum, sic est Domus ista Donorum.

The choir is remarkable for its fine carvings, particularly the statues of all the English monarchs; and the windows are exquisitely painted with the history of the Bible. The lanthorn steeple is 70 feet square, and 188 high, and the windows are 45. At the south end is a circular light, called the *marigold window* from the colour of its glass; and at the north end is a very large one, whose painting represents embroidery.—Here, in the reign of Richard I. was a barbarous massacre of the Jews; and Henry III. had, in this place, an interview with Alexander king of Scots. Several parliaments were held here in the reigns of Edward I. and II. A tribunal, not unlike the parliaments of France, was established at York by Henry VIII. to decide all causes in these northern parts, according to the rules of equity.

This city, as hath been already observed, is a county of itself; and its jurisdiction extends over 36 villages and hamlets in the neighbourhood. It is generally reckoned the second city in England; but though it stands upon more ground, it is inferior in trade, wealth, and number of people, to Bristol. It is situated in a fine plain, in the middle of the shire, on both sides the Ouse, walled, and divided into four wards, containing 28 parishes. It enjoys large privileges and immunities, conferred upon it by a succession of kings from Henry II. and its chief magistrate has the title of *lord-mayor*, which is an honour peculiar to it and London. Richard II. made it a county of itself. The conservancy of most of the rivers of the county, within certain limits, belongs to the lord-mayor and aldermen. The middle arch of the bridge here over the Ouse, is thought to equal the Rialto at Venice, in architecture, height, and breadth, the diameter being 81 feet, and the height 51. Though this city is 60 miles distant from the sea, yet ships of 70 tons burden come up the river to it. The town-house, or Guildhall, stands upon the bridge, and is superior in all respects to that of London. In the Popish times there were nine albeys here, and a vast number of churches; but of the latter there are only 17 now. The steeple of that of Allhallows, is reckoned the finest in England. The archbishop has a fine palace; and the assembly-room, designed by the earl of Burlington, is very noble. Here are plays, assemblies, concerts, and the like entertainments, at some house or other, almost every night in the week. In the old castle, built originally by William the Conqueror, and repaired in 1701, the assizes are kept. It serves also for the county goal, which is the neatest and pleasantest in England, with an area larger than that of the King's-bench, and has a handsome chapel in it, with a good allowance for a preacher. This city has long given the title of *duke* to some branch of the royal family, and lately to his royal highness Edward, next brother to his present majesty George III. who was carried off by a violent fever at Monaco in Italy, in the flower of his age, to the great grief of the nation and the royal family.

The plenty and cheapness of provisions induces many persons of small fortune, or that would live frugally,

to

York.

to take up their abode here; and the venerable remains of Roman antiquities, and those of a latter date, as abbeys, churches, and castles, procure this city a visit from every curious traveller. Many Roman altars, urns, coins, inscriptions, &c. have been found; and Saxon coins are still extant that have been struck here. The members for this city have precedence of all others, except those of London, in the house of commons. An infirmary, after the manner of those of Bath, Bristol, &c. hath been erected in it; and a cotton manufacture (established, and brought to great perfection. Besides four weekly markets, it has a great many fairs; one, in particular, every other Thursday, for cattle and sheep.

YORKSHIRE, the largest county of England, bounded on the south by Derbyshire, Nottinghamshire, and Lincolnshire; on the north by Durham and Westmoreland; on the east by the German ocean; and on the west by Lancashire, and a part of Cheshire.—It is upwards of 80 miles in length from east to west, near as much in breadth, and about 360 in circumference, containing, in the whole, 26 hundreds or wapentakes, 49 market-towns, 563 parishes, 242 vicarages, with many chapels of ease, and 2330 villages. Its area is computed by some at 4684 square miles, by others at 3,770,000 acres, and its inhabitants at upwards of 530,000. It is divided into three parts, or ridings, viz. the West, East, and North; so denominated from their situation, in respect of the city of York. Each of these is as large, if not larger, than any ordinary county. There are other divisions, as Richmondshire, Allertonshire, Howdenshire, Hallamshire, Craven, Cleveland, Marsfield, Holderness, &c.

As the soil and face of the country vary greatly, so does the air. In the hilly parts the air is good, but the soil very indifferent; of the lower, some are marshy, others drier, and the soil of both rich; but the air of the former is more foggy and unhealthy than that of the latter.

The manufactures of this county are cutlery and hard-ware; particularly knives, bits, and spurs; but the principal are stockings and woollen cloth, with which it supplies, in a great measure, Germany and the North. As to the produce, it abounds in corn, cattle, horses, lead, and iron, coal, wood, lime, liquorice, alum, jet, &c. It lies wholly in the northern circuit, and much the greater part of it in the diocese of York; that only which is called *Richmondshire*, belonging to the diocese of Chester. The members it sends to parliament are 30; of which two are for the shire, and 28 for the towns.

YORK (*New*), one of the United States of America. It is bounded on the east by New-England; on the north by Canada; on the south by New-Jersey; and on the west by Delaware river. It produces corn, abounds in cattle, and has a good breed of horses; but the inhabitants are chiefly employed in fisheries. They supply the Caribbee islands with flour, salt-beef, pork, salt-fish, horses, and timber. They export a great deal of dried and salted fish to Europe; as also logwood, train oil, and whalebone. There are some forts on the north to defend them against the native Americans.

YORK (*New*), the capital of the province of New-York, in North-America, seated in an island at the

mouth of Hudson's river. It stands on an eminence, and is surrounded with a wall, and has other fortifications. It has a spacious harbour, with commodious quays, as well as warehouses. It is frequented by a great number of ships employed in trade, and in the fisheries. W. Long. 74. 40. N. Lat. 39. 40.

YOUNG (Dr Edward), was the son of a clergyman of the same name, and was born about the year 1679. When sufficiently qualified, he was matriculated into All-Souls college, Oxford; and designing to follow the civil law, he took a degree in that profession. In this situation he wrote his poems called *The Last Day*, published in 1704; which coming from a layman gave universal satisfaction: this was soon after followed by another, intitled *The Force of Religion*, or *Vanquished Love*. These productions gained him a respectable acquaintance; he was intimate with Addison, and thus became one of the writers of the Spectator: but the turn of his mind leading him to the church, he took orders, was made one of the king's chaplains, and obtained the living of Welwyn in Hertfordshire, worth about 500*l. per annum*, but he never rose to higher preferment. For some years before the death of the late prince of Wales, Dr Young attended his court pretty constantly; but upon his decease, all his hopes of church preferment vanished; however, upon the death of Dr Hales, he was taken into the service of the princess dowager of Wales, and succeeded him as her privy chaplain. When pretty far advanced in life, he married the lady Elizabeth Lee, daughter of the late earl of Litchfield. This lady was a widow, and had an amiable son and daughter, who both died young. What he felt for their loss, as well as for that of his wife, is finely expressed in his *Night Thoughts*, in which the young lady is characterized under the name of Narcissa; her brother by that of Philander; and his wife, though nameless, is frequently mentioned: and he thus, in an apostrophe to death, deprecates the loss of all the three:

Insatiate archer, could not once suffice!

Thy shafts flew thrice, and thrice my peace was slain,

And thrice ere thrice yon moon renew'd her horn.

He wrote three tragedies, *The Revenge*, *Basilin*, and *The Brothers*. His satires, called *Love of Fame the universal Passion*, are by many esteemed his principal performance; though Swift said the poet should have been either more angry or more merry: they have been characterized as a string of epigrams written on one subject, that tire the reader before he gets through them. His *Complaint*, or *Night Thoughts*, exhibit him as a moral and melancholy poet, and are esteemed his master-piece. They form a species of poetry peculiarly his own, and in which he has been unrivalled by all those who attempted to write in this manner. They were written under the recent pressure of his sorrow for the loss of his wife, daughter, and son-in-law; they are addressed to Lorenzo, a man of pleasure and the world, and who, as it is insinuated by some, is his own son, but then labouring under his father's displeasure. As a prose-writer he arraigned the prevailing manners of his time, in a work called *The Centaur not Fabulous*; and when he was above 80 years of age, published *Conjectures on Original Composition*. He published some other pieces; and the whole of his works are collected in 4 and 5 vols 12mo.

Dr

Young
||
Ypres.

Dr Young's turn of mind was naturally solemn; and he usually, when at home in the country, spent many hours of the day walking in his own church-yard among the tombs. His conversation, his writings, had all a reference to the life after this; and this turn of disposition mixed itself even with his improvements in gardening. He had, for instance, an alcove with a bench, so painted near his house, that at a distance it looked as a real one, which the spectator was then approaching. Upon coming up near it, however, the deception was perceived, and this motto appeared, *Invisibilia non decipiunt*, "The things unseen do not deceive us." Yet, notwithstanding this gloominess of temper, he was fond of innocent sports and amusement; he instituted an assembly and a bowling-green in the parish of which he was rector, and often promoted the gaiety of the company in person. His wit was generally poignant, and ever levelled at those who testified any contempt for decency and religion. His epigram, spoken extempore upon Voltaire, is well known; who happening in his company to ridicule Milton, and the allegorical personages of Death and Sin, Young thus addressed him:

Thou art so witty, profligate, and thin,
You seem a Milton with his Death and Sin.

One Sunday preaching in office at St James's, he found, that though he strove to make his audience attentive, he could not prevail. Upon which his pity for their folly got the better of all decorums, and he sat back in the pulpit, and burst into a flood of tears. Towards the latter part of life, he knew his own infirmities, and suffered himself to be in pupillage to his house-keeper; for he considered that, at a certain time of life, the second childhood of age demanded its wonted protection. His son, whose boyish follies were long obnoxious to paternal severity, was at last forgiven in his will; and our poet died regretted by all, having performed all that man could do to fill his post with dignity. His death happened in 1765.

YOUTH, that state of man, in which he approaches towards his greatest perfection of body.— In this state, according to Dr Cullen, rigidity and strength are now greater, but still, with respect to the middle point, laxity prevails; a less proportion of fluids, with respect to the vessels, but still prevailing humidity; increased cellular substance, on which the growth of the body chiefly depends till the acme, and long after; heart less in proportion to the system than formerly, and more in a balance with it; the arteries are diminished, in some measure, with respect to the veins, but still exceed them; the whole viscera are larger, and particularly the lungs; and, as the vessels are more rigid, consequently a greater determination of fluids to that organ, which explains the diseases incident to the stage of life, hæmoptoeis, peripneumony, &c. The same sensibility and irritability continue, perhaps, as before, but the former is more accurate, from the tension of the vessels, and consequently the fibres. The latter is rather encreased, and hence irascibility more frequently appears at this period. There is also great mobility, but with much less levity.

YPRES, a handsome, large, and populous town of the Aultrian Netherlands, with a bishop's see. It

has a considerable manufactory in cloth and serges, and every year in Lent there is a considerable fair. It is one of the barrier towns, but was besieged and taken by the French in 1744. It is seated on a fertile plain on the river Ypre, in E. Long. 2. 58. N. Lat. 50. 51.

YUCCA, ADAM'S NEEDLE; a genus of the monogynia order belonging to the hexandra class of plants.

Species. 1. The gloriosa, or common Adam's needle; rises with an erect, ligneous, thick stem two or three feet high, having very long, narrow, stiff, entire leaves ending in a long, sharp, black-spine, garnishing the stem almost to the bottom and in a large tuft at top; and from the centre of the top leaves rises a long branching peduncle, sustaining a panicle of bell-shaped white and purple flowers.

2. The filamentosa, or Virginia yucca; rises with an upright, thick, ligneous stem two or three feet high, adorned at top with a tuft of very long, spear-shaped, stiff, blunt-pointed, sawed filamentous leaves, emitting long threads from the sides, hanging downward; and from the top of the stem amidst the leaves an erect peduncle or flower-stalk, several feet high, garnished with many large, white, and purple-striped leaves. Both these species flower in August and September, and make an ornamental appearance, but are not succeeded by seeds in this country. They are natives of North America, the former that of Canada, and the latter of Virginia, and are both tolerably hardy.

3. The aloifolia, or aloe-leaved yucca; rises with an erect, thick, fleshy stem, eight or ten feet high, crowned with a large tuft of long narrow, stiff, cre-nated, aloe-like leaves, ending in sharp spines; and from the centre of the crown of leaves come out the flower-stalk, branching pyramidally two or three feet high, having all the branches terminating in a spike of flowers, purple without and white within, appearing in August and September.

4. Draconis, or tree-leaved yucca; rises with an upright, thick, brown stem, three feet high, crowned with long, narrow, serrated leaves ending in spines and nod downward; and in the centre of the leaves arise the flower-stalk very branchy, with all the branches terminating in spikes of flesh-coloured flowers in August and September.

All these four species of yucca, being of singularly curious growth, are worthy of culture in every good collection, keeping some of all the sorts in pots, to move to shelter of a green-house in winter, as they will afford a conspicuous and entertaining variety in this collection: some plants of the two first sorts may also, after attaining a little strength and gradually hardened, be planted out in the full ground in some dry warm situation, sheltered by adjacent shrubs and trees. As all the sorts are of a succulent nature, they should always be planted in a light dry soil; if somewhat sandy the better. The propagation of all the sorts is by off-sets and suckers, from the root and head of the plants; also by seed. The two last kinds being tender, cannot bear the open air.

Uss. A kind of bread is made from the roots of this plant by the Indians, which much resembles that from the Cassia. See JATROPHA.

Yucca

Z.

Z,
ZAFRE.

Z or **z**, the twenty-fourth and last letter, and the nineteenth consonant of our alphabet; the sound of which is formed by a motion of the tongue from the palate downwards and upwards to it again, with a shutting and opening of the teeth at the same time. This letter has been reputed a double consonant, having the sound *dz*; but some think with very little reason; and, as if we thought otherwise, we often double it, as in *puzzle*, *muzzle*, &c. Among the ancients, **Z** was a numeral letter, signifying two thousand, and with a dash added a-top, **Z̄** signified two thousand times two thousand, or four millions.

In abbreviations this letter formerly stood as a mark for several sorts of weights; sometimes it signified an ounce and a half, and very frequently it stood for half an ounce; sometimes for the eighth part of an ounce, or a dram Troy weight; and it has in earlier times been used to express the third part of an ounce, or eight scruples. **ZZ** were used by some of the ancient physicians to express myrrh, and at present they are often used to signify zinziber, or ginger.

ZAARA, **ZAPARA**, or **SAHARA**, a barren and desert country of Africa, stretches itself from the Atlantic Ocean on the west, to the desert of Barca and Nubia on the east; that is, from the eighth degree of west to the twenty-sixth of east longitude; and from Biledulgerid on the north to Negroland on the south; or from the fifteenth degree of latitude quite to the tropic of Cancer, and even beyond; so that it will be about 400 or 500 miles in breadth, from north to south; and above 1500 in length, from east to west. The river Niger is its boundary to the south. It was known to the ancients by the name of Libya Interior, or Libya Deserta; and is supposed to have been then inhabited by the Getuli. At present it is mostly inhabited by Arabs, who, for the generality, are an ignorant, brutish, and savage people, who lead a wandering life, and live chiefly on the milk of their flocks, with a little barley-meal, and some dates. The poorer sort go naked, except the females, who commonly wrap a clout about their middle, and wear a kind of bonnet on their head; but the wealthier sort have a kind of loose gown, made of blue callicoe, with large sleeves, that is brought them from Negroland. Both sexes are very swarthy; the men tall and thin, but the women fat and lusty. When they move from one place to another for fresh pasture, water, or prey, most of them ride on camels, which have generally a sort of saddle between the bunch and the neck, with a string or strap run through their nostrils, which serves for a bridle; and instead of spurs they use a sharp bodkin. Their tents or huts are covered with a coarse stuff, made of camels hair, and a kind of wool or moss that grows on the palm trees. These Arabs live here under the government of their sheiks

or cheyks, as in Arabia, Egypt, and other places. Besides these Arabs, there is a people here who live in settled habitations, and are more civil and hospitable, carrying on a kind of commerce with strangers. The religion of both is a kind of Mohammedism.

ZABULON (anc. geog.), one of the twelve tribes, bounded on the north by the tribes of Asher and Naphthali, on the east by the sea of Galilee, on the south by the tribe of Issachar, or the brook Cison, which ran between both, on the west by the Mediterranean; so that it touched two seas, or was bimarous.

ZABULON (anc. geog.), a very strong town in the tribe of that name, on the Mediterranean, surnamed *of men*, near Ptolemais: its vicinity to which makes it probable that it was also Chabulon, unless either name is a faulty reading in Josephus; distant about 60 stadia from Ptolemais.

ZACYNTHUS (anc. geog.), an island to the south of Cephalenia 60 stadia, but nearer to Peloponnesus, in the Ionian sea, formerly subject to Ulysses, in compass above 160 stadia, woody and fruitful, with a considerable cognominal town, and a port. The island lies over against Elis, having a colony of Achæans from Peloponnesus, over-against the Corinthian Gulf. Both island and town are now called *Zante*, to the west of the Morea, and south of Cephalonia. E. Long. 21. 30. N. Lat. 37. 50.

ZAFFRE, or **SAFFRE**, is the residuum of cobalt, after the sulphur, arsenic, and other volatile matters of this mineral have been expelled by calcination. It is therefore a kind of calx of cobalt, of a grey or reddish colour. The use of cobalt is to produce a very fine blue colour, when it is melted with fusible and vitrifiable matters. This blue colour produced by the vitrification of zaffre proceeds from the earth or calx of a semi-metallic substance contained in cobalt, called by chemists *regulus of cobalt*. This is proved by melting zaffre with a reducing flux, like any other roasted ore; by which means the above-mentioned semi-metallic regulus of cobalt will be obtained. The scoria in this fusion has also a blue colour, which proceeds from a portion of the calx of this regulus that is not reduced, but is vitrified along with the scoria. The calx therefore or metallic earth of the regulus of cobalt is the sole cause of the blue colour produced by zaffre. But as the quantity of regulus contained in cobalt is variable, therefore some zaffres furnish more blue than others. The heterogeneous fixed matters contained in cobalts, contribute, according to their quantity, not only to the greater or less intensity of the blue colour, but also to its lustre and beauty. For which reason, those who manufacture zaffre from cobalt, make frequent essays of the roasted ore, by mixing it with vitreous matters, to discover the intensity and beauty of the blue colour. Good cobalts calcined would form

Zabulon
||
Zafre.

Zaleucus
||
Zama.

too deep a blue, and almost a black glass, if they were not previously mixed with a certain quantity of vitreous frit. In the manufacture of zaffre, therefore, the calx of cobalt, the strength of which has been previously determined by essays, is mixed with such a quantity of sand, or of powdered flints and quartz, that with the addition of some saline flux, a deep blue glass may be formed. The zaffre that is commonly sold, and which comes from Saxony, is a mixture of calx of cobalt with some vitrifiable earth, as we have said. It is of a grey colour, as all calxes of cobalt are before vitrification. Some zaffres are dearer than others, according to the intensity of the colour which they are capable of producing. Zaffre is employed in the manufacture of pottery and of porcelain, for painting the surface of the pieces of ware upon which it is applied together with some saline flux, previously to the baking or glazing, that the same fire may also vitrify this colouring material.

The blue of zaffre is the most solid and fixed of all the colours that can be employed in vitrification. It suffers no change from the most violent fire. It is successfully employed to give shades of blue to enamels, and to the crystal-glasses made in imitation of some opaque and transparent precious stones, as the lapis lazuli, the turquois, the saphire, and others of this kind.

ZALEUCUS, a famous legislator of the Locrians, and the disciple of Pythagoras, flourished 500 years B.C. He made a law, by which he punished adulterers with the loss of both their eyes; and his son offending, was not absolved from this punishment: yet, to show the father as well as the just law-giver, he put out his own right, and his son's left eye. This example of justice and severity made so strong an impression on the minds of his subjects, that no instance was found of the commission of that vice during the reign of that legislator. It is added, that Zaleucus forbid any wine being given to the sick on pain of death, unless it was prescribed by the physicians; and that he was so jealous of his laws, that he ordered that whoever was desirous of changing them, should be obliged, when he made the proposal, to have a cord about his neck, in order that he might be immediately strangled, if those alterations were esteemed no better than the laws already established. Diodorus Siculus attributes the same thing to Charondas, legislator of the Sybarites.

ZALUSKI (Andrew Chrysothom), bishop of Plocko, and afterwards of Varnia, and grand chancellor of Poland, was the son of Alexander Zaluski, waiwode of Rawa. He had a great share in all the important affairs of the state, and died in 1711, aged 61. His principal work is a curious collection of Latin Letters, printed in 1709 and 1711, in 3 vols. folio. These letters contain the history of Poland, and interesting memoirs of Europe, during his own time.

ZAMA (anc. geog.), a town of Chamane, a district of Cappadocia, of unknown situation.—Another Zama, of Mesopotamia, on the Sacoras, to the south of Nisibis.—A third, of Numidia, distant five days journey to the west of Carthage: it was the other royal residence of the kings of Numidia, hence called *Zama Regia*. It stood in a plain; was stronger by art than nature; richly supplied with every necessary; and abounding in men, and every weapon both of defence and annoyance.

The last of these is remarkable for the decisive battle fought between the two greatest commanders in the world, Hannibal the Carthaginian and Scipio Africanus. Of this engagement, the most important perhaps that ever was fought, Mr Hooke gives us the following account.

“Scipio drew up his army after the Roman manner, except that he placed the cohorts of the Princes directly behind those of the Hastati, so as to leave sufficient space for the enemy's elephants to pass thro' from front to rear. C. Lælius was posted on the left wing with the Italian horse, and Masinissa with his Numidians on the right. The intervals of the first line Scipio filled up with his Velites, or light-armed troops, ordering them, upon a signal given, to begin the battle; and in case they were repulsed, or broke by the elephants, to run back through the lanes before mentioned, and continue on their flight till they were got behind the Triarii. Those that were wounded, or in danger of being overtaken, were to turn off to the right and left through the spaces between the lines, and that way escape to the rear.

“The army thus drawn up, Scipio went from rank to rank, urging his soldiers to consider the consequences of a defeat, and the rewards of victory: on the one hand, certain death or slavery; (for they had no town in Africa strong enough to protect them), on the other, not only a lasting superiority over Carthage, but the empire of the rest of the world.

“Hannibal ranged all his elephants, to the number of above 80, in one front. Behind these he placed his mercenaries, consisting of 12,000 men, Ligurians, Gauls, Baleares, and Mauritanians.

“The new levies of Carthaginians and other Africans, together with 4000 Macedonians, under a general named Sopater, composed the second line. And in the rear of all, at the distance of about a furlong, he posted his Italian troops, in whom he chiefly confided. The Carthaginian horse formed his right wing, the Numidians his left.

“He ordered their several leaders to exhort their troops, not to be discouraged by their own weakness, but to place the hope of victory in him and his Italian army; and particularly directed the captains of the Carthaginians to represent to them what would be the fate of their wives and children if the event of this battle should not prove successful. The general himself, walking through the ranks of his Italian troops, called upon them to be mindful of the 17 campaigns in which they had been fellow-soldiers with him; and of that constant series of victories, by which they had extinguished in the Romans all hope of ever being conquerors. He urged them to remember, above all, the battles of Trebia, Thrasymenus, and Cannæ; with any of which the approaching battle was in no wise to be compared, either with respect to the bravery, or the number of the enemy. “The Romans were yet unfoiled, and in the height of their strength when you first met them in the field; nevertheless you vanquished them. The soldiers now before us are either the children of the vanquished, or the remains of those whom you have often put to flight in Italy. Maintain therefore your general's glory and your own, and establish to yourselves the name of invincible, by which you are become famous throughout the world.”

“When

"When the Numidians of the two armies had skirmished a while, Hannibal ordered the managers of the elephants to drive them upon the enemy. Some of the beasts, frightened at the noise of the trumpets, and other instruments of war, which sounded on all sides, immediately ran back amongst the Numidians of the Carthaginian left wing, and put them into confusion; which Masinissa taking advantage of, entirely routed them. Great destruction was made of the Velites by the rest of the elephants, till these also being terrified, some of them ran through the void spaces of the Roman army which Scipio had left for that purpose; others falling in among the cavalry of the enemy's right wing, gave Lælius the same opportunity against the Carthaginian horse as had been given to Masinissa against the Numidian, and of which the Roman did not fail to make the same use. After this the infantry of the foremost lines joined battle. Hannibal's mercenaries had the advantage in the beginning of the conflict; but the Roman Hastati, followed and encouraged by the Princes, who exhorted them to fight manfully, and showed themselves ready to assist them, bravely sustained the attack, and at length gained ground upon the enemy. The mercenaries not being seasonably supported by their second line, and therefore thinking themselves betrayed, they in their retreat fell furiously upon the Africans; so that these, the Hastati coming up, were obliged to fight for some time both against their own mercenaries and the enemy. When the two Carthaginian lines had ceased their mutual rage, they joined their strength; and though now but a mere throng of men, broke the Hastati: but then the Princes advancing to the assistance of the latter, restored the battle; and most of the Africans and mercenaries were here cut off. Hannibal did not advance to their relief, the Roman Triarii not having yet engaged, and the Princes being still in good order: and left the routed Africans and mercenaries should break the ranks of his Italian soldiers, he commanded these to present their spears at those who fled to them for protection, which obliged the runaways to move off to the right and left.

"The ground over which the Romans must march before they could attack Hannibal, being strewed with heaps of dead bodies and weapons, and being slippery with blood, Scipio feared that the order of his battalions would be broke, should he pass it hastily. To avoid this mischief, he commanded the Hastati to give over the pursuit, and halt where they were, opposite to the enemy's centre: after which, having sent all his wounded to the rear, he advanced leisurely with the Princes and Triarii, and placed them on the wings of the Hastati. Then followed a sharp engagement, in which victory was long and eagerly disputed. It would seem that the Romans, though superior in number, were once upon the point of losing the day; for Polybius tells us, that Masinissa and Lælius came very seasonably, and as if sent from heaven, to their assistance. These generals being returned from the pursuit of the cavalry, fell suddenly upon the rear of Hannibal's men, most of whom were cut off in their ranks; and of those that fled, very few escaped the horse, the country all around being a plain.

"There died of the Carthaginians in the fight above 20,000, and almost the like number were taken

prisoners. The loss on the side of the Romans amounted to about 2000 men. Hannibal escaped with a few horse to Adrumetum, having performed every thing in the engagement which could be expected from a great general. His army (says Polybius) could not have been more skillfully drawn up. For as the order of the Roman battalions makes it extremely difficult to break them, the Carthaginian wisely placed his elephants in the front, that they might put the enemy in confusion before the armies should engage. In his first line he placed the mercenaries; men bold and active, but not well disciplined, that by their impetuosity he might give a check to the ardour of the Romans. The Africans and Carthaginians, whose courage he doubted, he posted in the middle between the mercenaries and his Italian soldiers, that they might be forced to fight, or at least that the Romans, by slaughtering them, might fatigue themselves and blunt their weapons. Last of all, he drew up the troops he had disciplined himself, and in whom he chiefly confided, at a good distance from the second line, that they might not be broken by the route of the Africans and mercenaries, and kept them in reserve for a vigorous attack upon a tired and weakened enemy."

ZANGUEBAR, a country in Africa, lying on the eastern coast, between 3 degrees of north latitude, and 18 south. It includes several petty kingdoms, in which the Portuguese have various settlements. The inhabitants, except those converted by the Portuguese, are all Mahometans or Idolaters; and the latter much the more numerous. The names of the principal territories are *Mombaza, Lamoni, Melinda, Quiloa, and Mosambique*. The Portuguese have built several forts in Mombaza and Mosambique, and have settled several colonies there. They trade with the Negroes for slaves, ivory, gold, ostrich-feathers, wax, and drugs. The productions are much the same as in other parts of Africa between the tropics.

ZANTE, an island of the Mediterranean, near the coast of the Morea, 17 miles south-east of the island of Cephalonia, belonging to the Venetians. It is about 24 miles in length, and 12 in breadth, and very pleasant and fertile; but its principal riches consist in currants, with which it greatly abounds. They are cultivated in a very large plain, under the shelter of mountains on the shore of this island; for which reason the sun has greater power to bring them to perfect maturity. Here are also the finest peaches in the world, each of which weigh 8 or 10 ounces. Here are also cucumbers and excellent figs, and a great deal of very good oil. The town called Zante may contain near 20,000 inhabitants. The houses are low, on account of the frequent earthquakes, for scarce a year passes without one; however, they do no great damage. The natives speak both Greek and Italian. There are very few Roman Catholics among them; but they have a bishop as well as the Greeks. This place has no fortifications, but there is a fortress upon an eminence planted with cannon. In one part of this island is a place which shakes when trod upon like a quagmire; and a spring which throws out a great deal of bitumen, especially at the time of an earthquake. It serves instead of pitch to pay the bottoms of the ships, and about 100 barrels in a year are used for this purpose. There are about 50 villages in the island; but no other

Zama
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Zante.

Zapata,
Zea.

large town beside Zante. It is seated on the eastern side of the island, and has a good harbour. The English and Dutch have each a factory and consul here. E. Long. 21. 15. N. Lat. 37. 57.

ZAPATA, a kind of feast or ceremony held in Italy, in the courts of certain princes, on St Nicholas's day; wherein people hide presents in the shoes or slippers of those they would do honour to, in such a manner as may surprise them on the morrow when they come to dress; being done in imitation of the practice of St Nicholas, who used in the night-time to throw purses of money in at the windows, to marry poor maids withal.

ZEA, INDIAN CORN, in botany, a genus of the monoccia triandria class. There are three species, viz.

1. The Americana grows naturally in the islands of the West Indies, with a very large strong stalk, which rises to the height of 10 or 12 feet. The leaves are long, broad, and hang downward; they have a broad white midrib. When the seeds of this sort are ripe, the spikes or ears are nine or ten inches long, and sometimes a foot; but these rarely ripen in England.

2. The alba is cultivated in Italy, Spain, and Portugal. The stalks of this sort are slenderer than those of the former, and seldom rise more than six or seven feet high. The leaves are narrower than those of the first sort, and are hollowed like the keel of a boat, and their tops hang downwards. The grains of this sort do not come to maturity in England, unless the season proves very warm, and the grains are planted early and in a warm soil and situation.

3. The vulgare is cultivated in the northern parts of America, and also in Germany. The stalks of this are slender, and seldom rise more than four feet high. The leaves are shorter and narrower than those of the two former; they are hollowed like the keel of a boat, and their tops hang down. The spikes of male flowers are short, and the ears or spikes of grain are seldom more than four or five inches long. This sort ripens its grain perfectly well in England, in as little time as barley, so may be cultivated here to advantage.

There are several varieties of the two last species, which differ in the colour of their grain. The most common colour is that of a yellowish white; but there are some with deep yellow, others with purple, and some with blue grains; and when the different colours are planted near each other, the farina will mix, and the ears will have grains of several colours intermixed; but when the grains of the different varieties are planted at a proper distance from each other, the produce will be the same with the grains which were sown.

These plants are seldom cultivated in England.—In Italy, Germany, and in many parts of North America, they are treated in the following manner:

They first dig the ground well in the spring; and after having made it level, they draw a line across the whole piece intended to be planted; then they raise little hills at about three or four feet distance, into each of which they put two or three good seeds, covering them about an inch thick with earth; then they move the line four feet farther, continuing to do the same through the whole spot of ground, so that the rows may be four feet asunder, and the hills three or four feet distance. Six quarts of this seed is generally

allowed to an acre of land, which, if the soil be good, will commonly produce 50 bushels of corn.

When the corn is ripe, they cut off the stalks close to the ground, and after having gathered off the spikes of grain, they spread the stalks in the sun, to harden and dry, which they afterward use in the same manner as reeds in England for making fences, covering sheds, &c. for which purpose they are very useful to the inhabitants of warm countries; and when there is a scarcity of forage, they feed their cattle with them green, as fast as the corn is gathered off.

The corn is ground to flour, and the poorest sort of people in America, and also in Italy and Germany, make their bread of this flour; and in many of the warmer countries, the inhabitants roast the whole spikes, and dress them many different ways, making several dishes of it; but this grain seldom agrees with those who have not been accustomed to eat it: however, in times of scarcity of other grain, this would be a better substitute for the poor than bean-flour, or other sorts, which have been used in England, and at all times will be found a hearty food for cattle, hogs, and poultry; so that in light sandy lands, where beans and pease succeed not well, this grain may be cultivated to answer both purposes to advantage.

If this grain is cultivated by the horse-hoeing husbandry, it may be done at less expence than in any other method; for this is one of the plants which is more particularly adapted to this husbandry.

The time for sowing it is about the same as for barley.

ZEAL, the exercise of a warm animated affection, or passion, for any thing.

ZEALAND, the chief of the Danish islands, is situated at the entrance of the Baltic Sea, bounded by the Schaggerrack Sea on the north; by the Sound, which separates it from Schonen, on the east; by the Baltic Sea on the south; and by the strait called the *Great Belt*, which separates it from the island of Funen, on the west; being of a round figure, near 200 miles in circumference: the chief town is Copenhagen.

ZEALAND, is also a province of the United Netherlands, consisting of eight islands, which lie in the mouth of the river Scheld, bounded by the province of Holland, from which they are separated by a narrow channel, on the north; by Brabant on the east; by Flanders, from which they are separated by one of the branches of the Scheld, on the south; and by the German ocean on the west.

NEW ZEALAND, a country of Asia, in the South Pacific Ocean, first discovered by Tasman, the Dutch navigator, in the year 1642, who gave it the name of *Staten Land*, though it has been generally distinguished in our maps and charts by the name of *New Zealand*, and was supposed to be part of a southern continent: but it is now known, from the late discoveries of Captain Cook, who sailed round it, to consist of two large islands, divided from each other by a strait four or five leagues broad. They are situated between the latitudes of 34 and 48 degrees south, and between the longitudes of 166 and 180 degrees east from Greenwich. One of these islands is for the most part mountainous, rather barren, and but thinly inhabited; but the other is much more fertile, and of a better appearance. In the opinion of Sir Joseph Banks,

Zea,
Zealand

Banks, and of Dr Solander, every kind of European fruits, grain, and plants, would flourish here in the utmost luxuriance. From the vegetables found here, it is supposed that the winters are milder than those in England, and the summers not hotter, though more equally warm; so that it is imagined, that if this country were settled by people from Europe, they would, with moderate industry, be soon supplied, not only with the necessaries, but the luxuries of life, in great abundance. Here are forests of vast extent, filled with very large timber trees; and near 400 plants were found here that had not been described by the naturalists. The inhabitants of New Zealand are stout and robust, and equal in stature to the largest Europeans. Their colour in general is brown, but in few deeper than that of the Spaniard who has been exposed to the sun, and in many not so deep; and both sexes have good features. Their dress is very uncouth, and they mark their bodies in a manner similar to the inhabitants of Otaheite, and which is called *tattooing*. Their principal weapons are lances, darts, and a kind of battle-axes; and they have generally shown themselves very hostile to the Europeans who have visited them.

ZEALOTS, an ancient sect of the Jews, so called from their pretended zeal for God's law, and the honour of religion.

ZEBRA, in zoology. See *Equus*.

ZECHARIAH, a canonical book of the Old Testament, containing the predictions of Zechariah, the son of Barachia, and grandson of Idolo. He is the eleventh of the 12 lesser prophets. Zechariah entered upon the prophetic office at the same time with Haggai, and was sent to the Jews upon the same message, to reprove them for their backwardness in erecting the temple and restoring divine worship; but especially for the disorder of their lives and manners, which could not but derive a curse upon them. By several notable visions and types, he endeavours to confirm their faith, and establish their assurance concerning God's providence with them, and care over them; and as a proof and demonstration of this, he interperes the most comfortable promises of the coming of the kingdom, the temple, the priesthood, the victory, the glory of Christ the Branch. Nor does he forget to assure them of the ruin of Babylon, their most implacable enemy. This prophet is the longest and most obscure of all the lesser prophets, his style being interrupted and without connection.

ZEDOARY, in the materia medica, a root, the several pieces of which differ so much from one another in shape, that they have been divided into two kinds, as if two different things, under the names of the *long* and *round* zedoary, being only the several parts of the same root.

Zedoary is to be chosen fresh, sound, and hard, in large pieces; it matters not as to shape, whether long or round; of a smooth surface, and of a sort of fatty appearance within, too hard to be bitten by the teeth, and of the briskest smell that may be: such as is friable, dusty, and worm eaten, is to be rejected.

Zedoary, both of the long and round kind, is brought us from China; and we find by the Arabians that they also had it from the same place. The round tubera are less frequent than the long, and some of them

have therefore supposed them the produce of a different and more rare plant; but this is not so probable as that the general form of the root is long, and the round tubera are only *lusus naturæ*, and less frequent in it.

Zedoary, distilled with common water, affords a thick and dense essential oil, which soon concretes of itself into a kind of camphor; and on this oil its virtues principally depend. It is a sudorific, and is much recommended by some in fevers, especially of the malignant kinds. It is also given with success as an expectorant in all disorders of the breast, arising from a tough phlegm, which it powerfully incides and attenuates; it is also good against flatulences, and in the choleric; it strengthens the stomach, and assists digestion; and finally, is given with success in nervous cases of all kinds.

ZELL, a city of Germany, in the circle of Lower Saxony, capital of the duchies of Zell and Lunenburg, situated at the confluence of the rivers Ailer and Fuhle, 30 miles north of Hanover, and 40 south of Lunenburg. E. Long. 10. N. Lat. 52. 52.

ZEND, or **ZENDAVESTA**, a book containing the religion of the Magians, or worshippers of fire, who were disciples of the famous Zoroaster. See *MAGI*.

This book was composed by Zoroaster during his retirement in a cave, and contained all the pretended revelations of that impostor. The first part contains the liturgy of the Magi, which is used among them in all their oratories and fire-temples to this day; they reverence it as the Christians do the Bible, and the Mahometans the Alcoran. There are found many things in the Zend taken out of the scriptures of the Old Testament, which Dr Prideaux thinks is an argument that Zoroaster was originally a Jew. Great part of the Psalms of David are inserted: he makes Adam and Eve to have been the first parents of mankind, and gives the same history of the creation and deluge as Moses does, and commands the same observances about clean and unclean beasts, the same law of paying tithes to the sacerdotal order, with many other institutions of Jewish extraction. The rest of its contents are an historical account of the life, actions, and prophecies of its author, with rules and exhortations to moral living. The Mahometans have a sect which they call *Zendikites*, who are said to be the Sadducees of Mahometanism, denying providence and the resurrection, believing the transmigration of souls, and following the Zend of the Magi.

ZENITH, in astronomy, the vertical point; or a point in the heavens directly over our heads.

ZENO ELEATES, or of *Elea*, one of the greatest philosophers among the ancients, flourished about the 504th year before the Christian æra. He was the disciple of Parmenides, and even, according to some writers, his adopted son. Aristotle asserts, that he was the inventor of logic; but his logic seems to have been calculated to perplex all things, and not to clear up any thing. For Zeno employed it only to dispute against all comers, and to silence his opponents, whether they argued right or wrong. He proposed very embarrassing arguments with respect to the existence of motion; and Aristotle, in the sixth book of his *Physics*, has preserved some of them, which are extremely subtle, especially the famous argument named *Achilles*.

Zeno
II
Zephaniah.

Zephyrus
I
Zeus.

As he lived long before Diogenes the Cynic, it is certain that those who have said that this last philosopher refuted Zeno's arguments against motion, by taking a turn or two up and down his school, are mistaken. He flew into a violent passion with a man who railed at him; and it being thought strange that he should feel such indignation, he replied, "Were I insensible to censure, I should be equally so with respect to praise." He showed great courage in suffering pain; for having undertaken to restore liberty to his country, which groaned under the oppression of a tyrant, and the enterprise being discovered, he supported with extraordinary firmness the sharpest torments. It is said that he had the courage to bite off his tongue, and spit in the tyrant's face, for fear of being forced, by the violence of his torments, to discover his accomplices. Some say that he was pounded alive in a mortar.

ZENO, a celebrated Greek philosopher, was born at Citium, in the isle of Cyprus, and was the founder of the sect of the Stoics. This sect had its name from that of a portico at Athens, where this philosopher chose to hold his discourses. He was cast upon that coast by shipwreck; and he ever after regarded this as a great happiness, praising the winds for having so happily driven him into the port of Piræum. Zeno was the disciple of Crates, and had a great number of followers. He made the sovereign good consist in living in conformity to nature, guided by the dictates of right reason. He acknowledged but one God; and admitted an inevitable destiny over all events. His servant taking advantage of this last opinion, cried, while he was beating him for his dishonesty, "I was destined to steal." To which Zeno replied, "Yes; and to be beaten." This philosopher was accustomed to say, "That if a wife man ought not to be in love, as some pretended, none would be more miserable than beautiful and virtuous women, since they would have none for their admirers but fools." He also said, "That a part of knowledge consists of being ignorant of such things as ought not to be known: that a friend is another self; that a little matter gives perfection to a work, though perfection is not a little matter." He compared those who spoke well and lived ill, to the money of Alexandria, which was beautiful, but composed of bad metal. It is said, that being hurt by a fall, he laid violent hands on himself about 264 B. C. Cleanthes, Cryppus, and the other successors of Zeno maintained, that with virtue we might be happy in the midst even of disgrace and the most dreadful torments. They admitted the existence of only one God, the soul of the world, which they considered as his body, and both together forming a perfect being. It must be confessed, that of all the sects of the ancient philosophers, this was one of those which produced the greatest men.

We ought not to confound the two Zenos already mentioned, with

ZENO a celebrated Epicurean philosopher, born at Sidon, who had Cicero and Pomponius Atticus for his disciples, and who wrote a book against the mathematics, which, as well as that of Posidonius's refutation of it, is lost; nor with several other Zenos mentioned in history.

ZENOBIA, queen of Palmyra. See PALMYRA.

ZEPHANIAH, a canonical book of the Old Te-

stament, containing the predictions of Zephaniah the son of Cushi, and grandson of Gedaliah; being the ninth of the 12 lesser prophets. He prophesied in the time of king Josiah, a little after the captivity of the ten tribes, and before that of Judah; so that he was cotemporary with Jeremiah. He freely publishes to the Jews, that what increased the divine wrath against them, was their contempt of God's service, their apostasy, their treachery, their idolatry, their violence and rapine, and other enormities: such high provocations as these, rendered their destruction terrible, universal, and unavoidable; and then, as most of the prophets do, he mingles exhortations with repentance, as the only expedient in these circumstances.

ZEPHYR, the *West-Wind*, or that which blows from the cardinal point of the horizon opposite to the east.

ZEPHYRUS, one of the pagan deities, was represented as the son of Aurora, and the lover of the nymph Chloris, according to the Greeks, or of Flora, according to the Romans; and as presiding over the growth of fruits and flowers. He is described as giving a refreshing coolness to the air by his soft and agreeable breath, and as moderating the heat of summer by fanning the air with his silken wings. He is depicted under the form of a youth, with a very tender air, with wings resembling those of the butterfly, and with his head crowned with a variety of flowers. As the poets of Greece and Rome lived in a warm climate, they are lavish in the praise of this beneficent deity, and under his name describe the pleasure and advantage they received from the western breezes.

ZEST, the woody thick skin, quartering the kernel of a walnut; prescribed by some physicians, when dried and taken with white wine, as a remedy against the gravel.

Zest is also used for a chip of orange or lemon peel; such as is usually squeezed into ale, wine, &c. to give it a flavour; or the fine ethereal oil which spurts out of that peel on squeezing it.

ZEUGMA, a figure in grammar, whereby an adjective or verb which agrees with a nearer word, is also, by way of supplement, referred to another more remote.

ZEUS, in ichthyology, a genus belonging to the order of thoracici. The head is compressed, and declines, the upper lip being vaulted over by a transverse membrane; the tongue is subulated; there are seven rays in the gill membrane; and the body is compressed.—The species are four; of which the most remarkable is the faber, or dore. It is of a hideous form, its body is oval, and greatly compressed on the sides; the head large; the snout vastly projecting; the mouth very wide; the teeth very small; the eyes great, the irides yellow; the lateral line oddly distorted, sinking at each end, and rising near the back in the middle; beneath it on each side is a round black spot. The tail is round at the end, and consists of 15 branched rays. The colour of the sides is olive, varied with light blue and white, and while living is very resplendent, and as if gilt; for which reason it is called the *dore*. The largest fish we have heard of weighed 12 pounds.

Superstition hath made the doree rival to the had-dock, for the honour of having been the fish out of whose mouth St Peter took the tribute-money, leaving en

PLANTS

in STONE.

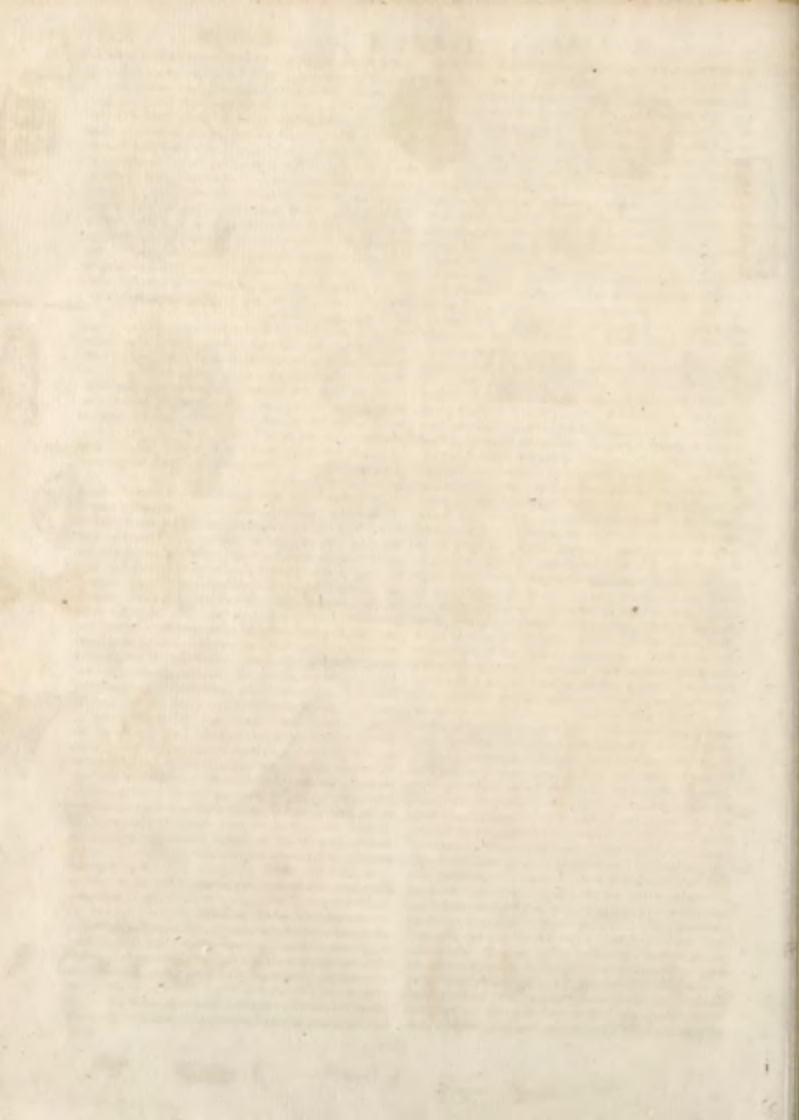
LEAVES

CORALS

*Propolis**Pecora**Isobolus**Spongia Lignosa**Calamites Indurata**Isobolus**Isobolus**Alcyonites**Coral*

FISHES TEETH

*Platystrophia**Platystrophia**Isobolus**A Ball Sculpt*



Zeuxis.

on its sides those incontestible proofs of the identity of the fish, the marks of his finger and thumb. It is rather difficult at this time to determine on which part to decide the dispute; for the doree likewise asserts an origin of its spots of a similar nature, but of a much earlier date than the former. St Christopher, in wading through an arm of the sea, having caught a fish of this kind *en passant*, as an eternal memorial of the fact, left the impressions on its sides to be transmitted to all posterity. In our own country it was very long before this fish attracted our notice, at least as an edible one. We are indebted to the late Mr Quin for adding a most delicious fish to our table, who overcoming all the vulgar prejudices on account of its deformity, has effectually established its reputation. This fish was supposed to be found only in the southern seas of this kingdom, but it has been discovered last year on the coast of Anglesea. Those of the greatest size are taken in the Bay of Biscay, off the French coasts; they are also very common in the Mediterranean: Ovid must therefore have styled it *rarus faber*, on account of its excellency, not its scarcity.

ZEUXIS, a celebrated painter of antiquity, flourished about 400 years before Christ. He was born at Heraclea; but as there have been many cities of that name, it cannot be certainly determined which of them had the honour of his birth. Some learned men however conjecture, that it was the Heraclea near Crotona in Italy. He carried painting to a much higher degree of perfection than Apollodorus had left it; discovered the art of properly disposing of lights and shades, and particularly excelled in colouring. He amassed immense riches; and then resolved to sell no more of his pictures, but gave them away; saying very frankly, "That he could not set a price on them equal to their value." Before this time he made people pay for seeing them; and nobody was admitted to see his Helena without ready money, which occasioned the wags calling his picture *Helena the Courtesan*. It is not known whether this Helen of Zeuxis was the same with that which was at Rome in Pliny's time, or that which he painted for the inhabitants of Crotona to be hung up in the temple of Juno: this last he painted from five beautiful girls of that city, copying from each her greatest excellencies. Pliny observes, that this admirable painter, disputing for the prize of painting with Parrhasius, painted some grapes so naturally, that the birds flew down to peck them. Parrhasius, on the other hand, painted a curtain so very artfully, that Zeuxis mistaking it for a real one that hid his rival's work, ordered the curtain to be drawn aside, to show what Parrhasius had done; but having found his mistake, he ingenuously confessed himself vanquished, since he had only imposed upon birds, while Parrhasius had deceived even a master of the art. Another time he painted a boy loaded with grapes; when the birds also flew to this picture, at which he was vexed; and confessed, that this work was not sufficiently finished, since had he painted the boy as perfectly as the grapes, the birds would have been afraid of him. Archelaus, king of Macedonia, made use of Zeuxis's pencil for the embellishment of his palace. One of this painter's finest pieces was a Hercules struggling some serpents in his cradle, in the presence of his affrighted mother: but he himself chiefly esteemed his *Athleta*, or Champion,

under which he placed a Greek verse that afterwards became very famous, and in which he says, "That it was easier to criticise than to imitate the picture." He made a present of his Alcmena to the Agrigenines. Zeuxis did not value himself on speedily finishing his pictures; but knowing that Agatharchus gloried in his being able to paint with ease and in a little time, he said, "That for his part he, on the contrary, gloried in his slowness; and if he was long in painting, it was because he painted for eternity." Verrius Flaccus says, that Zeuxis having painted an old woman, he laughed so very heartily at the sight of this picture, that he died: but as no other of the ancients have mentioned this particular, there is the greatest reason to believe it fabulous. Carlo Dati has composed in Italian the Life of Zeuxis, with those of Parrhasius, Apelles, and Protogenes. This work was printed at Florence in 1667.

ZICLAG, or ZIKLAG (anc. geog.), a town of the tribe of Simeon, on the borders of the Philistines, (Joshua xv. and xix.), but in the hands of the Philistines till David's time, (1 Sam. xxvii. and xxx.)

ZIN (anc. geog.), a wilderness encompassing Idumea, at least on the south and west, as far as Palestine or Canaan; but according to Wells, on the east of Edom, to the north of Ezion-gaber.

ZINC. See CHEMISTRY, p. 1864, *feA*. iii. 8.; *MATERIA MEDICA, Catalogue of Simple*; and *PHARMACY*, n^o 798—801.

It is remarkable that this semi-metal, when united with copper even in a considerable proportion, diminishes very little the malleability of that metal, and at the same time renders its colour more beautiful, and more like the colour of gold. This colour varies according to the different proportions of these two metallic substances in the compound, which acquires different names accordingly, as brass, tombac, similor, pinchbeck, and prunee's metal. The zinc for these compositions must be very pure, and free from other metallic bodies. The method of purifying this semi-metal, which is principally founded upon its property of not uniting with sulphur, is thus described by Mr Macquer:—"When zinc is melted in a large crucible, suet and sulphur alternately, and the latter in larger quantities than the former, must be thrown upon it. If the zinc is pure, the sulphur burns freely on its surface; but if it is alloyed, the sulphur combines with the other metals, and forms with them a kind of scoria, which must be taken off. This alternate projection of suet and sulphur upon zinc is continued till the sulphur be burnt on the surface of the melted zinc without forming any scoria; the zinc thus purified, may be successfully employed for making of brass or metallic mixtures in imitation of gold.

ZINZENDORFF (Nicholas Lewis), count, was the noted founder of the German religious sect called *Moravians*, or *Herrnhuters*. From his own narrative it appears, that when he came of age in 1721, his thoughts were wholly bent on gathering together a little society of believers, among whom he might live, and who should entirely employ themselves in exercises of devotion under him. He accordingly purchased an estate at Bertholdsdorf in Upper Lusatia, where being joined by some followers, he gave the curacy of the village to a man of his own complexion; and Bertholdsdorf

Ziclag

Zinzendorf

Zinzendorf
Zisca.Zinziber
||
Ziph.

dorff soon became talked of for a new mode of piety. One Christian David, a carpenter, brought a few prophets from Moravia; they began a new town about half a league from the village, where count Zinzendorf fixed his residence among them, and where great numbers of Moravians flocked and established themselves under his protection: so that in 1732 their number amounted to 600. An adjacent hill, called the *Huthberg*, gave occasion to these colonists to call their new settlement *Huth des Herrn*, and afterward *Herrnhuth*; which may be interpreted "The guard or protection of the Lord;" and from this the whole sect have taken their name. The count spared neither pains nor art to propagate his opinions; he went himself all over Europe, and at least twice to America; and sent his missionaries throughout the world. In 1733 a Herrnhut was established even in Greenland; the society possesses Bethlehem in Pennsylvania, and has a settlement among the Hottentots: China, it is reported, has admitted them; and we know what progress they have made in our own country as well as on the continent. Their discipline is very rigid, and therefore submission to the will of their superiors is inculcated as the will of their Saviour: hence the language they talk in is, "Jesus will have it so; the Lamb commands it;" a language not uncommon in the mouth of spiritual taskmasters. As to the doctrine taught by the Moravians, it may be observed, that enthusiastic devotees in all ages, have been apt to suffer their heavenly affections to stray down to carnal objects; but it was reserved for count Zinzendorf to frame a religious system upon obscene principles. Thus he says, "What is called in the Bible by the hideous name *pendulum*, or a thing to be ashamed of on account of the fall, is changed by the Saviour into *verendum*, or a thing to be worshipped." "I consider (says he) the parts for distinguishing both sexes in Christians, as the most honourable of the whole body, my Lord and God having partly inhabited them and partly worn them himself." In conformity to these ideas, he and his followers esteem the conjugal embrace as the highest act of devotion. "Jesus (we are told) is the spouse of all the sisters; the husbands, in the proper sense, are his procurators or agents, and may therefore be called *vice christi*, or *vice gods*: all souls are of the feminine gender; the male quality adapted to bodies at their formation being detached as soon as it is interred." Their discourses and hymns contain a deal of nonsense about the five wounds of Christ; particularly the side hole. Count Zinzendorf died in 1760. Those who wish to know more of the Moravian tenets may consult Rimius's account of them, translated in 1753.

ZISCA (John), a famous general of the forces of the Hussites, in the 15th century, was a gentleman educated at the court of Bohemia, in the reign of Wenceslaus. He entered very young into the army, and after distinguishing himself on several occasions, lost an eye in a battle, whence he was called *Zisca*, or *One-eyed*. At length the Reformation, begun by John Hus, spreading through almost all Bohemia, Zisca placed himself at the head of the Hussites, and had soon under his command a body of 40,000 men. With this army he gained several victories over those of the Romish religion, who carried on a kind of crusade against them; and built a town in an advantageous situation,

to which he gave the name of *Tabor*; whence the Hussites were afterwards called *Taborites*. Zisca lost his other eye by an arrow at the siege of the city of Rabi; but this did not prevent his continuing the war, his fighting battles, and gaining several great victories, among which was that of Aulig on the Elbe, in which 9000 of the enemy were left dead on the field. The emperor Sigismund, alarmed at his progress, caused very advantageous proposals to be offered to him; which he readily accepted, and set out to meet Sigismund, but died on the road. He ordered that his body should be left a prey to the birds and wild beasts; and that a drum should be made of his skin, being persuaded that the enemy would fly as soon as they heard its sound. It is added, that the Hussites executed his will; and that the news of this order made such an impression on the disturbed imaginations of the German Papists, that in many battles they actually fled at the beat of the drum with the utmost precipitation, leaving their baggage and artillery behind them.

ZINZIBER, or ZINGIBER, in botany. See *AMOMUM* and *GINGER*.

ZION, or SION (anc. geog.), a very famous mountain, standing on the north side of the city of Jerusalem, (Pal. xlviii. 2.); containing the upper city, built by king David; and where stood the royal palace, (Josephus). A part of Zion, situate at its extremity, was called *Millo*, or, in the city of David, (2 Chron xxxii. 5.) Modern travellers, who have been upon the spot, say, that Zion is the whole of the mountain, on which Jerusalem stands at this day, though not to the extent in which it anciently stood on the same mountain, as appears Pal. ix. 12. 15. lxxv. l. lxxxvii. 2, 3. If. lxii. 1. swelled into several eminences or tops; as Moriah, Acra Bezetha, and Zion, a particular eminence of mount Zion Proper, &c. encompassed on three sides, east, west, and south, with one continued very deep and steep valley; by means of which it was impregnable on these three sides, and always attacked and taken, according to Josephus, by the enemy on the north side, where mount Zion becomes level, and the vales of Gihon and Jehosaphat gradually lose themselves. This deep and steep valley incontestibly constitutes the compass of the old Jerusalem on those three sides, as plainly appears to any person who has been upon the spot. On that particular top of the mount called *Zion*, stood the fortrefs of the Jebusites; which being afterwards taken by David, came to be called the *city of David*, where he had his royal residence, and kept his court. That part of the valley which lay to the east was called *Jehosaphat's*, having mount Olivet lying beyond it; that to the south, *Gebinnon*; and that to the west, *Gihon*, from cognominal mountains lying beyond them. At the west end of Gihon, without the city, stood Golgotha or Calvary. The pretended Golgotha, shown at this day within the walls, is the spurious brat of interested and fraudulent monks, (Korie). There is another Zion, the same with HEB-MON.

ZIPH, or SIPH (anc. geog.), the name of a wilderness or desert in the tribe of Judah, where David was a fugitive; lying to the south-east of Hebron; so called from Ziph or Siph, a twofold town in this tribe; the one more to the south towards Idumea, on the confines of Eleutheropolis, (Jerome); the other 8 miles

ZIRCHNITZER, to the east of Hebron, towards the Dead Sea, inclining southwards, because near mount Carmel. Here was a mountain, mentioned 1 Sam. xxiii. 14. in which David abode, said by Jerome to be rugged, dismal, and always overcast. *Ziphim, Ziphlei, or Ziphenses*, the inhabitants of Ziph, ver. 19.

ZIRCHNITZER, *see*, otherwise called the *lake of Czirknitz*, in Carniola, is about one German or four English miles in length, and half as much in breadth, contains three beautiful islands, and is encompassed at some distance with mountains and forests. But what is most remarkable is, that it disappears generally once a-year, about St John or St James's day, running off through holes or pits in the bottom; sometimes it will disappear twice or thrice a-year, and sometimes even in winter, if the weather be dry. On the other hand, it has been known to continue two or three years without running off. Of the holes or pits, there are five much larger than the rest, each of which successively, when the water runs off, stands empty five days; so that the whole lake becomes dry in 25. As soon as the beginning of the ebb is observed, the fishing in the pits begins, which belong to five seigniories. The fish, which are carp, tench, pike, eels, and two other sorts, called *schleien* and *ruten*, are caught by laying nets over the holes. Mr Keyser tells us, that upon the ringing of a bell at Zirknitz, when the waters begin to fall, the peasants, both men and women, run to the pools quite naked, notwithstanding both the clergy and magistrates have used their utmost endeavours to suppress so indecent a custom. When the water runs off early in the year, in about three weeks after it is gone there is good grass on the bottom, which is mowed down, and the bottom afterwards ploughed, and sowed with millet. If the water runs not off early, nothing can be sown; and if it returns soon, the seed is lost. With respect to its return, the water at first bursts out of some pits on the south side with great violence, a little rain always falling at the same time; but after-

wards (when the rain falls heavier, and it thunders at the same time so loud as to shake the earth) it breaks out through all the apertures with great force, inasmuch that the lake is filled in 18 or 24 hours, at which time it is in a manner covered with wild fowl; such as geese, ducks, &c. After the millet-harvest, all manner of game is hunted, caught, or killed in it. On the south side are two caverns, out of which, when it thunders, water issues with astonishing violence; and if it happens in harvest, a great many naked, black, and blind, but fat ducklings, are brought up with the water, which in 14 days receive their sight, and are covered with feathers.

ZODIAC, in astronomy, a fascia, or broad circle, whose middle is the ecliptic, and its extremes two circles parallel thereto, at such a distance from it as to bound or comprehend the excursions of the sun and planets. *See* **ASTRONOMY**, n° 204.

ZODIACAL LIGHT. *See* **AURORA Borealis**.

ZONE, in geography and astronomy, a division of the terraqueous globe with respect to the different degrees of heat found in the different parts thereof.

A zone is the fifth part of the surface of the earth, contained between two parallels.

The zones are denominated torrid, frigid, and temperate.

The torrid zone is a fascia, or band, surrounding the terraqueous globe, and terminated by the two tropics. Its breadth is 46. 58. The equator, running through the middle of it, divides it into two equal parts, each containing 23. 29. The ancients imagined the torrid zone uninhabitable.

The temperate zones are two fasciæ, or bands, environing the globe, and contained between the tropics and the polar circles. The breadth of each is 43. 2.

The frigid zones are segments of the surface of the earth, terminated, one by the antarctic, and the other by the arctic circle. The breadth of each is 46. 58.

Z O O L O G Y

Mammalia. **I**S that part of Natural History which relates to *Animals*. It is necessary to mention in this place, that we have given the descriptions and characters of animals under their proper names. The scientific part of the subject, therefore, or the method of investigating the genera or species of animals, by means of natural or artificial arrangement, only remains to be explained.

In order to abridge the study of zoology, many methods of reducing animals to classes, genera, and species, have been invented. But as that of Linnæus is undoubtedly the best, the most extensive, and the most generally adopted, we shall give a brief account of it.

Linnæus divides the whole animal kingdom into six classes. The characters of these six classes are taken from the internal structure of animals, in the following manner:

CLASS I. MAMMALIA, includes all animals that suckle their young. The characters of this class are these:—The heart has two ventricles and two auricles; the blood is red and

warm; and the animals belonging to it are *Mammalia*, *viviparous*.

CLASS II. AVES, or BIRDS. The characters are the same with those of Class I. excepting that the animals belonging to it are *oviparous*. *See* **BIRD**, and **ORNITHOLOGY**.

CLASS III. AMPHIBIA, or AMPHIBIOUS ANIMALS. The heart has but one ventricle and one auricle; the blood is red and cold; and the animals belonging to this class have the command of their *lungs*, so that the intervals between *inspiration* and *expiration* are in some measure *voluntary*. *See* **AMPHIBIOUS**.

CLASS IV. PISCES, or FISHES. The heart has the same structure, and the blood the same qualities with those of the *Amphibia*; but the animals belonging to this class are easily distinguished from the *Amphibia*, by having no such voluntary command of their *lungs*, and by having external *branchiæ* or *gills*. *See* **FISH**.

CLASS V. INSECTA, or INSECTS. The heart has one ventricle, but no auricle; the blood is cold

cold and white; and the animals are furnished with *antennæ* or *feelers*. See INSECT.

CLASS VI. VERMES, or WORMS. The characters are the same with those of Class V. only the animals have no antennæ, and are furnished with *tentaculo*.

The *First Class*, MAMMALIA, is subdivided into seven ORDERS; the characters of which are taken from the number, structure, and situation of the TEETH.

ORDER I. The PRIMATES have four incisors, or *fore-teeth*, in each jaw, and one *dog tooth*.

N. B. By one dog-tooth, Linnæus means one on each side of the *fore-teeth* in both jaws.—This order includes four genera, viz. Homo, Simia, Lemur, Vespertilio. See these articles.

ORDER II. The BRUTA have no *fore-teeth* in either jaw. This order includes six genera, viz. Elephas, Trichechus, Bradypus, Myrmecophaga, Manis, Dasypus. See these articles.

ORDER III. The FERÆ have, for the most part, six *conical fore-teeth* in each jaw. This order includes 10 genera, viz. Phoca, Canis, Felis, Viverra, Mustela, Ursus, Didelphus, Talpa, Sorex, Erinaceus. See these articles.

ORDER IV. The GLIRES, have two *fore-teeth* in each jaw, and no *dog-teeth*—This order includes 6 genera, viz. Hytrix, Lepus, Castor, Mus, Sciurus, Noctilio. See these articles.

ORDER V. The PECORA, have no *fore-teeth* in the upper jaw, but 6 or 8 in the under-jaw.—This order includes 6 genera, viz. Camelus, Moschus, Cervus, Capra, Ovis, Bos. See these articles.

ORDER VI. The BELLUÆ, have *obtuse fore-teeth* in each jaw.—This order includes 4 genera, viz. Equus, Hippopotamus, Sus, Rhinoceros. See these articles.

ORDER VII. The CETÆ, or *whale kind*, have no uniform character in their teeth, being very different in the different genera; but are sufficiently distinguished from the other orders of Mammalia, by living in the ocean, having pectoral fins, and a siphula or spiraculum upon the head.—This order includes 4 genera, viz. Monodon, Balæna, Phylæter, Delphinus. See these articles, and CETACEOUS.

The *generic* characters of the Mammalia are, like those of the orders, almost entirely taken from the TEETH, excepting the Vespertilio, which, besides the character of the order derived from the teeth, has this farther mark, that there is a membrane attached to the feet and sides, by means of which the creature is enabled to fly;—the Hytrix, whose body is covered with sharp spines;—and the whole order of Pecora, whose genera, besides the characters taken from the teeth, are distinguished into those which have *horns*, those which have *no horns*, and by peculiarities in the horns themselves.

The *specific* characters are very various, being taken from any part of the body which possesses a peculiar uniform mark of distinction. As examples of these characters are to be found under the proper name of

each genus; it is unnecessary to say any thing further concerning them in this place.

The *Second Class*, AVES, is subdivided into six ORDERS, the characters of which are taken chiefly from the structure of the BILL.

ORDER I. The ACCIPITRES, have a HOOKED BILL, the superior mandible, near the base being extended on each side beyond the inferior; and in some, the superior mandible is armed with *teeth*.—This order includes 4 species, viz. Vultur, Falco, Strix, Lanius. See these articles.

ORDER II. The PICÆ, have a convex, compressed BILL, resembling a knife.—This order contains 22 genera, viz. Buphaga, Certhia, Corvus, Cuculus, &c. See these articles.

ORDER III. The ANSERES, have an obtuse BILL, gibbous at the base, broadest at the point, covered with a smooth skin, and furnished with teeth: The *tongue* is fleshy; and the toes are palmated, or webbed.—This order includes 12 genera, viz. Alca, Anas, Colymbus, Diomedea, &c. See these articles.

ORDER IV. The GRALLÆ, have a long, obtuse, and somewhat cylindrical BILL: The *tongue* is undivided, and fleshy; and the *thighs* are naked. This order contains 18 genera, viz. Ardea, Fulica, Tringa, Charadrius, &c. See these articles.

ORDER V. The GALLINÆ, have a convex BILL; the superior mandible is vaulted over the inferior, and the margin of the superior mandible folds over the inferior one: The *nostrils* are half covered with a convex cartilaginous membrane: The *rectrices*, or principal quill-feathers of the tail, are always more than 12 in number; and the *feet* are divided, but connected at the innominate joint.—This order contains 7 genera, viz. Didas, Puffinus, Meleagris, Pavo, &c. See these articles.

ORDER VI. The PASSERES, have a conical sharp-pointed BILL; and the *nostrils* are oval, wide, and naked.—This order contains 15 genera, viz. Caprimulgus, Alauda, Calumba, &c. See these articles.

The *generic* characters of this class are taken from peculiarities in the *bill*, the *nostrils*, the *tongue*, the *feet*, the *feathers*, the *face*, the *figure of the body*, &c.

The characters which serve to distinguish the *species* are very various: For example, the *colour of particular feathers* or parts of *feathers*; *crests* of feathers on the head, disposed in different manners; the *colour of the cere* or *wax*; the *colour of the feet*; the *shape and length of the tail*; the *number, situation, &c. of the toes*; the *colour and figure of the bill*; &c.

The *Third Class*, AMPHIBIA, is divided into four ORDERS.

ORDER I. The REPTILES, have *legs*, and breathe by the *mouth*.—This order contains 4 genera, viz. Testudo, Draco, Lacerta, Rana. See these articles.

ORDER II. The SERPENTES, have no *legs*, and breathe

breathe by the *mouth*.—This order contains 6 genera, *viz.* Crotalus, Boa, Coluber, Anguis, Amphisbæna, Cæcilia. See these articles.

ORDER III. The NANTES, are furnished with *lungs*, and at the same time breathe by lateral *gills*; and the rays of their fins are cartilaginous.—This order contains 14 genera, *viz.* Accipenser, Balistes, &c. See these articles.

ORDER IV. The MEANTES, have both *lungs* and *gills*; and the *feet* are furnished with *toes* and *claws*.—This order contains but one genus, *viz.* the Siren. See SIREN.

The *generic* characters of this class are taken from the general figure of the *body*; from their having *tails* or *no tails*; being covered with a *shell*; having *teeth*, or *no teeth*, in the *mouth*; being furnished with *wings*; having *covered* or *naked* bodies; from the number, situation, and figure of the *scuta* and *scales*; from the number and situation of the *spiracula*; from the situation of the *mouth*, &c.

The *specific* characters are so very various, that it would be superfluous to enumerate them.

The *Fourth Class*, PISCES, is subdivided into four ORDERS, the characters of which are taken from the situation of the *belly-fins*.

ORDER I. The APODES, have *no belly-fins*.—This order contains 8 genera, *viz.* Ammodytes, Anarrhicas, Muræna, &c. See these articles.

ORDER II. The JUGULARES, have the *belly-fins* placed before the *pectoral fins*.—This order includes 5 genera, *viz.* Callionymus, Blennius, Gadus, &c. See these articles.

ORDER III. The THORACICI, have the *belly-fins* placed under the *pectoral fins*.—This order comprehends 17 genera, *viz.* Gobius, Labrus, Sparus, &c. See these articles.

ORDER IV. The ABDOMINALES, have the *belly-fins* placed behind the *pectoral fins*.—This order contains 17 genera, *viz.* Fistularia, Efox, Clupea, Cyprinus, &c. See these articles.

The *generic* characters of this class are taken from peculiarities in the *head*, the *mouth*, the *teeth*, the *nostrils*, the *rays* in the *membrane of the gills*, the *eyes*, the general figure of the *body*, the figure of the *tail*, the situation of the *spiracula*, &c.

The *specific* characters are taken from peculiarities in all the parts above enumerated, and many others.

See further the articles FISH in *Encycl.* and ICHTHOLOGY in the APPENDIX.

The *Fifth Class*, INSECTA, is subdivided into 7 ORDERS, the characters of which are taken from the wings. See the article INSECT.

ORDER I. The COLEOPTERA, have *four wings*, the two superior ones being *crucaceous*, and furnished with a *straight suture*.—This order comprehends 40 genera, *viz.* Attelabus, Scarabæus, Coccinella, Melœ, &c. See these articles.

ORDER II. The HEMIPTERA have *four wings*, the two superior ones being *semicrucaceous*, and *incumbent*, i. e. the *interior edges* lie above one another.—This order includes 12 genera, *viz.* Blatta, Gryllus, Cicada, &c. See these articles.

ORDER III. The LEPIDOPTERA, have *four wings*, all of them imbricated with *scales*.—This order contains 3 genera, *viz.* Papilio, Sphinx, Phalæna. See these articles.

ORDER IV. The NEUROPTERA, have *four wings*, interwoven with veins, like a piece of *network*, and *no suture* in the *anus*.—This order includes 7 genera, *viz.* Libella, Ephemera, Hemerobius, &c. See these articles.

ORDER V. The HYMENOPTERA, have the same characters with the former, only the *anus* is armed with a *sing.* But this mark is peculiar to the *females* and *neuters*; for the *males* have *no suture*.—This order comprehends 10 genera, *viz.* Apis, Formica, Vespa, &c. See these articles.

ORDER VI. The DIPTERA, have *two wings*, and two *clavated balancers* or *balances* behind each wing.—This order contains 10 genera, *viz.* Bombylius, Atilus, Tipula, &c. See these articles.

ORDER VII. The APTERA, have *no wings*. This order contains 14 species, *viz.* Acarus, Aranea, Pediculus, &c. See these articles.

See further the article INSECT in the *Encycl.* and the articles ENTOMOLOGY and INSECT in APPENDIX.

The *Sixth Class*, VERMES, is divided into five ORDERS.

ORDER I. The INTESTINA, are the most *simple animals*, being perfectly *naked*, and without *limbs* of any kind.—This order contains 7 genera, *viz.* Lumbricus, Spinunculus, Fasciola, Gordius, Ascaris, Hirudo, Mycine. See these articles.

ORDER II. The MOLLUSCA, are likewise *simple naked animals*, without any *shell*; but they are *brachiated*, or furnished with a kind of *limbs*.—This order comprehends 18 genera, *viz.* Afcidia, Limax, Doris, Tethys, Aphrodita, Sepia, &c. See these articles.

ORDER III. The TESTACEA, have the same characters with those of Order II. but are covered with a *shell*.—This order includes 39 genera, *viz.* Anomia, Cardium, Argonauta, Bulla, Buccinum, &c.

ORDER IV. The LITHOPHYTA, are *compound animals*, fixed upon a *calcareous base* constructed by the creatures *themselves*.—This order includes the corals, of which there are 4 genera, *viz.* Tubipora, Madrepora, &c. See these articles.

ORDER V. The ZOOPHYTA, are *compound animals*, furnished with a kind of *flowers*, and having a *vegetating root and stem*.—This order contains 15 genera, *viz.* Spongia, Gorgonia, Tubularia, Hydra, &c. See these articles.

This short explanation will enable any person who understands the Latin language to peruse the *Sytlema Naturæ* of Linnæus without the assistance of a master.—For more particular information concerning the several branches and subjects of zoology, he may consult the various articles above referred to.

ZOOPHYTE, in natural history, a kind of intermediate body partaking of the nature of a sensitive and a vegetable. See **ZOOLOGY**.

ZOOTOMY, the art of dissecting animals or living creatures, being the same with anatomy. See **ANATOMY**, and **COMPARATIVE ANATOMY**.

ZOROASTER, or **ZERDUSHT**, a celebrated Persian philosopher, said to have been the reformer of the religion of the magi, and to have lived in the reign of Darius Hystaspes. Others place him above 500 years before that æra : in short, authors differ so much with respect to him, that nothing certain can be affirmed on the subject.

ZOSIMUS, an ancient historian who lived at the end of the fourth and beginning of the fifth centuries. There are six books of his history extant ; in the first of which he runs over the Roman affairs in a very succinct manner from Augustus to Dioclesian ; the other five are written more diffusively. Zosimus was a zealous Pagan ; whence we find him frequently inveighing with great bitterness against the Christian princes, particularly against Constantine the Great, and the elder Theodosius. His history has been published with the Latin version of Leunclavius at Frankfort, 1590, with the other minor historians of Rome, in folio ; and at Oxford in 8vo. 1679.

ZUCCHERO (Taddeo), an Italian painter, born in the duchy of Urbino in 1529, was initiated in the art by his father, an ordinary painter ; but at the age of 14 was placed at Rome under Pietro Calabro. He excelled in a florid invention, and a genteel manner of designing ; but was not much admired for his colouring, which rather resembled that of statues than the life. He left many pieces unfinished, being snatched away in his prime in 1566.

ZUCCHERO (Frederico), an eminent painter, the brother of Taddeo, was born in 1543 ; and being carried to the jubilee at Rome in 1550, was placed under his brother there. He afterwards finished many of his brother's pieces. Pope Gregory XIII. employed him ; but having a difference with some of his officers, he drew a picture of Slander, that was afterward engraved by Cornelius Cort, in which he represented those who had offended him, decorated with asses ears. For this he was obliged to leave Rome ; he then worked in France for the cardinal of Lorraine, and in the Escorial for Philip II. without contenting either of them ; but was more fortunate in England, where he drew a picture of queen Elizabeth, and did some other pieces that were much commended. At length returning to Italy, and working at Venice, pope Gregory recalled and pardoned him. Soon after he received a brief from the pope for erecting an academy of painting ; of which being chosen the first prince, he built a noble apartment for their meeting. He afterwards went to Venice, to print some books he had written on painting, and from thence passed into Savoy ; but in a journey to Loretto died at Ancona, in the year 1609. In his style and manner of painting, he differed but little from his brother, though he far excelled him in sculpture and architecture.

ZUG, a canton of Switzerland, bounded on the east and north by that of Zurich, on the south by Schweiz and Lucern, and on the west by the canton of Lucern and the Freye-Amt, or Free

Provinces. It is not above 12 miles either way ; but very populous and fruitful, yielding wine, wheat, chestnuts and other fruits, in its vales, and excellent pasture on its mountains. The inhabitants of this canton are staunch Roman Catholics. It lies in the diocese of Constance, and its government is democratical. There are two lakes in it, abounding in fish, particularly large carps, pikes, and a species of trout, called *rotel* ; as well as several woods, full of game. Zug, which gives name to it, and is its capital, stands on the east side of a lake of the same name, about seven miles long, and is a strong neat town, containing a priory, and two convents.

ZUINGLIUS (Ulricus), an able and zealous reformer, who laid the foundation of a separation from Rome in Switzerland, at the same time that Luther did the like in Saxony, was born at Wildchausen in 1487. While he officiated as preacher at Zurich, a Franciscan sent by Leo X. came to publish indulgences there ; against which Zuinglius, after the example of Luther, declaimed powerfully. In the course of this opposition he started a new doctrine, which he called *Evangelical Truths* ; and from the beginning of 1519 to 1523, he preached not only against indulgences, but against other articles of the Romish church. But though Zuinglius made no less progress than Luther, he yet conducted himself with more moderation and prudence ; and wishing to have the concurrence of the civil powers, procured two assemblies to be called at Zurich : by the first, he was authorized to proceed as he had begun ; and by the second, the outward worship and ceremonies of the church of Rome were abolished. During these transactions, Zuinglius published several books in defence of his doctrines ; but treating of the eucharist, and prescribing a form of celebrating the Lord's supper, different from Luther, he was involved in violent disputes with the rest of his reforming brethren. The remainder of the Swiss cantons disallowing the proceedings of that of Zurich, other assemblies were called, and things tending to tumult, both sides had recourse to arms ; when Zuinglius, who began as a preacher, died in arms as a soldier, in 1531. His works amount to four vols folio : his doctrines were afterward spread, with some alterations, by Calvin, Beza, and others, whose followers were called *Calvinists*, while the disciples of Zuinglius retained the name of *Sacramentarians*.

ZURICH, a canton of Switzerland, bounded to the north by Swabia and the canton of Schaffhausen ; to the south by the town and territory of Rapperschweil and the cantons of Switz and Zug ; to the east by the Thurgau, Toggenburg, and Uznach ; and to the west by the free bailiages and county of Baden. It is about 60 miles from north to south, and 48 from east to west. With respect to its face, air, and soil, it is said to be an epitome of all Switzerland, as containing in it hills, valleys, plains, corn-lands, vineyards, lakes, and rivers. Their wines have a tartness at first, but the longer they are kept the more agreeable they are. The other products are excellent fruits, corn, pasture, fine clay, chalk, several coloured earths, pit-coal, turf, and sulphur. There are also some mineral springs in the canton ; and of the lakes, that of Zurich is the most considerable. The reformation was introduced here by Zuinglius, in the year

1517. This canton is the first in rank, and inferior only to that of Bern in extent, power, and wealth; in consequence of which, its representatives preside in the general diets, when held in any place belonging in common to the cantons; and the affairs relating to the whole confederacy are transacted in its offices. Its quota, for the defence of the several members of the confederacy, is 1400 men. Of one of the two armies raised on these occasions, it nominates one of the commanders in chief, as Lucern does the other. Its revenue is said to be about 150,000 crowns a-year; of which, one year with another, two thirds are expended in the charges of government, and the rest laid up in the treasury. It can bring 50,000 fighting men into the field at a very short warning.

ZURICH, the capital of a canton of the same name in Switzerland, stands in a pleasant country, near where the river Aa issues from the lake that takes its name from the town, 23 miles from Schaffhausen, and 114 from Geneva. After having been ruined by Attila, the Hun, it is said to have been restored by Thuricius, son of Theodoric king of the Goths, from whom it took the name of *Thuricum*, corrupted afterwards into that of *Zurich*. The river divides it into two parts, and has two bridges over it. It is fortified in the modern way, and has wide ditches, covered with free stone. There are five arsenals in it, well stored with arms and artillery; an academy or college, having 15 professors; a museum, or chamber of rarities; a stately town-house, the pillars in the front of which are of black marble, streaked with white; and a town library. The sovereignty and administration of all affairs are lodged in the greater and lesser council, out of which are chosen the city-officers, as the councils are out of the 13 companies of burghers. There are several other councils or colleges, each of which has its particular department. Here are a great variety of silk, woollen, linen, cotton, and other manufactures, this being the place of the greatest trade in all Switzerland. Before the reformation, there was an abbey for ladies in this town, whose abbesses had the title of princess; the large revenues of which are now applied mostly to pious and charitable uses. The town is well supplied with provisions by and from its lake. The streets are neat, and houses well-built, but not magnificent. The college here hath produced some learned men, particularly Zuinplius and Bullinger. In the town-library are several letters to Bullinger from lady Jane Gray daughter to the duke of Suffolk. In one of the arsenals is the figure of William Tell, dressed and armed in the ancient Swiss manner, with the cross-bow, whence he shot the arrow that struck the apple off his child's head. The unmarried women here are distinguished from the married, by a particular knot of ribbons on their heads, and the men are generally dressed in black; for the young only are allowed to wear coloured stuffs, and those quite plain, gold, silver, and jewels, being forbid, and luxury and vanity of every

kind carefully guarded against. When they go to church, the men all wear bands, and, when in mourning, bonnets made of pasteboard covered with crape.

Both men and women are so fond of music, that there are few of them that cannot play on some instrument. If a burgher goes out of town, or a peasant enters it, without a sword, they are liable to be fined. No persons, whatever their rank or office may be, are exempted from the sumptuary laws. The burgomasters, who are the same as the advocates at Bern, have the title of excellence. The hospitals here are very neat and well endowed; but they do not affect the ridiculous vanity of lodging the poor in palaces. Not only in this town and canton, and other parts of Switzerland, but also among the Grisons, the ministers all preach covered. The country about the town is very pleasant and fruitful; for both which it is not a little indebted to the lake, that extends 24 miles in length, and about two or three in breadth. The water is of a green colour, supposed to be owing to the melted snow that falls into it from the adjacent mountains. That part of it next Zurich is called the *Lower Lake*, and the other end the *Upper*. The cathedral, or great church here, is collegiate. The present city is said to owe its origin to a nunnery, founded by the emperor Lewis I. near where the ancient Tigurum stood.

ZUTPHEN, a strong and considerable town of the United Provinces, in Guelderland, and capital of a county of the same name. It has a magnificent church, and is surrounded with walls. It was taken by the French in 1672, who in 1674 delivered it up to the States General. It is seated at the confluence of the rivers Berkel and Yessel, nine miles south-east of Deventer, and 55 east by south of Amsterdam.—E. Long. 6. 13. N. Lat. 52. 12.

ZUIDER-ZEE, a great gulph or bay of the German ocean, which extends from south to north in the United Provinces, between Friesland, Over-Yessel, Guelderland, and Holland. It is so called from its situation towards the south, and is said formerly to have been a lake, and that the land is swallowed up which united North-Holland with Friesland.

ZYGOMA, in anatomy, a bone of the head, or rather an union or assemblage of two processes or eminences of bones; the one from the os temporis, the other from the os maxæ: these processes are hence termed the *zygomatic processes*, and the suture that joins them together is denominated the *zygomatic suture*.

ZYGOMATICUS, in anatomy, a muscle of the head, arising from the *Os ZYGOMA*, whence its name, and terminating at the angle of the lips.

ZYGOPHYLLUM, BEAN CAPER; a genus of the monogynia order belonging to the decandria class of plants. There are eight species, partly shrubby and partly herbaceous plants, all natives of warm climates, though some of them are hardy enough to endure the open air in this country.

A P P E N D I X:

CONTAINING

ARTICLES OMITTED,

AND

OTHERS (marked *Encycl.*) further EXPLAINED OR IMPROVED;

TOGETHER WITH

Corrections of ERRORS and of WRONG REFERENCES.

A.

Abatement
||
Achas.

ABATEMENT. For n° 12. l. read p. 3587.
art. 2. par. ult.

ABERDEEN, line 9. dele *This*; and read *Two very antique spires.*

ABERRATION, in optics. For n° 19—22. read, *See LIGHT in the Index subjoined to OPTICS.*

ABIES. At the end, for n° 61. read *Catalogue of Simples*, p. 4483.

ABORTION. For n° 12. read p. 5010. chap. viii.

ABROTANUM. In the marginal note, dele *Filago*; and for n° 62, 63. read p. 4483.

ABSINTHIUM. For n° 64, 65, 66. read *Catalogue of Simples*, p. 4483.

ABSORBENT MEDICINES. For marginal note, read *See MATERIA MEDICA*, p. 4475. col. 1.

ABSORBENT Vessels. In the marginal note, dele "*See MEDICINE, Part I. n° 11, &c.*" And at the end of the article, for n° 21, 50. read p. 6203, *et seq.*

ABSTINENCE. In the marginal note, for P. vi. n° 328, &c. read n° 499, 500.

ACANTHUS. Dele the marginal note.

ACCELERATOR. For n° 176. read *Table of the Muscles.*

ACER, the MAPLE TREE, (*Encycl.*) The pseudo-platanus, or balsard fycamore, by tapping yields a liquor not unlike that of the birch-tree, from which the Highlanders in Scotland sometimes make an agreeable and wholesome wine.

ACETOSA. In the marginal note, for n° 69. read *Catalogue of Simples*, p. 4483.

ACETUM. For n° 71, &c. read *Catalogue of Simples*, p. 4483.

ACETUM Diffillatum. For n° 682. read 679.

ACHOR. On the margin, for n° 762, 913. read n° 760, 1009.

ACHRAS, a genus of the monogynia order, belonging to the hexandria class of plants. There are three species; the most remarkable of which are, 1. The sapota, with oblong oval leaves, and smooth turbinate fruit. 2. The mammosa, with spear-shaped

leaves, and large oval fruit. The first is common about Panama, and some places in the Spanish West Indies, but is not to be found in any of the British settlements in America. The second sort is very common in Jamaica, Barbadoes, and most of the West India islands, where the trees are planted in the gardens for their fruit, which is by many persons greatly esteemed. It grows to the height of 35 or 40 feet, having a straight trunk covered with an ash-coloured bark. The branches are produced on every side, forming a regular head; and are beset with leaves near a foot long, and almost three inches broad in the middle. The flowers are a cream colour; and are succeeded by large oval covered by a brownish skin, inclosing a thick pulp of a russet colour, very luscious, and called *natural marmalade*, from its resemblance to that of quinces.—These trees being natives of very hot climates, cannot be preserved in this country except in the warmest stoves.

ACHROMATIC TELESCOPES. For OPTICS, n° 20. read p. 5597.

ACIDS, (*Encycl.*) Acids form one of the general classes into which Salts are usually divided, the other two being called *alkalies* and *neutrals*. The most common and easy method of distinguishing acids is by their peculiar taste; but there are many other properties which equally distinguish them, the principal of which are: 1. With water they combine into a fluid, whose specific gravity is not a medium betwixt the weight of the water and acid separately taken. 2. With spirit of wine they unite into a substance very different from either of the component parts, called *ether*. 3. They unite with absorbent earths, alkalies, animal, metallic, and sometimes with pure argillaceous earths, from which they cannot afterwards be separated without considerable difficulty. 4. They change the blue colour of vegetables to red, and heighten the red colour of those which are so already. 5. If mixed with a fermentable liquor, they will prevent that process from taking place; or if the fermentation has already begun, the acid will put a stop to it. 6. They cannot be frozen but in a degree of cold considerably below

Achas
||
Acids.

GLASS 0138





Acid. low 32°, the freezing point of water.

To two of these rules, however, there is an exception; viz. the volatile sulphureous acid, which will neither unite with absorbent earths, nor change the colour of vegetable infusions. But this is not to be attributed to the nature of the acid itself. It arises from the phlogiston with which the volatile sulphureous acid is still combined; for the pure sulphureous acid is not different from that called the *vitriolic*, and is exceedingly strong.

By some philosophers acids have been reckoned simple chemical elements, and by others they have been thought to be formed of water and earth. The former opinion, however, is refuted by some experiments which prove the destructibility of certain acids; and the latter seems not at all probable. We have no instance of an acid being formed out of these two ingredients; nor can we conceive how two substances, seemingly so insipid and inactive, can produce a third with properties so exceedingly different from both. The vegetable acids can all of them be destroyed by means of fire; in which case they yield a great quantity of fixed air, thereby showing that it is properly their element, or that from which they are formed. What are the constituent parts of fixed air, we know not. Dr Priestley supposes it to be a modification of the nitrous acid; but from the great quantities of dephlogisticated air yielded by the latter, this opinion seems also improbable; nor indeed can any thing concerning the origin of fixed air be deduced with certainty from such experiments as have yet been made.

The vitriolic and marine acids are resolved into a kind of air peculiar to themselves; so that we have few or no data to guess at their composition. In their action upon bodies, acids greatly resemble cold, as alkalies do heat; the former always tending to preserve, or even increase, the cohesion of such bodies as they do not chemically dissolve, and consequently to keep them from putrefaction; while alkalis, on the other hand, dissolve the cohesion, and thus sooner bring on the effects of putrefaction.

But although acids thus produce the effects of cold, this is only to be understood of them in a very diluted state; for when concentrated, they are so far from producing cold, that with some bodies a most violent heat, and even flame itself, is engendered. Thus a mixture of the vitriolic and nitrous acid will set on fire oil of turpentine; the nitrous acid alone will kindle oil of cloves, saffron, and some others. In this concentrated state they prove a violent and corrosive poison if taken into the body; though when diluted, they not only may be taken with safety, but in many cases prove medicines of great efficacy; particularly in fevers, where they are useful by their property of allaying thirst, as well as by their tonic and antiseptic qualities.

The acids are divided into three classes expressive of their origin, viz. the mineral, vegetable, and animal. The *mineral* are, the vitriolic, the nitrous, and marine acids; to which we may now add that of arsenic. The *vegetable* are, the acetic acid, that of tartar, the acid juices of fruits, the acids obtained from woods by distillation, and the acid of sugar. The *animal* acids are, that of phosphorus, the acid of ants, wasps, bees, &c.

All or most of the acids, as already mentioned, will unite themselves with alkaline salts, earths, and metals; but some of them have these properties in a much stronger degree than others. The mineral acids particularly excel in this respect; though even among these there are considerable differences. The vitriolic is reckoned the strongest; though it is probably inferior to the acid of arsenic. Of this last, however, the properties are not yet generally known.

The *vitriolic*, or, as it is sometimes called, the *universal acid*, when very pure and strong, appears like a clear oil, having twice the specific gravity of water, or even more; in which state it is called *oil of vitriol*, though improperly, for it has not the least oily quality, but on the contrary mixes with water so violently that a great heat immediately takes place. In this state the smallest quantity of an inflammable substance, such as a bit of cork or straw, falling into it, gives a brownish or black colour; and as this frequently happens to those who sell the acid in small quantities, we very often buy it thus discoloured.

This acid was originally named the *vitriolic*, from its being distilled from vitriol or copperas; and the name is still retained, though this method of distillation is universally superseded by that of obtaining it from the fumes of burning sulphur. It is found almost universally. It exists in vast quantity in sulphur; so that it can be extracted from it with profit even when great part of the acid fumes are lost. In the waters of the ocean it is found combined with calcareous earth, and with the earth called *magnesia*. In the former case, it subsides to the bottom of the salt-pans, forming what is called *pan-gratch*; and in the latter, it produces the bitter purging salt called *Epsom salt*.—In the earth it is found in vast quantities united with calcareous matter, and crystallized in the large masses called *gypsum*, *alabaster*, *Paris plaster*, or *suco*. It is also found in many kinds of hard water united with the same earth, and sometimes with iron; in which case it forms what are called *chalybeate mineral waters*. In clay of all kinds it exists, most frequently combined with calcareous earth, but sometimes with the argillaceous or substance of the clay itself. In this last case the compound formed by the union is *alum*. This acid exists also in great plenty in the pyrites, or hard heavy lumps called *brasses*, found in coal-mines. Here it is combined with inflammable matter, and the compound is *sulphur*; but by exposure to the air the inflammable part flies off, and the acid partly saturates itself with iron, which these substances also contain in plenty, and partly appears in its proper form. Hence the water which washes pyrites thus exposed contains partly a green vitriol formed by the union of the acid with the metal; and partly a loose acid, which if it could be concentrated would become pure oil of vitriol.—Hence probably the origin of vitriolic and acid waters.—It is also frequently found in or near copper mines; and then makes its appearance in a very acrid poisonous water of a bluish colour, from which the blue copperas or vitriol is extracted.

The vitriolic acid is of very considerable use in many different mechanical arts. In tanning of leather, it is used to give consistency to the leather after it has been almost dissolved by the lime. In dyeing, it is of use for fixing and brightening of various colours, especially

Acid.

Acid.

if combined with the argillaceous earth into the compound called *alum*. In bleaching, it is also exceedingly useful for dissolving the impurities which cannot be extracted by fixed alkali, whence the cloth acquires a clearer colour than if no acid was used. In medicine it is a good antiseptic and corroborant. It is useful in many other cases, so that the consumption of it is very great; and though several manufactories of vitriolic acid have been erected, the market cannot be overstocked.

The *nitrous acid*, commonly called *aquafortis*, when pure, is a limpid liquor considerably lighter than oil of vitriol, its weight being to that of water as 19 to 12. A very small quantity of inflammable matter communicates to a large portion of this acid a deep orange or reddish colour, and causes it emit very dense fumes of a red colour and suffocating nature. It is obtained only by distilling the neutral salt called *saltpetre* with oil of vitriol. Concerning its origin there have been great disputes; some asserting that it is naturally contained in the air; others, that it is the effect of putrefaction; some, that it is only the vitriolic acid altered by having been mixed with putrefying vegetable and animal substances; and lastly, which is the most probable opinion, it has been asserted, that the nitrous acid is naturally found in vegetables, and consequently that its being procured in large quantities from putrefied vegetables is not a sign of its being produced, but only exposed to view by that process; and in confirmation of this hypothesis, it is observed, that almost all those salts called *essential* by the chemists, are no other than the nitrous acid combined with volatile alkali. In the earth, this acid is also found in various parts and in many different proportions; but the accounts we have of its production, notwithstanding their being so often repeated by different authors, are still so confused and uncertain, that very little confidence can be put in them.

The uses of *aquafortis* in dyeing, and in other mechanic arts, is very considerable. It affords one method of separating gold from silver, being endowed with a power of dissolving the latter, but not the former. It is also of considerable use in chemistry and medicine, particularly in the making of gun-powder; for to this we must ascribe the whole power exerted by the explosion of that composition. In this case, however, it is not made use of in its pure state, but in conjunction with a fixed alkali, forming the neutral salt called *nitre* or *saltpetre*.

Though the nitrous acid is weaker than the vitriolic, in point of chemical affinity and quantity of acid power, yet it acts much more briskly upon all substances than the former; and by its means the vitriolic acid may be made to dissolve many which it cannot do by itself. Being used for so many purposes, the consumption of nitre is immense.

The *marine acid*, muriatic acid, or acid of sea-salt, has its name from being found in the waters of the ocean, forming our common salt in conjunction with the fossil fixed alkali. Besides this, and the fossil or rock-salt, which is of the same nature with the salt of the ocean, the marine-acid has no other origin excepting the bitter liquor which remains after the extraction of sea-salt. Here it is found in combination with the earth called *magnesia*, forms a liquor very pun-

Acid

gent to the taste, which cannot be crystallized; and if evaporated to dryness, soon attracts moisture from the air sufficient to reduce it again to a fluid state.

The marine acid is the weakest and the lightest of all the mineral acids. In its most concentrated state it is of a lemon-colour, continually exhaling dense white fumes which spread to a great distance, and are of a very suffocating nature. The marine acid is scarce ever concentrated equally with the other two, on account of its being much more volatile; and therefore its specific gravity cannot well be ascertained. The marine acid dissolves metals with less heat and ebullition, and fewer vapours, than the other two, but adheres to them with much more obstinacy; so that almost all the metals, even gold itself, become volatile, and arise with this acid in form of a sublimate. The uses of marine acid, except what is employed in sea-salt, are very limited, and therefore there is no great demand for it. However, it is useful in the solution of some metals, particularly gold; in which case it is mixed with a proportion of *aquafortis*, and then forms a compound called *aqua regia*.

The *VEGETABLE* acids most generally used are *vinegar* or the *acetous acid*, and the *acid of tartar*. The former is produced by a kind of fermentation; the latter from wine which is long kept, and seems to be a kind of essential salt. The uses of vinegar as an article of food are very extensive. It is also the basis of some elegant and useful medicines. Cream of tartar makes no inconsiderable article in the materia medica, and is also used in some of the mechanic arts. The other vegetable acids are but little known or made use of, the acid juices of fruits excepted, which are almost entirely confined to culinary purposes.

With regard to the *ANIMAL* acids, that of phosphorus excepted, they have been very little the subject of investigation. The phosphoric acid, however, is not entirely confined to the animal kingdom. It is obtained by distillation from mustard, and some other vegetables. By means of the vitriolic acid also, it may be had in great quantity from calcined bones and other animal earths. The only substance from which it can be had without the trouble of distillation, is urine.—By simple evaporation, a kind of salt composed of phosphoric acid and volatile alkali is obtained. The phosphoric acid being used only for matters of curiosity, the consumption of it is inconsiderable.

ACIDUM PINGUE, an imaginary acid, which some German chemists supposed to be contained in fire, and by combining with alkalies, lime, &c. to give them their caustic properties; an effect which is found certainly to depend on the loss of their fixed air. See the article *AIR*, (*Encycl.*) n° 16. *et seq.*

ACONITUM, (*Encycl.*) See also *MONKSHOOD*, (*Encycl.*)

ACORUS. On the margin, for n° 194. read *Catalogue of Simples*.

ACOUSTICS. In the foot-note, p. 57. line 3. from the bottom, for *FIRE*, read *ATMOSPHERE*, n° 8.

ACRIDS. For 25. read 45.

ACRIMONY, *MORBIFIC*. For 127—132, 163. read 215—227.

ACROSPIRE. For n° 5. read n° 1.

ACT, in dramatic poetry. For *CHAR. II.* read *PART II. scē. i.*

AC.

ACTINIA, in zoology, a genus belonging to the order of vermes mollusca. The body is oblong and smooth, attaching itself firmly by its basis to rocks or other solid substances, having a dilatable apex hooked within. The mouth is furnished with crooked teeth, the rostrum cylindrical and radiated. There are five species, some of which make a beautiful appearance, and are called *Animal Flowers*, *Sea Anemonies*, and *Urtica Marina*. See *Animal Flower*.

ACTION, in law, (*Encycl.*) See also *SUIT*, (*Encycl.*)

ACTION, among physicians. In the marginal note, de le chap. iii. iv. v.

ADANSONIA, (*Encycl.*) See also *BAOBAB*, (*Encycl.*)—Line 8 and 9. de le and *South America*.

ADDER-WORT. For n° 170. read *Catalogue of Simples*.

ADIANTHUM. In the marginal note, for n° 73. read *Catalogue of Simples*.

ADMIRALTY ISLANDS, lie in about 2° 18' S. Lat and 146° 44' E. Long. There are between twenty and thirty islands said to be scattered about here, one of which alone would make a large kingdom. Captain Carteret, who first discovered them, was prevented touching at them, although their appearance was very inviting, on account of the condition of his ship, and of his being entirely unprovided with the articles of barter which suit an Indian trade. He describes them as clothed with a beautiful verdure of woods, lofty and luxuriant, interspersed with spots that have been cleared for plantations, groves of coconut trees, and houses of the natives, who seem to be very numerous. The largest of these islands is eighteen leagues long in the direction of east and west. The discoverer thinks it highly probable that these islands produce several valuable articles of trade, particularly spices, as they lie in the same climate and latitude as the Moluccas.

ADVOCATE, (*Encycl.*) Advocates in the English courts, are more generally called *counsel*. See the article *COUNSEL*, (*Encycl.*)

ADWOWSON, (*Encycl.*) See also *PATRONAGE*, (*Encycl.*)

ÆRA. In the marginal note, de le 1, 6, 7, 8.

ÆTIOLOGY. In the marginal note, for *Chap.* 11, &c. read *passim*.

AFFECTIONS and PASSIONS. For n° 153. read *passim*.

AGALOCHUM. For *MATERIA MEDICA*, read *XYLO-ALOES*.

AGARICUS. In the marginal note, for n° 76. read *Catalogue of Simples*.

AGE. In the marginal note, for 242. read 2—7.

AGUE. For n° 424—426. read n° 122, 136, 148, 156.

AIR, (*Encycl.*) The general mass of fluid which goes by the name of air, however simple and homogeneous it may have been thought in former times, is so far from possessing the simplicity of an element, that it is the receptacle of all kinds of effluvia produced from terrestrial substances either naturally or artificially. Hence, whatever may be the nature of the aerial fluid when absolutely pure, that which we breathe, and commonly goes under the name of *air*, must be considered as an exceedingly heterogeneous mixture, various at various

times, and which it is by no means possible to analyse with accuracy.

Though, in this view, air seems to be a kind of sink or common sewer, where all the poisonous effluvia arising from putrid and corrupted matters are deposited; yet it has a wonderful facility of purifying itself, and one way or other of depositing these vapours contained in it; so that it never becomes noxious except in particular places, and for a short time, the general mass remaining upon all occasions pretty much the same. The way in which this purification is effected is different, according to the nature of the vapour with which the air is loaded. That which most universally prevails is water; and from experiments it appears, that the quantity of aqueous vapour contained in the atmosphere is immense. Dr Halley, from an experiment on the evaporation from a fluid surface heated to the same degree with that given by our meridian sun, has calculated, that the evaporation from the Mediterranean sea alone is sufficient to yield all the water of the rivers which run into it. Dr Watson, in his *Chemical Essays*, has given an account of some experiments made with a view to determine the quantity of the water raised from the earth itself in time of drought; and calculates, that, when there had been no rain for above a month, and the grass was become quite brown and parched, the evaporation from an acre was not less than 1600 gallons in 24 hours. Making afterwards two experiments, when the ground had been wetted by a thunder-shower the day before, the one gave 1973, the other 1905, gallons in 12 hours. From this the air is every moment purified by the ascent of the vapour, which continually flies off into the clouds, thus leaving room for the exhalation of fresh quantities; so that as the vapour is considerably lighter than the common atmosphere, and of consequence ascends with great velocity, the air during all this time is said to be *dry*, notwithstanding the vast quantity of aqueous fluid that passes through it.

Nor is it only from the aqueous vapour that the air is purified at this time. Much of that vapour arising from decayed and putrid animal and vegetable substances, and which by modern philosophers is called *phlogiston*, attaches itself to the aqueous vapour, and ascends along with it. Another part is absorbed by vegetables; for the phlogistic vapour, as has been shown under *AGRICULTURE*, n° 5. is probably the food of plants. The phlogistic vapours which ascend along with the aqueous ones, probably continue there and descend along with the rain; whence the fertilizing qualities of rain-water above those of any other. Thus we may see why a dry air, whether cold or hot, must always be wholesome; but as the atmosphere cannot always receive vapours, it is obvious, that when great rains come on, especially if attended with heat, the lower regions of the air must be overloaded with vapours both of the aqueous and phlogistic kind, and of consequence be very unwholesome.

But besides the aqueous and phlogistic vapours, both of which are specifically lighter than common air, there are others, which, being specifically heavier, cannot be carried off in this manner. Hence these gross vapours contaminate certain places of the atmosphere, rendering them not only unhealthy, but absolutely poisonous. Of these are, 1. Sulphureous, acid, capillary,

Air. and metalline exhalations. These are produced principally by volcanoes; and as they descend in consequence of their specific gravity, they suffocate and spread destruction all around them, poisoning not only animals, but vegetables also. 2. The vapours arising from houses where lead and other metals are smelted, have the same pernicious qualities; inasmuch that the men who breathe them, the cattle who eat the grass, and the fishes who inhabit the waters on which they fall, are poisoned by them if taken into the body in a certain proportion. 3. Of the same kind are the *mofcets*, or emanations of fixed air which sometimes proceed from old lavas, or perhaps from some other places even of the surface. From all these the air seems not capable of purifying itself, otherwise than either by dispersing them by winds, or by letting them subside by their superior gravity, till they are absorbed either by the earth or water, according as it is their nature to unite with one or other of these elements. 4. Of this kind also seem to be those vapours which are called properly *pestifential*. The contagion of the plague itself seems to be of an heavy sluggish nature, incapable of arising in the air †, but attaching itself to the walls of houses, bed-cloaths, and wearing apparel. Hence scarce any constitution of the atmosphere can dispel these noxious effluvia; nor does it seem probable that pestifential distempers ever cease until the contagion has operated so long, and been so frequently communicated from one to another, that, like a ferment much exposed to the atmosphere, it becomes vapid, communicates a milder infection, and at last loses its strength altogether.

† See *Medicines*,
no 149.

Mechanical Properties of the Air.—In common with water, the air we breathe possesses *gravity*, and consequently will perform every thing which water can do, making allowance for the great difference between the specific gravity of water and of air. This difference indeed is exceedingly great, and has been variously calculated. Ricciolus estimates the gravity of air to be to that of water as 1 to 1000; Merfennus, as 1 to 1300, or 1 to 1356; Lana, as 1 to 640; and Galileo, only as 1 to 400. But Mr Boyle, by more accurate experiments, makes the air at London to be to water as 1 to 938; and thinks, that, all things considered, the proportion of 1 to 1000 may be taken as a medium. But by three experiments made since that time before the Royal Society, the specific gravity of the air was determined to be to that of water as 1 to 840, 852, and 860. By a very accurate experiment, Mr Hauksbee fixed the proportion as 1 to 885. But as all these experiments were made when the barometer was at 29½ inches, Dr Jurin supposes, that, at a medium between heat and cold, when the barometer is 30 inches high, the proportion between the two fluids may be taken as 1 to 800; and this agrees with the observations of the Hon. Mr Cavendish, made when the barometer was at 29½ inches, and the thermometer at 50.

By means of its gravity, the air presses with great force upon all bodies, according to the extent of their surface. M. Pascal has computed the quantity of this pressure to be no less than 2322 pounds upon every square foot of surface, or upwards of 15 pounds on every square inch. According to some experiments made by M. Amontons and de la Hire, a column of

air on the surface of the earth, and 36 fathoms high, is equal in length to three lines depth of mercury. From the barometer, however, we know that the whole pressure of the atmosphere is very different; sometimes being equal only to a column of 28 inches, and varying from thence to 31 inches. The whole quantity of pressure must thus be immense, and has been computed equal to a globe of lead 60 miles in diameter.

By means of its gravity, the atmosphere accomplishes many useful purposes in nature. It prevents the arterial vessels of animals and the sap-vessels of plants from being too much distended by the expansive power (whatever it is), which has a perpetual tendency to swell them out. Thus we see, that, in the operation of cupping, where the pressure of the air is taken off from a particular part, the expansive force instantly acts, and swells out the vessels to a great degree. Hence also, when animals are put into an air-pump, their whole bodies swell.

By its gravity also, the air promotes the union of fluid bodies, which would instantly cease in *vacuo*. Thus oils and salts, which remain united in air, separate as soon as that fluid is extracted. Hence also, when hot water is put under an exhausted receiver, it boils violently; because, the pressure of the air being now taken off, the particles of steam, which existed invisibly among the water, and which the gravity of the atmosphere prevented from flying off so soon, are now hurried up with great velocity, by means of the excessive comparative gravity of the aqueous fluid.

On the gravity of the air depend the ascent of water in pumps, syphons, &c. and likewise all the phenomena of the barometer.

Besides its gravity, which the air has in common with water and other fluids, there is another, which it has only in common with steam or vapour. This is called its *elasticity*; by which, like a spring, it allows itself to be compressed into a smaller bulk, and then returns again to its original size upon removing the pressure.

This property of the air was first ascertained by some experiments of lord Bacon, who, upon this principle, constructed his *vitrum calendare*, the first thermometer. Of this power we have numerous proofs. Thus, a blown bladder being squeezed in the hand, we find the included air sensibly resist; so that, upon ceasing to compress, the cavities or impressions made in its surface are readily expanded again and filled up.

On this property of elasticity the structure and office of the *Air-Pump* depend. Every particle of air always exerts this nius or endeavour to expand, and thus strives against an equal endeavour of the ambient particles; whose resistance happening by any means to be weakened, it immediately diffuses into an immense extent. Hence it is that thin glass bubbles, or bladders filled with air, and exactly closed, being included in the exhausted receiver of an air-pump, burst by the force of the included air. So a bladder quite flaccid, containing only the smallest quantity of air, swells in the receiver and appears quite full. The same effect is also found, by carrying the flaccid bladder to the top of an high mountain.

It has been questioned among philosophers, whether this elastic power of the air is capable of being destroyed or diminished. Mr Boyle made several experiments

with a view to discover, how long air brought to the greatst degree of expansion to which he could reduce it in his air-pump, would retain its spring; and could never observe any sensible diminution. Desaguliers found, that air, after having been inclosed for half a year in a wind-gun, had lost none of its elasticity; and Roberval, after preserving it in the same manner for 16 years, observed, that its expansive projectile force was the same as if it had been recently condensed. Nevertheless, Mr Hauksbee concludes, from a latter experiment, that the spring of the air may be so disturbed by a violent pressure, as to require some time to return to its natural tone. Dr Hales inferred, from a number of experiments, that the elasticity of the air is capable of being impaired and diminished by a variety of causes.

The weight or pressure of the air, it is obvious, has no dependence on its elasticity; but would be the same whether the air had such a property or not. But the air, being elastic, is necessarily affected by the pressure, which reduces it into such a space, as that the elasticity, which re-acts against the compressing weight, is equal to that weight. In effect, the law of this elasticity is, that it increases as the density of the air increases; and the density increases as the force increases by which it is pressed. Now there must necessarily be a balance between the action and re-action; i. e. the gravity of the air which tends to compress it, and the elasticity of the air which endeavours to expand it, must be equal. Hence the elasticity increasing, or diminishing universally, as the density increases or diminishes, i. e. as the distance between the particles diminishes or increases, it is no matter whether the air be compressed and retained in such space by the weight of the atmosphere, or by any other means; it must endeavour in either case to expand with the same force. And as hence, if air near the earth be pent up in a vessel, so as to cut off all communication with the external air, the pressure of the inclosed air will be equal to the weight of the atmosphere. Accordingly, we find mercury sustained to the same height, by the elastic force of air inclosed in a glass vessel, as by the whole atmospheric pressure. On the same principle air may be artificially condensed; and hence the structure of the *Air-Gun*.

The utmost limits to which air of the density which it possesses at the surface of the earth, is capable of being compressed, have not been ascertained. Mr Boyle made it 13 times more dense; Dr Halley says that he has seen it compressed so as to be 60 times denser than in its natural state, which is farther confirmed by M. Papin, and M. Høuygens. Dr Hales, by means of a press, condensed it 38 times; and by forcing water in an iron ball or globe, into 1551 times less space than it naturally occupies. However, Dr Halley has asserted, in the *Philosophical Transactions*, Abr. vol. ii. p. 17, that from the experiments made at London, and by the academy del Cimento at Florence, it might be safely concluded, that no force whatever is able to reduce air into 800 times less space than that which it naturally possesses on the surface of our earth. In answer to which, M. Amontons, in the *Memoirs of the French Academy*, maintains, that there is no fixing any bounds to its condensation; that greater and greater weights will still reduce it into less and less compass;

that it is only elastic in virtue of the fire which it contains; and that as it is impossible ever absolutely to drive all the fire out of it, it is impossible ever to make the utmost condensation.

The dilatation of the air, by virtue of its elastic force, is found to be very surprising; and yet Dr Wallis suggests, that we are far from knowing the utmost of which it is capable. In several experiments made by Mr Boyle, it dilated first into 9 times its former space; then into 31 times; then into 60; then into 150. Afterwards it was brought to dilate into 8000 times its space, then into 10000, and even at last into 13679 times its space; and this altogether by its own expansive force, without the help of fire. On this depends the structure and use of the *MANOMETER*.

Hence, it appears, that the air we breathe near the surface of the earth, is compressed by its own weight into at least the 13679th part of the space it would possess *in vacuo*. But if the same air be condensed by art, the space it will take up when most dilated, to that it possesses when condensed, will be, according to the same author's experiments, as 550000 to 1.

M. Amontons, and others, we have already observed, attribute the rarefaction of the air wholly to the fire contained in it; and therefore, by increasing the degree of heat, the degree of rarefaction may be carried still farther than its spontaneous dilatation. Air is expanded one-third of its bulk by boiling water.

Dr Hales found, that the air in a retort, when the bottom of the vessel was just beginning to be red-hot, was expanded through twice its former space; and in a white, or almost melting heat, it occupied thrice its former space; but Mr Robins found, that air was expanded by the heat of iron, just beginning to be white, to four times its former bulk. On this principle depends the structure and office of the *THERMOMETER*.

M. Amontons first discovered that air will expand in proportion to its density, with the same degree of heat. On this foundation the ingenious author has a discourse, to prove "that the spring and weight of the air, with a moderate degree of warmth, may enable it to produce even earthquakes, and other of the most vehement commotions of nature."

According to the experiments of this author, and M. de la Hire, a column of air on the surface of the earth 36 fathoms high, is equal in weight to three lines depth of mercury; and it is found, that equal quantities of air possess spaces reciprocally proportional to the weights with which they are pressed: the weight of the air, therefore, which would fill the whole space possessed by the terrestrial globe, would be equal to a cylinder of mercury, whose base is equal to the surface of the earth, and its height containing as many times three lines as the atmospherical space contains orbs equal in weight to 36 fathoms of that wherein the experiment was made.—Hence, taking the denseness of all bodies, *e. g.* gold, whose gravity is about 14630 times greater than that of air in our orb, it is easy to compute that this air would be reduced to the same density as gold, by the pressure of a column of mercury 14630 times 28 inches high, i. e. 409640 inches: since the bulks of air in that case would be in the reciprocal ratio of the weights by which they are pressed. These 409640 inches, therefore, express the height at which the barometer must stand, where the

Air.

Air.

air would be as heavy as gold, and the number ²¹⁶³¹₂₀₅₆₀ lines, the thickness to which our column of 36 fathoms of air would be reduced in the same place. Now, we know that 43528 fathoms, which is the depth where the above pressure and consequent reduction take place, are only the 74th part of the semi-diameter of the earth; and therefore, beyond that depth, whatever matter exists, it must be heavier than gold. It is not improbable, therefore, that the remaining sphere of 645538 fathoms diameter may be full of dense air, heavier by many degrees than the heaviest bodies which we know. Hence again, as it is proved, the more air is compressed, the more does the same degree of fire increase the force of its spring, and render it capable of a proportionably greater effect; we may infer, that a degree of heat, which in our orb can only produce a moderate effect, may have a very violent one in such lower orb; and that, as there may be many degrees of heat in nature beyond that of boiling-water, it is probable there may be some whose violence thus assisted by the weight of the air, may be sufficient to tear asunder the solid globe. See the article EARTHQUAKE.

The elastic power of the air is the second great source of the effects of this important fluid. By means of this it insinuates into the pores of bodies possessing this prodigious faculty of expanding, which is so easily excited that it must necessarily put the particles of bodies into which it insinuates itself into perpetual oscillations. Indeed, the degree of heat, and the air's gravity and density, and consequently its elasticity and expansion, never remaining the same for the least space of time, there must be an incessant vibration or dilatation and contraction in all bodies.

We observe this reciprocation in several instances, particularly in plants, the trachea or air-vessels of which do the office of lungs; for the contained air alternately expanding and contracting, as the heat increases or diminishes, by turns presses the vessels and eases them again, and thus promotes a circulation of their juices.

Hence we find, that no vegetation or germination will proceed *in vacuo*. Indeed, beans have been observed to grow a little tumid therein; and this has led some to attribute that to vegetation which was really owing to no other cause than the dilatation of the air within them. The air is very instrumental in the production and growth of vegetables, not only by invigorating their several juices while in an elastic active state, but also by greatly contributing in a fixed state to the union and firm connection of their several constituent parts.

From the same cause it is, that the air contained in bubbles of ice, by its continual action, bursts the ice; and thus glasses and other vessels frequently crack when their contained liquors are frozen. Thus also, entire columns of marble sometimes cleave in the winter time, from some little bubble of included air's acquiring an increased elasticity. From the same principle arise all putrefaction and fermentation; neither of which will proceed, even in the best disposed subjects, *in vacuo*.

Since we find such great quantities of elastic air generated in the solution of animal and vegetable substances, a good deal must constantly arise from the

dissolution of these elements in the stomach and bowels, which is much promoted by it.

In reality, all natural corruption and alteration seem to depend on air; and metals, particularly gold, only seem to be durable and incorruptible, in virtue of their not being pervious to air.

Air, effects of the different ingredients of it.—Air not only acts by its common properties of gravity and elasticity, but there are numerous other effects arising from the peculiar ingredients of which it consists.

Thus, 1. It not only dissolves and attenuates bodies by its pressure and attrition, but as a chaos containing all kinds of menstua, and consequently possessing powers for dissolving all bodies. It is known that iron and copper readily dissolve and become rusty in air, unless well defended with oil. Boerhaave assures us, that he has seen pillars of iron so reduced by air, that they might be crumbled to dust between the fingers; and as for copper, it is converted by the air into a substance much like the verdigrase produced by vinegar.

Mr Boyle relates, that in the southern English colonies the great guns rust so fast, that after lying in the air for a few years, large cakes of crocus martis may be separated from them. Acosta adds, that in Peru the air dissolves lead, and considerably increases its weight. Yet gold is generally esteemed indissoluble by air, being never found to contract rust, though exposed to it ever so long. The reason may be, that sea-salt, which is the only menstruum capable of acting on gold, being very difficult to volatilize, there is but a small proportion of it in the atmosphere. In the laboratories of chemists, where aqua regia is prepared, the air becoming impregnated with an unusual quantity of this salt, gold contracts a rust like other bodies.

Stones also undergo the changes incident to metals. Thus Purbeck stone, of which Salisbury cathedral consists, is observed gradually to become softer, and to moulder away in the air; and Mr Boyle gives the same account of Blackington stone. He adds, that air may have a considerable operation on vitriol, even when a strong fire could act no farther upon it. And he has found, that the fumes of a corrosive liquor work more suddenly and manifestly on a certain metal when sustained in the air, than the menstruum itself did, which emitted fumes on those parts of the metal which it covered; referring to the effects of the effluvia of vinegar on copper.

The dissolving power of air is increased by heat, and by other causes. It combines with water; and by access of cold, deposits part of the matter which was kept dissolved in it by a greater degree of heat. Hence, the water, by being deposited and condensed upon any cold body, such as glass, &c. in windows, forms fog, and becomes visible. Air, likewise, by means of its dissolving power, accelerates evaporation and distillation.

2. Air volatilizes fixed bodies. Thus, sea-salt being first calcined, then fused by the fire, and when fused exposed to the air to liquefy; when liquified set to dry, and then fused again, repeating the operation; will by degrees be almost wholly evaporated, nothing but a little earth remaining. Helmont mentions it as an arcanum in chemistry, to render fixed salt of tartar volatile; but this is easily effected by air alone; for

if some of this salt be exposed to the air, in a place replete with acid vapours, the salt draws the acid to itself, and, when saturated with it, is volatile.

3. Air also fixes-volatile bodies. Thus, though spirit of nitre or aquafortis readily evaporate by the fire, yet if there be any putrefied urine near the place, the volatile spirit will be fixed, and fall down in form of aqua secunda.

4. Air brings many quiescent bodies into action; i. e. excites their latent powers. Thus, if an acid vapour be diffused through the air, all the bodies of which that is the proper menstruum, being dissolved by it, are brought into a state proper for action.

In the various operations of chemistry, air is a very necessary and important agent; the result of particular processes depending on its presence or absence, on its being open or inclosed. Thus, the parts of animals and vegetables can only be calcined in open air; in close vessels they never become any other than black coals. And these operations are affected by the changes to which the air is liable. Many instances might be adduced to this purpose. Let it suffice to observe, that it is very difficult to procure oil of sulphur, *per campum*, in a clear dry atmosphere; but in a thick moist air it may be obtained with greater ease, and in larger quantities. So pure well-fermented wine, if it be carried to a place where the air is replenished with the fumes of new wine then fermenting, will begin to ferment afresh.

The changes in the air arise from various causes, and are observable, not only in its mechanical properties, such as gravity, density, &c. but in the ingredients that compose it. Thus, at Fahlun in Sweden, noted for copper-mines, the mineral exhalations affect the air in such a manner as to discolour the silver coin in purses; and the same effluvia change the colour of brass. In Carniola, Campania, &c. where are mines of sulphur, the air sometimes becomes very unwholesome, which occasions frequent epidemic diseases, &c.

The effluvia of animals also have their effect in varying the air; as is evident in contagious diseases, plagues, murrains, and other mortalities, which are spread by an infected air.

For the vivifying principle of air, see the article *Blood*, (*Encycl.*)

Different kinds of Air. The late numerous discoveries and improvements relating to this subject have not been more interesting to philosophers, than useful to science and beneficial to society. Many perplexing processes in chemistry have been explained in consequence of those discoveries, several have been facilitated, and a number of new and useful ones have been introduced. The phenomena attending metallic calcinations and reductions have been greatly elucidated. The knowledge of the use of the air in respiration; the method of ascertaining its purity, and fitness for that function; the investigation of deplogified air; the method of impregnating water with fixed air; are all calculated to answer purposes of the highest utility. The medicinal properties of fixed air have been in a great measure ascertained, and its antiseptic qualities in other respects promise to be of considerable advantage. The method of ascertaining the purity of the air of a place, and the manner of ventilating an apartment, are of great use for those concerned in public

buildings. In short, there is perhaps no station in life where some knowledge of this subject may not be of use. Although, therefore, the different kinds of air have already been treated of at some length in various parts of this work, yet to render a subject so useful in itself, and so frequently agitated in conversation, more generally intelligible, a short recapitulation, with necessary additions, shall here be given.

1. *Fixed or Fixable Air*, or *Aerial Acid*, is perhaps the oldest permanently elastic fluid different from common air that has been known to mankind. Its pernicious qualities of suffocating animals and extinguishing flame indeed, are those by which it chiefly, if not entirely manifested itself for a long time, nor have its good properties been discovered till very lately. By the miners, who too frequently feel the fatal effects of it, this kind of air is called the *choke-damp*. It is found, however, not only in mines, but in various caverns, wells, and cellars, or other places which have not been ventilated for a long time; and it is also found in various mineral waters from whence it is continually escaping; so that at these springs there is generally a superincumbent body of fixed air of a considerable depth. It has often happened, that people who for the sake of heat having gone to sleep near brick-kilns, have been found dead; owing, no doubt, to the fixed air and other noxious vapours exhaling from the bricks during the time of burning. The grotto del Cani in Italy has long been famous for the stratum of fixed air which lies at the bottom of it, which suffocates small animals whose heads cannot reach above it, or even the largest if their heads are held down in it for a very short time. In some places where this kind of air is naturally produced, its generation continues only for a time, and then ceases. In others it is continual; but, in general, in all places where this air is found naturally, it is mixed with a considerable quantity of common air. Hence it sometimes extinguishes flame, where it is not fatal to animals; and frequently some other fluids, as inflammable and phlogificated air are mixed with it.

Fixed air is artificially produced in three different ways; viz. by fermentation, by heat, and by acids. When vegetable or animal-substances, especially the former, are fermented, they yield a great quantity of fixed air. In breweries, on the surface of the fermenting liquor, there is always a stratum of fixed air reaching as high as the edge of the vats; so that if these vessels are deep, and the fermenting liquor much below their edges, the above-mentioned stratum may be some feet in thickness. The same phenomenon is observable in the fermentation of wines in general; and it is owing to the production and elasticity of fixed air, that fermenting liquors, when put into close vessels, often burst them with great violence. The case is the same whatever substance it is that undergoes the vinous fermentation, though the quantity of fixed air produced is not the same in all substances, nor even in the same substance at different times. From 42 cubic inches of beer, Dr Hales obtained 639 cubic inches of air in 13 days. From a quantity of sugar undergoing the vinous fermentation, Mr Cavendish obtained 50 much fixed air, that out of 100 parts of the former, 57 appeared to have been volatilized and converted into fixed air.

But though a vast quantity of fixed air escapes du-

Air. ring this process of fermentation, a very considerable portion still remains united with the fermented liquor, and to this it owes all its brilliancy, and agreeable pungent acidulous taste; for when the fixed air is totally evaporated, the liquor becomes entirely vapid and flat. Hence also we are furnished with a method of restoring the brilliancy to these liquors after they have lost it in consequence of being exposed to the atmosphere, viz. by impregnating them again with fixed air, either naturally or artificially produced.

Dr Priestley has made several experiments in order to determine the quantity of fixed air contained in several sorts of wine. His method was to take a glass vial (fitted with a ground stopple and tube), capable of containing 1½ ounce measure. This he filled with wine, plunging it into a proper vessel of water. The whole was then put over the fire, and the water, into which the phial was plunged, suffered to boil. The end of the tube being placed under the mouth of an inverted receiver filled with quicksilver, the heat expelled the fixed air from the wine, which entering into the receiver ascended in bubbles through the quicksilver to the top, pushing out part of the metal and taking its place. The result of his experiments was as follows.

1½ oz. measure of	Madeira	contained of pure fixed air	} of an ounce measure.
	Port of six years old		
	Hock of five years		
	Barrelled claret		
	Tokay of 16 years		
	Champagne of two years		
	Bottled cyder of 12 years	3½ oz. measures.	
		3½ ditto.	

During the acetous fermentation also, liquors emit a vapour, great part of which is fixed air, though the nature of its other component parts has not yet been thoroughly ascertained.

Fixed air is likewise produced, though in no great quantity, by putrefaction. In this case, however, a great part of the elastic fluid consists of inflammable and phlogisticated air, and the fixed air itself seems to be intimately connected with a putrid offensive effluvia. "It seems (says Dr Priestley) to depend in some measure upon the time and other circumstances in the dissolution of animal or vegetable substances, whether they yield the proper putrid effluvia, or fixed, or inflammable air."

The elastic fluid produced by putrefying vegetables, when kept in a moderate degree of heat, is almost all fixed air; while that from animal substances contains several times more inflammable than fixed air. Vegetable substances yield almost all the permanently elastic fluid in a few days, but animal bodies continue to emit it for several weeks. When the elastic fluid yielded by animal substances is absorbed by water, and that water boiled, the fixed air may then be obtained without any mixture of the putrid effluvia. It is also to be observed, that the quantity of elastic fluid producible from animal substances is various according to the nature of the parts of the animal employed. Thus, the muscular parts will yield less elastic fluid, and also less mixed with any putrid or offensive effluvia, than a whole animal, or than the liver, &c. The proportion of inflammable and of fixed air is also various, according to the various parts employed.

In every combustion, except that of sulphur or of

metals, a quantity of fixed air is generated. This may be observed by fixing a lighted candle in an inverted receiver over a basin of lime water, for a precipitation of the lime will presently ensue; and the same precipitation (which is one of the characteristics of fixed air) will always ensue, whether a candle, a burning piece of wood, or, in short, any other combustible substance, except sulphur or metals, be made use of.

During this production or extrication of fixed from atmospheric air, the latter is always considerably diminished. If a piece of charcoal be burned by throwing the focus of a lens upon it when contained in a glass receiver inverted in water, after the apparatus is cooled, the water will have mounted a small way into the receiver. The diminution, however, is limited, and depends on several circumstances. Dr Hales has observed, that, in equal receivers, the air suffers a greater diminution by burning large candles than small ones; and likewise that, when equal candles are made use of, the diminution is greater in small than in large receivers. The cause of this phenomenon probably is, that the air contained in the receiver cannot all come into contact with the flame of the candle; whence, as soon as the air which is nearest the flame becomes contaminated, the candle is extinguished. Thus the author of a Concise Treatise on the Various Kinds of Permanently Elastic Fluids, has diminished the air of an inverted receiver one sixth part, by moving the candle whilst it burned through the different parts of the vessel, so that the flame was brought into contact with a greater quantity of the confined air than if it had remained in one situation till it became extinct. Dr Mayow observed, that by the burning of a candle the air was diminished of one thirtieth only; Dr Hales found it to be diminished of one twenty-sixth part; and Dr Priestley found it to be diminished of one fifteenth or sixteenth. Mr Cavendish observed, that air suffered a diminution of one-tenth of the whole quantity, by passing through an iron-tube filled with red-hot powder of charcoal. A candle, or any other combustible body, will cease to burn by itself, and consequently to contaminate a quantity of confined air much sooner, than when it is, in some manner, forced to burn by the external application of heat. "The focus of a burning mirror," says Dr Priestley, "thrown for a sufficient time either upon brimstone or wood, after it has ceased to burn of its own accord, and has become charcoal, will have a much greater effect of the same kind, diminishing the air to its utmost extent, and making it thoroughly noxious." The combustion of the phosphorus of urine diminishes air in a great degree. Mr Lavoisier has observed, that by the combustion of phosphorus, air may be diminished of about one-fifth or one-sixth. This accurate philosopher has also observed, that the acid of phosphorus thus formed, acquires the weight lost by the diminished air; finding that about three inches of air were absorbed by every one grain of phosphorus, when the experiment was tried with a receiver inverted in water, upon the surface of which a small quantity of oil had been introduced; but when the receiver was inverted in quicksilver, the absorption was constantly between two one-fourth and two three-fourth inches for each grain. Mr Cavallo mentions his having often repeated the experiment of burning phosphorus in a glass tube inverted in

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in water, by applying the closed part of the tube wherein the phosphorus was contained, to a pretty strong fire, when he always observed that the utmost diminution of the inclosed air effected by this means was full one-fifth.

Dr Hales remarked, that after the extinction of candles in a receiver, the air continued to diminish for several days after. This may be owing to the gradual absorption of part of it by the water; it having been remarked by Dr Priestley, "that this diminution of air by burning is not always immediately apparent, till the air has passed several times thro' water; and that when the experiment was made with vessels standing in silver instead of water, the diminution was generally inconsiderable till the air had passed through water."

In these experiments of burning combustible bodies in a quantity of air, and measuring the diminution, we should always remark two causes of mistake, viz. the absorption of air by the coaly residuum of the burned matter, which sometimes is very considerable, or by the fluid in which the receiver is inverted, and the production of elastic fluid from the burning substances; thus gunpowder generates a great quantity of elastic fluid when inflamed, &c.

Even the electric spark separates fixed air from common atmospheric air; for when a number of these sparks are taken in a small quantity of common air over lime-water, a diminution will take place, the lime will be precipitated, and if we put a blue vegetable juice instead of the lime-water, it will be turned red by the acidity of the fixed air deposited upon it. Dr Priestley having cemented a wire into one end of a glass tube, the diameter of which was about one tenth of an inch, and having fixed a brass ball to that extremity of the wire which was out of the tube, filled the lower part of it with the juice of turnsole or archil, so that a quantity of common air was contained in the tube between the extremity of the wire and the surface of the liquor. Then taking electric sparks between the said wire and liquor for about one minute, the upper part of the liquor began to look red, and in about two minutes it was manifestly so. The air, at the same time, was diminished in proportion as the liquor became red; but when the diminution arrived to be one-fifth of the quantity of the air contained, then a longer electrization produced no sensible effect. "To determine," says the doctor, "whether the cause of the change of colour was in the air or in the electric matter, I expanded the air which had been diminished in the tube by means of an air-pump, till it expelled all the liquor, and admitted fresh blue liquor in its place; but after that, electricity produced no sensible effect, either on the air or on the liquor; so that it was evident that the electric matter had decomposed the air, and had made it deposit something that was of an acid nature."

The calcination of metals, as we have already observed, phlogisticates, and consequently diminishes common air; but does not produce any fixed air, since the lime-water, over which the calcination is made, does not become turbid; and when metallic calxes are exposed to a sufficient strong heat, they in general yield some fixed air: so that it seems that the fixed air which is formed in the act of the calcination of metals is absorbed by the calx. Some fixed air may be obtained from red lead, by no greater degree of heat than that

of the flame of a candle applied to the phial that contains it.

Easy methods of obtaining Fixable Air for occasional Experiments, &c.

1. *By Fermentation.* Mix together equal parts of brown sugar and good yeast of beer, to which add about twice the bulk of water. This mixture being put into a phial, to which a bent tube with a cork may be adapted, will yield a considerable quantity of fixed air, which may be received into a vial filled with quick-silver or water, as in the following process.

2. *By Acids.* Let a glass tube, open at both ends, be bent, by means of a blow-pipe and the flame of a candle, nearly into the shape of an S, as it is represented by AB, and fix a cork D to one of its extremities, so as to fit the neck of a common vial, that may hold about four or five ounces measure. The hole through the cork may be made with an iron wire red-hot, and the tube may be fastened in it with a bit of soft wax, so as not to let any air go through. Fill a similar vial, or any glass receiver K, with water, and invert it after the manner shown above, in a basin HI, about half filled with water. Now put some chalk or marble, grossly powdered, into the bottle E, so as to fill about a fourth or fifth part of it, and upon it pour some water, just enough to cover the chalk; then add some oil of vitriol to it, which needs not be more than about the fourth or fifth part of the water. Immediately after, apply the cork D, with the tube AB, to the bottle, and putting it in the situation FG, let the extremity B of the tube pass through the water of the basin into the neck of the bottle K, which now must be kept up with the hand, or other convenient support, as it cannot rest upon the bottom of the basin. The mixture of chalk, &c. in the bottle FG, will immediately begin to effervesce, showing a frothing, and an intestine motion accompanied with heat, that may be felt by applying the hand to the outside of the bottle. The elastic fluid called *fixed air* is copiously emitted from this mixture, and passing through the bent tube, will go into the bottle K, as appears by the bubbles which come out of the tube, and passing through the water, ascend to the top of the inverted bottle. In proportion as the elastic fluid fills the bottle K, the water gradually descends, and at last is quite expelled from it; the bottle K then is filled with fixed air, and being corked under water, may be removed from the basin, and kept for use. Another bottle may then be filled with water, and may be inverted over the extremity of the bent tube in the place of K, which other bottle may be filled in a similar manner, and so on till the mixture in FG has finished to yield any fixed air.

If one of these bottles filled with fixed air be uncorked, and holding it with the mouth upwards, a lighted wax taper, bent like L, or a small piece of it affixed to the extremity of a wire, be immediately let down in it, the flame will be instantly extinguished. The same thing will happen if a lighted piece of wood is let down in it.

Take a clean bowl, and putting the mouth of a bottle, filled with fixed air, in it, uncork it, and keep it in that situation for about a minute. The fixed air being specifically heavier than common air, will come out of the bottle, and will remain at the bottom of the

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Plate
CCCXIII.
fig. 1c

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Show

Air. bowl, whilst common air enters into the bottle; which bottle may now be removed; and, in order to show the real existence of the fixed air, which will immediately show its being heavier than common air, put a lighted wax taper into the bowl, pretty near its bottom, which taper will be extinguished immediately. The air in this experiment must be agitated as little as it is possible. That the flame of the wax taper was really extinguished by the fixed air, may be easily proved in the following manner:—Blow once or twice into the bowl, by which means the fixed air will be expelled from it; and then, on letting down a lighted wax-taper in it as before, it will be found that it is no longer extinguished, but will burn very well, the bowl being now filled with common air. This experiment never fails of surprising the spectators, as it clearly exhibits two remarkable properties of a fluid, which they can neither see nor distinguish by the feeling.

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When the bottle K is about half filled with fixed air, put a mark with a bit of soft wax on the outside of it, just coinciding with the level of the water in it, and immediately after shake the bottle; but taking care that its mouth be not lifted above the surface of the water in the basin. After having shaken it for about a minute, on intermitting the agitation, it will be found that the water is above the mark; which shows that some of the fixed air has been absorbed by it. Let this absorption be carried on as far as possible, by agitating the bottle repeatedly, and allowing time to let more fixed air be produced and enter into the bottle in proportion as the water absorbs it. Then apply the hand, or a finger, to the mouth of the bottle whilst under water; bring the bottle out, and turn it with the mouth upwards. The water then will be found to have acquired a pleasant acidulous taste. The water thus impregnated with fixed air changes the blue infusion of some vegetable substances into red; so that if a weak solution of heliotrope is mixed with it, or indeed if it is simply exposed to fixed air, the liquor acquires a reddish appearance. It also corrodes iron, and some other metals, much more easily than common water. But the greatest and most useful property of this acidulated water, or water impregnated with fixed air, is its being a powerful antiseptic. As the most used mineral waters are medicinal principally on account of their being impregnated with fixed air, besides which they generally contain some small portion of metal or salt dissolved; they may be imitated by impregnating water with fixed air, and then adding that quantity of salt or of metal, that by analysis the original mineral waters are found to contain.

It is for its great property of hindering putrefaction, that fixed air by itself, or incorporated with various fluids, especially with water; and that vegetables, fugar, and other substances which abound with fixed air, are very powerful remedies in putrid diseases*. Sir John Pringle supposes, with great probability, that the frequent use of sugar and fresh vegetables, which at this time make up a considerable part of the diet of the European nations, prevents those putrid diseases and plagues which formerly were rather frequent.—Dr Macbride, showing experimentally that fixed air is discharged by such substances as form our common food, ascribes the preservation of the body from putrefaction in great measure to the fixed air,

which in the ordinary process of digestion is disengaged from the aliment, and incorporates with the fluids of the body.

From the same property it may be also usefully applied to several economical purposes. Mr Henry found, that fixed air can preserve fruit incorrupt for a considerable time. He tried a bunch of Italian grapes, which being suspended in the middle part of Dr Nouth's apparatus, and being supplied with plentiful streams of fixed air every day, was preserved without any signs of decay for about one month longer than a similar bunch suspended in a decanter containing common air. Strawberries and cherries he also found to be preserved without decay some days longer in fixed than in common air. Indeed, fixed air preserves not only fruit, but resists putrefaction in general. Dr Macbride, in his elegant Essays on Medical and Philosophical Subjects, has published various experiments which demonstrate this property of fixed air. He found, that not only good meat was preserved incorrupt for a considerable time, when exposed to fixed air; but that the putrefaction of substances actually putrid was impeded by this means, and even that those substances were restored from the putrescent to a sound state. That putrefaction was checked by fermentation, was discovered by Sir John Pringle; and Dr Macbride observed, that this effect was owing to the fixed air produced in the act of fermentation. But it must be observed, that when the found, or even putrid substances, expose a very great surface to the fixed air, as is the case with milk, bile, and other fluids impregnated with fixed air, and also with small bits of meat, then they are preserved for a considerable time; but large pieces of solid animal substances, as for instance roundish pieces of flesh of about half a pound weight, do not seem to remain incorrupt much longer in fixed than in common air; at least the difference is inconsiderable. Sir William Lee, baronet, in two of his letters to Dr Priestley, informs him of his having found, that flesh-meat, even in the hot season, could be preserved wholesome for several days, by only washing it two or three times a-day in water impregnated with fixed air. "We have been enabled," says he, "to preserve meat as perfectly sweet and good to the extent of ten days, as at the first killing; and there seems no doubt it might be preserved much longer." He has even recovered some meat that had begun to change. This useful discovery, Sir William justly observes, may be very beneficial to the public, especially to butchers. "Particularly a butcher," says he, "who deals pretty largely, assures me, he found the greatest success from it, and only objects that the veal was a little discoloured, though kept perfectly sweet."

11. *Inflammable Air* is produced, like fixed air, both naturally and artificially. It is yielded abundantly by putrid animal and vegetable substances, and in general by those inflammable bodies which part easily with their phlogiston. Hence, in caverns and mines, especially in coal-mines, this fluid is often found. Sometimes, when the miners break a piece of the mineral, thereby probably disclosing some hidden cavity, the inflammable air rushes out in great quantity. Being specifically lighter than common air, it always ascends, and escapes through fissures, except in those places

* See Medicine, n^o 498.

ir. which are closely vaulted. Being generally mixed with a considerable quantity of common air, it is less noxious than fixed air; so that the miners breathe it with impunity; though, by reason of its inflammable property, it often produces terrible explosions; from whence the miners have called it the *fire-damp*.

Inflammable air is often produced in ditches, exhaling from the surface of putrid water; in burying-places and houses of office, where putrefying animal or vegetable matters are collected. It may also be extracted from the waters of moat lakes and rivers where, in great quantities of fermentable and putrefying matters are thrown, as in the Thames, Severn, &c. In warm climates this kind of air is produced in much greater quantities, as the processes of fermentation and putrefaction there go on much more rapidly than in colder countries. So rapid is the production of this kind of air indeed in hot climates, that if the mud at the bottom of a pond is well stirred, and a lighted candle immediately afterwards brought near to the surface of the water, the inflammable air will take fire, and a flame instantly spread over the surface of the pond, affording a very curious spectacle in the night-time. Inflammable and fixed air, as also phlogisticated air, are discharged by our aliments in the natural course of digestion, and afterwards discharged from the intestines.

There is scarce any substance from which, by one process or other, inflammable air may not be obtained. But to the inflammable elastic fluids thus obtained, perhaps no other properties in common can be ascribed than those of being inflammable, and being specifically lighter than common air. In other respects they show a material difference between each other, both in weight, smell, power of burning, of preserving their properties, and the phenomena attending their combustion. Hence various species of this fluid might be enumerated. As yet, however, there have not been a sufficient number of observations to enable us to make these distinctions properly. We shall therefore only remark the difference between a real inflammable gas, and that which is evidently formed by mixing a volatile inflammable fluid with the common atmosphere. A drop of ether put into a quantity of common air, diffuses itself by evaporation through the whole, taking fire at the approach of a candle like true inflammable air. In like manner Mr Cigna observes, that air saturated with volatile alkali is inflammable; and Dr Priestley has found, that alkaline air is itself weakly inflammable.

To produce Inflammable Air.

The process for making this sort of gas is the same as that for making fixed air: one of the materials only must be different, viz. iron filings, or grossly powdered zinc, must be used instead of chalk; to which filings some oil of vitriol and water must be added, in the same proportion as in the fixed air, or rather a little more of oil of vitriol.

N. B. Instead of the filings of iron, small nails, or small bits of iron-wire, answer equally well.

The inflammable elastic fluid produced by this mixture, has a displeasing smell, even when mixed with a very large quantity of common air; so that if any considerable quantity of it comes out of the bottle, before the cork with the bent tube be applied to it, &c.

its smell may be perceived all over the room in which the experiment is made; but this smell is not particularly offensive.

When a bottle has been filled with this elastic fluid, stop the mouth of it with your thumb, or any stopper, and taking it out of the basin, bring it near the flame of a candle; and when the mouth of the bottle is very near it, remove the stopper, and the elastic fluid contained in the bottle will be immediately inflamed; and if the capacity of the bottle is nearly equal to four ounces measure, it will continue burning quietly for about half a minute, the flame gradually descending lower and lower, as far as about the middle of the bottle, in proportion as the inflammable gas is consumed.

In this experiment we see, that inflammable air follows the general rule of all other combustible substances, namely, that of burning only when in contact with common air: thus the flame of this gas, whilst burning, is observable only on that surface of it which is contiguous to the common air; so that if the bottle be closed, the flame is put out immediately, because the air is intercepted from it. But if the inflammable air were put in such a situation as to expose a very great surface to the common air, it is plain, that by this means its combustion would be accelerated, so as to let it burn instantly, and go off with an explosion, caused by the sudden rarefaction of the air. In fact, this effect may be easily observed in the following manner: When the bottle is to be inverted into the basin, in order to let it be filled with the inflammable gas, instead of filling it entirely with water, let half of it remain filled with common air; then invert it, and let the other half, which now is filled with water, be filled with inflammable air after the usual manner; and when the bottle is full, remove it in the manner shown above, and approach it to the flame of the candle, by which means the inflammable air takes fire; but now it explodes all at once with a large flame and a considerable report, sometimes breaking the bottle in which it is contained. In this case, the bottle being filled with equal parts of inflammable and common air, these two elastic fluids were mixed together, so that almost every particle of the one touched every particle of the other, and hence the sudden combustion was occasioned. The force of this explosion is so very considerable, that some pistols have been contrived, which are charged with a mixture of air and inflammable gas, and being fired by means of an electric spark, are capable to drive a leaden bullet with great violence. Sometimes those pistols are made of glass (but in this case they are not charged with a bullet), and it is very diverting to show, that pistols are charged and explode by the combustion of an invisible substance.

When a slender pipe is tied to the neck of a bladder, and the bladder is filled with inflammable air, after the manner described in the preceding experiment (viz. when the bladder was required to be filled with fixed air), two very pleasing experiments may be performed with it. First, the inflammable gas may be inflamed by applying the flame of the candle to the extremity of the pipe; and squeezing at the same time the bladder, a stream of fire will be formed in the air, which will last as long as the bladder contains any inflammable air; for this gas coming out of the pipe with violence, will continue inflamed for a considerable

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way in the air. Secondly, the extremity of the pipe may be dipped into a solution of soap, then removing it from the solution, and squeezing the bladder very gently, a ball of soap-water may be formed, including inflammable air: which ball, on account of the inflammable gas being much lighter than common air, as soon as it is detached from the pipe will ascend upwards, and will break by dashing against the ceiling, contrary to those commonly made by children, which in still air go downwards.—Whilst the ball is ascending, if the flame of the candle be approached to it, the film of soap-water will be instantly broke, and the inflammable air will take fire; thus a flame may be shown to be seemingly produced from a soap-ball.

In flagrant waters where inflammable air is naturally produced, it may, especially in the hot months, be caught in great plenty in the following manner. Fill a wide-mouthed bottle with the water of the pond, and keep it inverted therein; then with a stick stir the mud at the bottom of the pond, just under the inverted bottle, so as to let the bubbles of air which come out of it enter into the bottle: which air is inflammable. When by thus stirring the mud in various places, and catching the air in the bottle until this is filled, a cork or glass-stopper must be put over it whilst standing in water, and then the bottle may be taken home, in order to examine the contained inflammable fluid at leisure.

Heat alone is capable to extract a good deal of inflammable air out of most inflammable substances, even from some of the metals. Dr Hales obtained inflammable air by simply distilling wax, pitch, pease, amber, coals, and oyster-shells. Mr Fontana says he extracted a considerable quantity of inflammable air from spathose iron, by the action of fire only, applied to a matras. But Dr Priestley has obtained it from a vast many more substances. His method is, to introduce the required substance into a gun-barrel, to the extremity of which a tube of glass, or of a tobacco-pipe, was luted, and a flaccid bladder was tied to the end of this tube, which received the elastic fluid produced, when the gun-barrel was put into the fire. The Doctor observes, that in order to get a considerable quantity of inflammable air from various substances, the heat must be applied suddenly. "For," says he, "notwithstanding the same care be taken in luting, and in every other respect, six or even ten times more air may be got by a sudden heat than by a slow one, though the heat that is last applied be as intense as that which was applied suddenly. A bit of dry oak, weighing about twelve grains, will generally yield about a sheep's bladder full of inflammable air with a brisk heat, when it will only give about two or three ounce measures, if the same heat be applied to it very gradually. To what this difference is owing, I cannot tell. Perhaps the phlogiston, being extricated more slowly, may not be entirely expelled, but form another kind of union with its base." When the Doctor wanted to extract inflammable air from metals by means of heat only, he directed the focus of a lens upon them, whilst they were under the exhausted receiver of the air-pump, or were confined by quicksilver.

From pure filings of iron, and of steel carefully fortified with a magnet, and confined by quicksilver in an

inverted glass jar, Dr Priestley, by means of the focus of a lens, obtained some permanently elastic fluid, which, as he observes, was weakly inflammable. In forcing the steel-filings for this experiment, the Doctor observes, that care must be taken not to let any other substance be mixed with them, since the least bit of wood, or any vegetable or animal matter, hardly discernible by the eye, will yield more inflammable air than a considerable quantity of iron-filings. "I found (says he) at this time, that eleven grains of steel-filings, from watch-springs, yielded $\frac{1}{4}$ more inflammable air, than the same weight of iron-filings; which agrees with the hypothesis that steel contains more phlogiston than iron."

By directing the focus of the lens upon filings of zinc or upon brass-dust *in vacuo*, the Doctor obtained an elastic fluid that was strongly inflammable. But from tin he obtained an elastic fluid that was weakly inflammable. With other metallic substances, or with the calx of any metal whatever, the Doctor had no success.

From a mixture of iron-filings and chalk, the Doctor obtained, by means of the lens, a plentiful mixture of fixed and inflammable air, as might be naturally expected.

The elastic fluid expelled from charcoal by heat only, is fixed air; but the residuum of it Dr Priestley found to be inflammable. Mr Fontana had a very elegant way to extract inflammable air from red-hot charcoal. With a pair of tongs he took a piece of charcoal, when thoroughly ignited, and plunging it in water, brought it instantly under a large-mouthed receiver, which was filled with and inverted in the water, in order to collect the bubbles of inflammable air that proceeded from the charcoal in the act of cooling. After the same manner he treated several pieces of charcoal, or the same piece several successive times, until he got a quantity of inflammable air sufficient for his purpose.

By means of heat in a gun-barrel, Dr Priestley obtained from pipe-clay, first inflammable, and then fixed air. But a quantity of inflammable air is obtained, together with fixed air, in various cases, as we have already remarked.

Pit-coal, by distillation, yields inflammable air, which, when fired in a wide-mouthed phial, burns with a bright lambent flame, without explosion.

By exposing to heat, in a gun-barrel, a mixture of calx of zinc and charcoal, or Prussian blue, Mr de Lussane obtained an inflammable air, which burned without explosion.

Dr Priestley found, that when iron-filings and brimstone, moistened with water, were confined by quicksilver, and suffered to ferment in a warm place, some inflammable air was generated. Filings of zinc and brimstone produced the same effect.

By taking electric sparks in any kind of oil, spirit of wine, ether, or spirit of sal ammoniac, Dr Priestley obtained inflammable air. The oil, or other liquor, was confined in a glass tube by quicksilver, and a wire was cemented in the upper part of the tube, through which the sparks being sent, went to the quicksilver through the oil; but after that a few sparks had been taken, a quantity of inflammable air was generated, &c. Left the production of inflammable

Air. air should be attributed to the cement which fastened the wire, the Doctor repeated the experiment with ether in a glass syphon; but the inflammable air was generated as before. This elastic fluid does not lose its inflammability by being passed several times from one vessel into another through water.

Alkaline air, by taking electric explosions in it, is changed into inflammable air.

By means of acids, inflammable air is obtained in greater abundance, and more readily. Iron, zinc, or tin, yield plenty of inflammable air when acted on by diluted vitriolic or marine acids.

If iron is put into strong vitriolic acid, the quantity of elastic fluid that is produced is very little, except heat be applied to the phial, for then the production of elastic fluid is more copious; but this elastic fluid is vitriolic acid air, mixed with a small portion of inflammable air, the proportional quantity of it being less when the acid is more concentrated.

Zinc, treated after the same manner, produces the like effects, except that it gives more elastic fluid, without the application of heat, than iron does; and the greatest part of the produced elastic fluid is inflammable.

In order to obtain the greatest quantity of inflammable air from iron or zinc, the vitriolic acid must be diluted with much water, as about one part of strong oil of vitriol to five or six parts of water. Dr Priestley found, that eleven grains of iron yielded $8\frac{1}{2}$ ounces measures of inflammable air. According to Mr Cavendish, one ounce of zinc, dissolved either in the vitriolic or marine acid, yields a quantity of inflammable air equal to the bulk of 356 ounces of water; one ounce of iron, dissolved by means of vitriolic acid, yields a quantity of inflammable air equal to the bulk of 412 ounces of water; and one ounce of tin yields half as much inflammable air as iron does.

The solutions of iron, tin, copper, lead, and zinc, in the marine acid, produce marine-acid air, and inflammable air, but in various quantities. The proportion of the former to the latter is as one to eight in iron, as one to six in tin, as three to one in copper and lead, and as one to ten in zinc. *Regulus of antimony*, dissolved in marine acid, with the application of heat, yields a small quantity of elastic fluid, which is weakly inflammable.

Dr Priestley obtained inflammable air, not only by dissolving various substances in marine acid, but also by exposing divers bodies to marine-acid air, which is probably the purest part of the marine acid. Having admitted iron filings to this acid air, they were dissolved by it pretty fast; half of the elastic fluid disappeared, and the rest was rendered unabsorbable by water, and inflammable. The same effect was produced by almost every substance which contains phlogiston, as by spirit of wine, oil of olives, spirit of turpentine, charcoal, phosphorus, bees-wax, sulphur, dry corkwood, pieces of oak, ivory, pieces of roasted beef, and even some pieces of a whitish kind of flint.

A greater or smaller portion of the acid air was absorbed, and the rest sometimes was all inflammable, and often was partly acid air, which was soon absorbed on the admission of water, and partly inflammable. In short, it seems as if this acid air, having a great affinity with phlogiston, separates it from all those substances which contain it even in small quan-

tity, and from that combination becomes inflammable.

By means of nitrous acid, inflammable air may be obtained from various substances containing phlogiston; but it is always mixed with nitrous air, and sometimes also with fixed and common or phlogisticated air. If two parts of spirit of wine, mixed with one part of nitrous acid, are put into a phial with a ground-Stopple and tube, and the flame of a candle be applied to it, so as to heat it gradually, the inflammable air will be produced very readily; the inflammability of which is, however, not very permanent, for by a little washing in water it may be annihilated. In the solution of most substances in nitrous acid, it generally happens, that the elastic fluid, which is obtained towards the latter end of the process, possesses the property of being inflammable; thus iron, dissolved in nitrous acid, yields nitrous air; but when the nitrous air ceases to be produced, if the heat of a candle be applied to the solution, more elastic fluid will be produced which is inflammable. "The nitrous acid (says Dr Ingenhoufz) when mixed with iron-filings in a very diluted state, gives, by the assistance of a moderate degree of heat, a mixture of different airs, partly fixed, partly common air, and partly phlogisticated air."

III. Nitrous Air. This is a permanently elastic fluid, which is never found naturally, like fixed or inflammable air, but is entirely artificial.

This elastic fluid consists principally of nitrous acid and phlogiston; so that it cannot be produced but from that acid, or, which is the same thing, from substances containing the nitrous acid and phlogiston; thus, when the nitrous acid is mixed with metals, or with animal or vegetable substances which contain phlogiston, nitrous air is generally produced; but very little or none of this sort of elastic fluid is yielded when the nitrous acid is mixed with metallic calxes, with pure ashes of vegetable substances, or, in short, with any substance which contains little or nothing of phlogiston. In this case, if the mixture is exposed to a sufficiently strong degree of heat, the nitrous acid is decomposed, and phlogisticated air is produced; though, in some period of the process, a little nitrous air is generally produced, which is owing to the small quantity of phlogiston which exists in most, if not in all metallic calxes, &c.

The variety of elastic fluids obtainable when nitrous acid is employed, may be deduced from observing, that the nitrous acid itself, by being decomposed, may generate dephlogisticated air; that, by joining with the phlogiston of the substance with which it is mixed, may generate nitrous air; that, by the mixture of those two elastic fluids, another elastic fluid, namely, phlogisticated air, may be formed; and that, by its acting as an acid, it may expel one or more other elastic fluids from those substances with which it is mixed.

All metallic substances, when mixed with the nitrous acid, yield nitrous air. Indeed gold, platina, and regulus of antimony, as they are not dissoluble in simple nitrous acid, must be dissolved in aqua regia, in order to obtain nitrous air from them. Although all metallic substances, by means of the nitrous acid, may be made to yield nitrous air; yet they do not produce it in equal quantities, with equal facility, and of equal goodness. The following are the more remarkable particulars relating to this matter:

Either silver, copper, brass, iron, mercury, bismuth,

or nickel, when mixed with nitrous acid, yield nitrous air in great quantities. Some of them, especially mercury, require the aid of heat in order to produce the elastic fluid; the flame of a candle applied to the phial is sufficient; but others, especially copper and iron, do not want the application of any heat. Gold, platinum, and the regulus of antimony, when put in aqua regia, yield nitrous air pretty readily. Among the metals, lead yields nitrous air in the smallest quantity. "I poured (says Dr Priestley) smoking spirit of nitre into a phial with a ground-stopper and tube, containing $1\frac{1}{2}$ ounce measures filled with small leaden shot, so as to leave no common air at all, either in the phial or in the tube; and I placed it so as to receive the air that might come from it in water.

"After waiting an hour, in which little or no air was produced, I applied the flame of a candle, though not very near, to it; and in these circumstances I got about an ounce measure of air: but upon some water rushing into the phial while the candle was withdrawn, air was produced very plentifully. I collected in all about a quarter of a pint; and might probably have got much more, but that the salt formed by the solution of the lead had so nearly closed up the tube, that I thought proper to discontinue the process. The air, both of the first and of the last produce, was of the same quantity; and so far nitrous, that two measures of common air, and one of this, occupied the space of two measures only; excepting that the very first and very last produce, mixed with common air, took up a little more room than that which I got in the middle of the process. When the air was produced very fast, it was exceedingly turbid, as if it had been filled with a white powder."

Among the semi-metals, zinc gives the weakest nitrous air, when dissolved in nitrous acid. The elastic fluid produced from it is mostly phlogisticated air. From 4 pennyweights and 17 grains of zinc, dissolved in spirit of nitre diluted with an equal quantity of water, Dr Priestley obtained about 12 ounce measures of very weak nitrous air. It occasioned a very slight effervescence when mixed with common air (c). The Doctor obtained nitrous air even from some flowers of zinc. "Having (says he) mixed a quantity of blue spirit of nitre with flowers of zinc, which were of a dull colour, and appeared from several experiments to contain a portion of phlogiston, it yielded, with the heat of a candle applied to the phial which contained it, strong nitrous air; when the common spirit of nitre, applied in the same manner, gave only phlogisticated air; the phlogiston of which came probably from the calx itself, though a small portion of it might have been in the nitrous acid, which I believe is never entirely free from it.

"This experiment also seems to prove, that an earth is the basis of nitrous air; for the same blue spirit of nitre, which gave nitrous air with these flowers of zinc, yielded no air at all when it was treated in the same manner without them."

The quantity of nitrous air that may be obtained from various metals, is difficult to be ascertained, on account of the diversity occasioned by the strength of the acid, the various nature of the metallic substance, and the method of performing the experiments. The following is a table of the produces of nitrous air from various metals, extracted from Dr Priestley's first vo-

lume of Experiments and Observations; but which, as the author himself intimates, is far from being very accurate.

dwts.	grs.		
6	0	of silver yielded	$17\frac{1}{2}$ ounce measures.
5	19	of quicksilver,	$4\frac{1}{2}$
1	$2\frac{1}{2}$	of copper,	$14\frac{1}{2}$
2	0	of brals,	21
0	20	of iron,	
1	5	of bismuth,	6
0	12	of nickel,	4

The various strength of the nitrous acid produces great diversity in the production of nitrous air. Thus, if copper is dissolved in strong nitrous acid, it will not produce the least quantity of nitrous air; but when dissolved in diluted nitrous acid, it produces a great quantity of that elastic fluid. The strong and pale-coloured nitrous acid should be diluted with at least two or three parts of water to one of the acid, for the easy production of nitrous air from copper and mercury.

The briskness of the effervescence, and the production of nitrous air, are promoted by heat, and also by letting the metallic substance present a great quantity of surface to the acids.

For the generality of experiments, no other degree of heat is required than that produced by the effervescence itself, except mercury be used, which requires the application of some heat. When the metal exhibits a very great surface to the acid, as is the case when filings are used, the effervescence and production of nitrous air are often much quicker than can be conveniently managed.

Copper or brals, when clipped into flat bits, each about two or three grains in weight, and about a quarter of a square inch in surface, and when dissolved in nitrous acid properly diluted, yield nitrous air very equally; but if iron be used, the pieces of it should be larger and fewer; in short, it should present a much less surface to the diluted acid; otherwise the increase of heat in the process, and the rapid production of elastic fluid, render the operation both difficult and dangerous for the operator.

As the nitrous air is mostly necessary to try the goodness of respirable air †, it is of great consequence to make it always of one constant degree of goodness; but this object is answered by dissolving substances of a very homologous nature in the nitrous acid; therefore it is plain, that the metals whose nature is more uniform, must be preferred for this purpose. Accordingly, brals yields nitrous air of a more uniform nature than iron: copper is superior to brals; but pure mercury is still superior to copper: and indeed this is the metal which, considering its nature, uniformity of substance, and easy solution, is upon the whole the most useful for this purpose.

It has been generally observed, that solid vegetable substances, when dissolved in nitrous acid, yield more nitrous air than the animal substances, though this nitrous air is not so pure as that obtained from metals.

Sometimes it contains some fixed air, and a good deal of inflammable air, which is mostly produced towards the end of the process. On the other hand, the nitrous air extracted from animal-substances generally contains a good deal of phlogisticated air, and sometimes some fixed air. In order to obtain nitrous air

from

(c) Mr de Laffone says, that zinc, when dissolved in nitrous acid, yields fixed and not nitrous air.

† See Experiment 1010.

Air. from the solution of animal and vegetable substances in nitrous acid, often some degree of heat must be applied to the phial. The acid also sometimes must be very concentrated, and in other cases it must be diluted; but it is hardly worth while, or practicable, to determine with exactness all those particular cases.

To make Nitrous Air.—The metal, viz. copper, brass, or mercury, is first put into the bottle, (which, as well as the whole process, is the same as that described for *fixed Air*), so as to fill about one-third of the same; then some water is poured into the bottle, so as just to cover the metal-fillings; and lastly, the nitrous acid is added, the quantity of which, when strong, should be about one-third or half the quantity of the water. The smell of the nitrous gas is very penetrating and offensive, and occasions a red smoke as soon as it comes into contact with the common air; hence, whenever any of it escapes from the bottle, it may be observed not only by the smell, but also by the slight red colour.

In order to observe the principal property of this elastic fluid, which is that of diminishing the bulk of common air, let a glass tube, closed at one end, and about nine inches long, and half or three quarters of an inch in diameter, be filled with water, and inverted in water; then take a small vial, of about half an ounce measure, filled with common air, and plunging it under the water contained in the same basin where the inverted tube is kept, let that quantity of air enter into the tube, which will go to the top of it, the water subsiding accordingly. Let a mark be made, either with a file or by sticking soft wax on the tube, just opposite to the surface of the water in it, which will mark how much of the tube is filled by that given measure of air. After the same manner, fill the same small vial (which we shall call the *measures*) again with air; throw that air into the tube, and put a mark on the tube coinciding with the level of the water in it. In this manner let four or five measures be marked on the tube. Now, if three measures of common air are put into this tube, when filled with water and inverted, they will fill a space of it as far as the third mark. The same thing will happen if three measures of nitrous instead of common air are put in it; but if two measures of common air and one measure of nitrous air, or one measure of the former and two of the latter, are introduced in it, they will fill a space much shorter than the third mark. On the moment that these two kinds of elastic fluids come into contact, a reddish appearance is perceived, which soon vanishes, and the water, which at first nearly reaches the third mark, rises gradually into the tube, and becomes nearly stationary after about two or three minutes; which shows that the diminution is effected gradually. See *Eudiometer*, and *Air*, n° 39. (*Encycl.*)

IV. *Dephlogisticated Air*. This is no other than exceedingly pure atmospheric air, entirely free from those heterogeneous vapours which contaminate the air we commonly breathe. The easiest method of procuring some of this air is to put some red-lead into the

bottle, together with some good strong oil of vitriol, but without any water. Let the red-lead fill about a quarter of the bottle, and the vitriolic acid be about the same quantity, or very little less; then apply the bent tube to the bottle, and proceed in the same manner as above. But it must be remarked, that without heat this mixture of red-lead and vitriolic acid will not give any dephlogisticated air, or it yields an inconsiderable quantity of it; for which reason the flame of a candle (that of a wax-taper is sufficient) must be applied under the bottom of the bottle; which for this purpose must be rather thin, otherwise it will be easily cracked (D). In this manner the red-lead will yield a good quantity of elastic fluid, the greatest part of which is dephlogisticated air; but not the whole quantity of it, for a good portion of fixed air comes out with it. In order to separate the fixed from the dephlogisticated air, the inverted bottle, when filled with the compound of both, as it is emitted from the red-lead, must be shook in the basin, for impregnating water with fixed air; by which means the water will absorb the whole quantity of fixed air, and leave the dephlogisticated air by itself.

From the first experiments by which this kind of air was produced, Dr Priestley concluded, that the nitrous acid and earth were essential ingredients in its composition †. This theory, however, seems to be † See *Air*, (*Encycl.*)
n° 44.
overthrown by subsequent experiments, where the purest dephlogisticated air was produced from substances in which no nitrous acid could be supposed to exist. The abbe Fontana having rendered some red precipitate very dry by keeping it in a small degree of heat for several hours, weighed 192 grains of it, and introduced this quantity into a glass vessel proper for expelling the air from it. Applying, then, a sufficient degree of heat under it, he received the air into a glass-jar filled with quicksilver, and inverted into a vessel of the same. Thus he procured $26\frac{1}{2}$ cubic inches of very pure dephlogisticated air, the mercury being at the same time revived, and losing 13½ grains of its weight, which is nearly the whole weight of the air emitted by it. By a similar process, red-lead also emits a very pure kind of air; and it is remarkable, that red-lead which has been kept for a long time, yields more dephlogisticated air than such as is new; the reason of which Mr Cavallo supposes to be, that red-lead, when newly made, is not such a pure calx as after it has been kept for some time. From sedative salt also, from manganese, lapis calaminaris, and all the vitriols, pure dephlogisticated air has been obtained; nor was it produced from the native vitriols, which might perhaps have been suspected to contain some nitre; but from iron, copper, and zinc, dissolved directly in pure vitriolic acid. Mercury dissolved in the vitriolic acid, distilled to drincks, and the residuum urged with a strong heat, yields first a quantity of vitriolic acid air mixed with fixed air, and then dephlogisticated air. “It is remarkable (says Dr Priestley) that, either by means of oil of vitriol or spirit of nitre, mercury yields a very great quantity of dephlogisticated
45 K 2 air;

(D) In this operation the flame of the candle, when once applied, must be kept continually near it; and when the mixture does not produce any more elastic fluid, or the operation is required to be intermitted, care should be taken to remove the extremity of the bent tube from the water first, and then to take off the flame of the candle from under the bottle; otherwise, if the flame of the candle be first removed, the materials within the bottle condensing by cold, the water immediately enters, which in an instant fills the bottle, and generally breaks it.

air; but with this difference, that in the process with spirit of nitre, almost the whole of it (that is, if the process is conducted with care, with the loss of not more than the 20th part of the mercury) is revived, and therefore may be used again and again; whereas in the process with the oil of vitriol, almost all the mercury is lost." By mixing the same acid with manganese also, dephlogisticated air was obtained. Mr Cavallo mentions one instance where dephlogisticated air was produced by means of the muriatic acid; but in this he seems to have mistaken Dr Priestley, whose authority he quotes. Minium, as already mentioned, yields a quantity of dephlogisticated air by heat, without any addition; and it seems to have been only this air which was set loose by the acid, and not any original production. His words are: "Spirit of salt, I have observed, dissolves a great quantity of minium. In order to discover what became of the air it contains, I distilled a quantity of that solution, which was of a yellow colour, made by the first affusion of the acid. When the solution became hot, it yielded a quantity of fixed air, so as to make lime-water turbid only in the slightest degree. As it boiled, no air at all was procured, nor when it was distilled to drinels. I treated in the same manner a saturated solution of white minium, made so by its colour having been discharged by a previous affusion of the acid. But this solution yielded no air at all from the beginning to the end of the process; nor was the common air in the retort phlogisticated either at the beginning or end."

From every experiment it appears, that dephlogisticated air, if it could be readily obtained, and at a cheap rate, would be a most valuable manufacture. The heat communicated by means of it to burning fuel is incredible. When a lighted candle is introduced into a phial containing dephlogisticated air, its flame not only grows larger, but becomes exceedingly bright. When the dephlogisticated air is very pure, the candle burns with a crackling noise as if the air contained some combustible matter, and wastes the wax or tallow surprisingly fast: the heat of the flame is also very intense. But the best method of observing its intensity is the following: Fill a bladder with dephlogisticated air, then fasten a glass tube to the mouth of the bladder: the outward aperture of this tube must be drawn to a fine point like that of an ordinary blow-pipe; then holding the extremity of the tube near the flame of a large candle or of a lamp, press the bladder so as to force the dephlogisticated air out through the small aperture of the tube, which will drive the flame of the candle into an horizontal direction, augmenting its force prodigiously; so that if small bits of any metal, held upon a piece of charcoal, or upon a piece of broken crucible, are presented to the apex of that flame, they will be presently melted. Even grains of platina may be melted by these means. The heat of other fuel is equally increased by blowing dephlogisticated air into it. "I put (says Dr Priestley) a quantity of Mr Bewley's pyrophorus into one of the small jars which I use for experiments on air in quicksilver, I inverted it in a basin of the same, and threw up dephlogisticated air at different times. It always occasioned a sudden and vehement accession, like the flashing of gunpowder; and the air was greatly diminished, as might have been foreseen." When mixed with in-

flammable air, and the mixture is brought near any flaming substance, or when an electric spark is sent through it, a great explosion ensues. If an ounce glass vial, which for this experiment should be very strong, be filled with a little more than one-third dephlogisticated, and the rest inflammable air, when the flame of a candle is presented to its mouth, it will explode nearly as loud as a small pistol.

It is not, however, only the advantages which might result from such an increase of heat that are expected from dephlogisticated air. It has been found by experience, that animals will live much longer in this kind of air than in an equal quantity of common air; whence it is supposed, that the breathing of it must be much more healthy, and contribute to longevity much more than the common atmosphere. Nay, there are not wanting some who attribute the longevity of the Antediluvians to the great purity of the atmosphere at that time; the whole mals being afterwards tainted by the deluge, in such a manner that it could never regain its former purity and salubrity. But all this as yet is mere conjecture; and excepting the single fact, that animals live much longer in a quantity of dephlogisticated than of common air, there is no evidence that the former contributes more to longevity than the latter. Dr Priestley even throws out a conjecture, that the use of dephlogisticated air might perhaps wear out the system much sooner than common air, in the same manner as it consumes fuel much faster than common air. The great quantity, however, even of the purest air, which is requisite to support animal life, and the expence and trouble of the most ready methods of procuring it, have hitherto prevented any fair trial from being made. Yet philosophers, considering the probability there is of this kind of air being salutary in many diseases, have bestowed some pains in attempting to find out methods of procuring it easily and in large quantity; concerning which we have the following observations in Cavallo's Treatise on Air.

"A man makes in general about 15 inspirations in a minute, and takes in about 30 cubic inches of aerial fluid. But the air which has been once inspired is not thereby much injured, and it may be respired again and again; so that, upon a very moderate calculation, and as appears from actual experiments often repeated, we may safely assert, that a person can breathe 400 cubic inches of good ordinary atmospheric air, at least 30 times, without any inconvenience, *i. e.* it would serve for two minutes; after which that air, though much depraved, is still in a state of being breathed, but then it would occasion some uneasiness. Now, supposing the dephlogisticated air employed to be four times more pure than common air, 400 cubic inches of dephlogisticated air would serve for at least 120 respirations, or eight minutes.

But supposing that 30 inches of common air are completely phlogisticated by a single inspiration, and changed for such as is quite fresh, which indeed is the case in common respiration, then 450 cubic inches of common air will be requisite for one minute's respiration, and 27,000 for one hour; and as dephlogisticated air is supposed to be four times as good, the same quantity of it will serve for four hours. Indeed, if we could depend on the assertions of Mr Fontana, that

Air. by adding lime-water to absorb the fixed air produced by respiration, an animal can live 30 times as long as without it; no doubt a much smaller quantity would serve."

But it is certain such assertions cannot be true; because, though the fixed air should be absorbed as soon as produced, the remaining quantity would still be contaminated by phlogiston. Nay, we are informed by Dr Priestley, who repeated Fontana's experiments, that animals *will not* live longer in a quantity of dephlogisticated air when it stands in contact with lime-water, than they will when no lime-water is used *. In what manner a difference so enormous can take place, between philosophers in other respects so accurate, we can by no means determine. It is plain, however, that if 27,000 inches of common air are necessary for a person in one hour, the same quantity of dephlogisticated air cannot be breathed longer than four hours, nor even so long, with any real advantage. Mr Cavallo indeed allows only 12,000 inches for four hours; but though this might no doubt sustain life for that time, the person must certainly expect nothing from it superior at least to the common atmosphere, if he was not materially injured by it.

A very ready method of procuring dephlogisticated air in large quantity, is by means of nitre; and on the supposition that 12,000 inches are sufficient for four, (or for 40 hours, as he limits the abbe Fontana's supposition), he proceeds in the following manner: "The instruments necessary for the production of dephlogisticated air from nitre are the following; viz. earthen retorts, or earthen vessels with a straight neck, somewhat in the shape of Florence flasks, but with a longer neck, these being cheaper than the retorts, and answering as well;—a small furnace, in which the earthen retort must be kept red-hot; a common chimney-fire is not sufficient. These furnaces may be very easily made out of large black-lead crucibles. The nitre must be put into the retort or other vessel, so as to fill half or nearly three quarters of its belly; then a bent glass tube is luted to the neck of the earthen vessel, in such a manner as not to let any elastic fluid escape into the open air. The best lute or cement for this or similar purposes is made by mixing together whiting and drying oil. The retort being put into the furnace, must be surrounded with lighted charcoal, which is to be supplied according as it wastes: in short, the belly of the retort must be kept quite red-hot, or rather white-hot, for about three hours at least. If, instead of the retort, the other described earthen vessel be used, care should be had to place it with the neck as little inclined to the horizon as possible, lest the nitre should stop the neck and break it." The air is then to be received into large glass-jars, as is usual in other experiments on air.

"The retort or other earthen vessel that is used for this purpose cannot serve for more than once, because it generally breaks in cooling; and besides, the decomposed nitre cannot easily be taken out of it. The retort capable of holding a pound of nitre (the quan-

ty necessary for producing 12,000 cubic inches of dephlogisticated air) for this operation, costs at least half-a-crown; the other earthen vessels in the shape of Florence flasks, but with longer necks, cost about 18d. a-piece or 2s.; so that the price of these vessels forms a considerable part of the expence. If glass vessels are employed, the nitre will not yield near so much air, though of a purer sort, because the glass vessels cannot endure such a great fire as the earthen ones. The retorts of metal, or at least of those metals which are most usually employed for this purpose, viz. iron and copper, phlogistate in a great measure the air as soon as produced. Considering, then, all these circumstances, it appears, that when a person has all the usual apparatus and furnace, the expences at present necessary in London for the production of 12,000 cubic inches of dephlogisticated air, viz. the price of one pound of nitre, of an earthen retort or other vessel, and of charcoal, amount to about 4 s. or 4 s. 6 d.

Another method of preparing dephlogisticated air is, by blowing that of the common atmosphere thro' melted nitre. In this process the phlogiston contained in the atmosphere is gradually consumed, by detonating with the acid of the nitre, and therefore issues much more pure than before. This method has the appearance at first of being much easier and more commodious than the former; but as it is impossible to mix the atmospheric air so exactly with the melted nitre that every particle of the one may come in contact with every particle of the other, it is plain that the former method must be preferable; not to mention that it will be found exceedingly troublesome to blow the air through the nitre, as the latter will be perpetually apt to cool and concreate into lumps by the cold blast.

V. *Vitriolic Acid Air*. This consists of the vitriolic acid, united with some phlogiston which volatilizes, and renders it capable of assuming the form of a permanently elastic fluid. To obtain it, some strong concentrated vitriolic acid must be put into the usual bottle, together with some substance capable of furnishing phlogiston. Olive oil answers very well. The oil of vitriol should be about three or four times as much as the sweet oil, and both together should fill about one-third or half the bottle. A gentle degree of heat is then required, in order to let these materials yield any elastic fluid; which may be done by applying the flame of a wax-taper, as directed above for the production of dephlogisticated air.

This elastic fluid has no action upon quicksilver, but is easily, and in great quantity, absorbed by water; so that if a small quantity of water be introduced into the receiver containing it, and inverted in quicksilver (s), the whole quantity of the acid air disappears, being absorbed by the water; from which it escapes very easily when exposed to the open air. The water thus impregnated acquires the properties of the volatile or sulphureous vitriolic acid.

A piece of camphor introduced into a receiver containing this kind of elastic fluid, is easily dissolved, but by the addition of water the camphor is again recovered.

If

(s) In order to introduce water, or any other fluid, into a receiver inverted in quicksilver, let a small phial be quite filled with that liquid; then holding it with the hand, stop its mouth with a finger, and thus plunge it into the quicksilver, and pass it under the inverted receiver, where being unstoppered, and turned with the mouth upwards, the contained fluid will instantly ascend to the top of the quicksilver in the receiver, on account of it being specifically lighter than quicksilver.

Air.

If a piece of charcoal is admitted to this vitriolic acid gas, it absorbs a good quantity of it, and acquires from it a disagreeable and pungent smell. It is remarkable, that this elastic fluid does not act upon iron; whereas the water combined with it is a powerful solvent of that metal.

VI. *Marine Acid Air*, is no other than the marine acid itself, which without any addition becomes a permanently elastic fluid. In order to procure it, put some sea-salt, or common kitchen-salt, into the usual bottle in which the materials for producing elastic fluids are generally put, so as to fill about a fourth-part of it, and upon this salt pour a small quantity of good concentrated vitriolic acid; then apply the bent tube to the bottle, and introduce it through the quicksilver into the receiver, filled with and inverted in quicksilver, after the usual method, and the elastic fluid, called *marine-acid air*, is copiously produced.

A small quantity of water introduced into a receiver, containing this sort of elastic fluid, absorbs instantaneously a prodigious quantity of it, and becomes a very strong marine acid spirit; indeed, much stronger than can be obtained by any other means.

If any metallic, or in general any inflammable substance, capable of furnishing a considerable quantity of phlogiston, as spirit of wine, oil, &c. be introduced into a receiver filled with this elastic fluid, it occasions a remarkable change; viz. the marine acid air, by acting on it, will be changed into an inflammable elastic fluid, that takes fire by the contact of ignited bodies.

When a small quantity, as for instance, about a fourth-part, of marine acid air is mixed with one part of common air, and a lighted candle is introduced into the receiver containing this mixture, the flame of the candle acquires a beautiful green or bluish colour.

VII. *Nitrous Acid Air*. The elastic fluid, called *nitrous acid air*, may be obtained from heated nitrous acid, the vapour of which acquires a permanent elasticity, and it has been found to remain undecomposed into a visible fluid by the cold to which it has been hitherto exposed. The great difficulty, is to find a fluid capable of confining this acid air, because it is easily and abundantly absorbed by water, which is one of its properties by which it differs from nitrous air. It acts upon quicksilver, and also upon oils: hence its examination cannot be made but very imperfectly; for substances must be exposed to it, or mixed with it, whilst it is actually changing its nature by acting on the mercury or other fluid that confines it.

When water has absorbed a good quantity of this elastic fluid, it acquires the properties of nitrous acid; and when heated, it yields a large quantity of nitrous air, viz. a quantity many times greater than that which water is wont to imbibe of it by agitation, or by any known means.

When the nitrous acid air is combined with essential oils, a considerable effervescence and heat is produced, nearly in the same manner as when the nitrous acid itself is poured upon those oils.

VIII. *Fluor Acid Air*. Put some of those minerals called *fluors*, or *fusible spars*, pulverized, into the usual bottle, and upon it pour some concentrated oil of vitriol; then adapt the bent tube, &c. The fluor acid air is at first produced without the help of heat; but in a short time it will be necessary to apply the flame of

a candle to the bottle, by which means a considerable quantity of this elastic fluid is obtained.

The properties of fluor acid air are nearly the same as those of the vitriolic acid air; hence some excellent philosophers are of opinion, that those two acid airs are essentially the same. The principal, if not the only property by which they are distinguished from each other, is, that when water is admitted into a receiver containing fluor acid air, the water absorbs only a part of it; for a stony crust is formed upon the surface of the water which hinders the farther absorption, and which must be broke before the water absorbs any more of it.

IX. *Alkaline Air*. Let the usual bottle be about half filled with volatile spirit of salt ammoniac; and after applying the bent tube, &c. let the flame of a candle be brought under the bottle, by which means the alkaline air will be produced copiously.

If a small quantity of water is introduced into the receiver filled with this elastic fluid, the whole quantity of it is readily absorbed by the water, which thereby becomes a strong volatile alkaline spirit. If some of this gas is introduced into a receiver containing either the marine or the vitriolic acid air, a white cloud is instantly formed, and the two invisible elastic fluids, losing at once their elasticity, form a visible substance, namely, concrete ammoniacal salts.

The properties of this air are, that it is permanently elastic and unchangeable when confined in vials perfectly dry; but on the approach of moisture, it is instantly absorbed in great quantity without leaving any residuum. There is, however, a point of saturation betwixt it and water, nor can the latter be made to imbibe more than one-third of its weight of alkaline air. When the barometer is at a mean height, alkaline air is specifically lighter than common air in the proportion of 7 to 15, and its elasticity is greater in the proportion of 475 to 132 *. It destroys animal life, and extinguishes fire, though in certain cases it has itself a degree of inflammability †. When a burning candle is put into a jar full of this air, it is indeed extinguished; but just before it goes out, the flame is enlarged by the addition of another of a pale yellow colour. Sometimes it will actually take fire when the flame of a candle approaches it, a weak flame being observed to spread considerably around the candle, and even through the whole body of the alkaline air. By the electric spark it is augmented in bulk, sometimes to $\frac{1}{2}$ more than it was before, and then becomes strongly inflammable air, without the least appearance of volatile alkali. The electric sparks taken in it are red. It dissolves ice almost as readily as a hot iron, even in a very severe cold. It does not act on copper in its dry state, though it does so remarkably when united with water. It readily unites with all the acid airs, forming with them ammoniacal salts according to their different natures. Dr Priestley made two sets of experiments to determine the quantity of these gases necessary to saturate each other; but they vary so much in their result that little dependence can be placed on them. They are as follow:

First Set of EXPERIMENTS.

	Measures.
One measure of marine acid air absorbed of alkaline air, 1	
One of vitriolic ditto,	2
	One

Air.

* See Vol. I. CANO, (Encycl.)
† See Vol. I. LATILE ALKALI, (Encycl.)

Air.	Measures.
One of fluor acid air,	2
One of nitrous air,	5
One of fixed air,	3
Second Set.	
One measure of fluor acid air saturated of alkaline ditto,	1 1/2
One of vitriolic acid air,	2
One of marine acid air,	1 1/2
One of fixed air,	1 1/2

The last set, however, the Doctor looks upon as less accurate than the foregoing.

TABLE of the Specific Gravities of the different Elastic Fluids.

Names of elastic Fluids.	Their specific gravities.	Weight of a cubic inch of, in grains.
Common air,	152	0,385
Dephlogificated air,	160	0,042
Phlogificated air (r),	140	0,377
Fixed air,	220	0,57
Inflammable air,	10	0,035
Nitrous air,	157	0,399
Marine-acid air,	243	0,654
Vitriolic-acid air,	300	0,778
Fluor-acid air,	450	1,24
Alkaline air.	70	0,2

X. *Hepatic Air*. A new kind of elastic fluid discovered by Mr Bergman. He obtained it from a mineral called *pseudo-galina nigra Dannemorensis*, an ore of zinc; and it has also been obtained from some other ores of this semimetal. One hundred parts of this mineral were found to contain 29 parts of sulphur, one of arsenic, six of water, six of lead, nine of iron, 45 of zinc, and four of siliceous earth. When oil of vitriol is poured upon this mineral, the hepatic smell is immediately perceived, and a small quantity of hepatic air is produced. Marine acid expels a much greater quantity of hepatic air from this mineral than the vitriolic. By means of diluted nitrous acid, nitrous air only was obtained. No other property of this kind of air is known, but that it deposits a quantity of sulphur when mixed with nitrous air.

Circulation of Air in Rooms. To render the circulation of air sensible, let the air of a room be heated by a strong fire, whilst the air of a contiguous room is cold; then let the door between these two rooms be opened, in which case the hot air of one room being lighter, will pass through the upper part of the opening of the door into the cold room; and, on the contrary, the cold air of the other room being heavier, will pass into the former room through the lower part of the opening; accordingly, it will be found, that applying a lighted candle at the top, in the middle, and at the lower part of the opening between the two rooms, a strong current of air will appear to pass from the hot into the cold room near the top; a contrary current of air will appear to pass from the latter into the former room near the lower part of the said opening; whilst in the middle there is little or no motion at all, as may be clearly perceived by the direction of the flame of the candle.

It is for the same reason that when the fire is lighted

in a chimney, a strong current of air is occasioned to enter the room, which may be felt by applying the hand near the key-hole, or other such small openings, if the doors and windows are shut; for the air over the fire being heated, becomes lighter, and ascends into the chimney, consequently other colder air must supply its place, which forces its way through all the small openings it can find. Were a room with a fire in it to be perfectly closed, excepting the chimney, the air in it would soon become unwholesome for respiration, and the fire would be soon extinguished, besides other inconveniences. Hence it appears, that those persons mistake who expect to keep the air of a room sweet and wholesome, especially for convalescents, by accurately stopping all the smallest openings that admit fresh air. When the current of air that enters into a room is on one side of it where it falls immediately upon the persons who sit in the room, then it may be offensive, especially to delicate constitutions. In that case, such opening should be closed; but at the same time another opening should be made for admitting fresh air, in another more convenient part; for a circulation of air, especially in rooms where a fire is kept, is not only salutary and useful, but is absolutely necessary.

In an ingenious publication, intitled *A Practical Treatise on Chimneys*, there are the following remarks relating to the properest method of admitting air into a room, and of expelling the contaminated air. The author, directing to make a vent-hole near the top of the room, in order to expel the heated and contaminated air, "this," says he, "might be done by means of a small tube opening into the room, either in or near the ceiling; which might either be carried to the top of the building, or be made to communicate with the external air by a small perforation through the wall at the roof of the room; by means of either of which, a proper circulation would be established, and the foul air be carried off.

"For the fire would no sooner have warmed any particles of air within the room, than these would be greatly expanded, and rise immediately upwards, so as to fill the higher parts of the room with rarefied air; and as other particles would be successively heated and rarefied in their turn, by their expansive force they would press upon the sides of the apartment in every place, so as to force the lightest particles through the opening left for that purpose in the top of the room; by which means the foulest air would be gradually drawn off, without defending again into the lower regions to the annoyance of the company."

But in order to admit fresh air into the room, "Let," says he, "another opening be made in the ceiling of the room, having a communication with a small pipe that should lead from thence either to the outside of the wall, or to any other part of the building that might be judged more convenient, where it should be bent, and conducted downwards, till it reached the ground; where it should be left open, to communicate with the external air.—In this situation the cool external air would be forced in at the lower opening of the tube, and made to ascend into the apartment in proportion to the quantity that escaped towards the higher regions by means of the ventilator. And as that weighty air would.

(r) The air was phlogificated by saturation with nitrous air.

Air.

would no sooner enter the room, than it would tend towards the floor by its own natural gravity, it would gradually mix with the heated air in its descent—become, in some measure, warmed by that means, and equally dispersed through the room, so as slowly and imperceptibly to reach the candles and the company in the room, and supply them with a sufficient quantity of fresh and wholesome air, without the inconveniences to which the company are subjected by the usual way of admitting fresh air (c). For if it enters near the floor of the apartment, it is hurried along in a rapid undivided stream towards the fire-place, and striking upon the legs and inferior parts of the body, affects them with a strong sensation of cold. To overcome the effects of this, large fires must be kept; by which other parts of the body are warmed to an extraordinary degree, which is productive of most of those disorders that are pernicious to the young, and often prove fatal to the old, during the winter-season, in these cold regions.

“ Thus might our apartments be kept constantly, and moderately, and equally warm, at a moderate expence, without endangering our health on the one hand, by respiring a confined, stagnant, and putrid air, or, on the other hand, by subjecting ourselves to such danger of catching colds, consumptions, and rheumatic complaints, by being exposed to such exceedingly unequal degrees of heat and cold, as are unavoidable where our apartments are so open as to admit a ready passage to the external air during the winter-season.

“ The reader will easily perceive, that all that has been here said has a reference only to those apartments in cold climates, and rigorous weather, where fire to warm them becomes necessary. In warmer regions, or during the summer-season, there can be no objection to the wheel-ventilator in the window.—It is a simple contrivance, and a safe and effectual mean of preserving the air in our apartments sweet and wholesome at that season.”

It is a vulgar error among many people, to believe that fire purifies the contaminated air, by destroying the noxious particles mixed with it; and for this reason they think, that the fire kept in a room where the air is tainted, purifies the room, by rendering the air in it again fit for respiration. Indeed, a fire kept in a room or apartment where the air is tainted, as is the case with hospitals, goals, and the like, does certainly purify the apartment, and the practice is very useful; but this effect is only because the fire promotes the circulation of the air, and dries the dampness of rooms, furniture, &c.: so that it is not the infected air that is purified, but is new, fresh, and wholesome air, that by the action of the fire has taken the place of the infected air; which infected air, being rarefied by the heat,

has been expelled from the apartment. Fire and combustion in general is so far from purifying contaminated air, that it actually contaminates a prodigious quantity of it in a short time; so that not only a common fire, but even a lighted candle, when kept in a well-closed room, wherein the external air has not a free access, instead of purifying, renders the air of that room noxious.

Instrument for ascertaining the Wholesomeness of Respirable Air. See EUDIOMETER.

Air Balloons. A general name for bags of any light substance filled with inflammable air or other permanently elastic fluid, whose specific gravity is considerably less than that of common atmospheric air. The consequence of their being filled in this manner is, that, if they are of any considerable magnitude, they ascend in the air to an amazing height, and will not only ascend in this manner by themselves, but carry up great weights along with them; remaining in these elevated regions till the fluid escapes, either by bursting the bag in consequence of part of the external pressure being removed, or by its gradual evaporation through the pores.

By this invention, the schemes of transporting people through the atmosphere, formerly thought chimerical, are realized; and it is impossible to say how far the art of aerial navigation may be improved, or with what advantages it may be attended. In the last century, a scheme of navigating the atmosphere was proposed by Mr Hook, very much resembling that of air-balloons; but which did not succeed, because he was unacquainted with any vapour possessing equal elasticity with the common air, and less specific gravity. His project was to have a very large copper-globe, so thin, that when it was exhausted of air it would be specifically lighter than an equal bulk of the common atmosphere. Hence it would ascend, and carry up bodies along with it. But it is easy to see that an invincible objection lay against this scheme from the pressure of the external atmosphere, which would not fail to crush such a large globe made of such thin materials.—Though inflammable air, and its great inferiority in specific gravity to common atmospheric air, has been known for several years, yet we hear of no attempts to construct air-balloons till, in the year 1782, Mr Cavallo attempted to make paper bags and bladders, filled with inflammable air, ascend; but failed, the former being permeable to inflammable air, and the latter being too weighty in proportion to their bulk. Had he thought of varnishing his paper, or making bags of gold-beaters skin, he would certainly have succeeded.

The honour of this invention, however, is unquestionably due to the brothers Stephen and Joseph Mont.

(c) Such readers as have been little accustomed to speculations of this sort, will be at a loss to comprehend in what manner two holes, both of them in the roof of the room, and communicating with the air, without any valve, or other contrivance, for opening or closing of themselves, should yet answer the two very opposite purposes; one, of constantly bringing cool air into the room without emitting any warm air—and the other, of as constantly emitting warm and admitting no cool air. They will please to advert, that the one of these tubes communicates with the atmosphere at the bottom of the house, and the other towards the top: the opening of the one is beneath the level of the room, that of the other above it. Now, as the air is more dense at the surface of the ground than at any height above it, the warm rarefying air will naturally issue at that opening where it meets with least resistance, which must invariably be through that which opens to the external air at the greatest height; and as the cool air will naturally be pressed into the room by that opening where the air is most weighty, this must invariably be by that which is nearest the surface of the earth.

Air.

Air. Montgolfier, proprietors of a considerable paper-manufacture at Annonay, a town in the Vivarais, about thirty-six miles south of Lyons: and their invention is the more to be admired, as it is not the effect of the late discovery of a permanently elastic fluid lighter than the common air, but of properties of matter long known, and in the hands of the many acute philosophers of this and of the last century. They conceived, that the effect they looked for might be obtained by confining vapours lighter than common air, in an inverted bag or covering, sufficiently compact to prevent their evaporation; and so light, that, when inflated, its own weight, added to that of the inclosed vapour, might fall somewhat short of the weight of the air which its bulk displaces.

On these principles, they prepared matters for an experiment. They formed a bag or balloon of linen cloth, lined with paper, nearly spherical, and measuring about 35 feet in diameter; its solid contents were about 22,000 cubic feet, a space nearly equal to that occupied by 1980 lb. of common air, of a mean temperature, on the level of the sea. The vapour, which, by conjecture, was about half as light as common air, weighed 990 lb. The balloon, together with a wooden frame suspended to the bottom, which was to serve as ballast, weighed 490 lb.; whence it appears, that the whole must have been about 500 lb. lighter than an equal bulk of common air. This difference of specific gravity, by which these bodies are made to rise, we shall henceforth, without warranting the propriety of the expression, call their *power of ascension*.

The 5th of June 1783 was fixed on for the display of this singular experiment. The states of Vivarais, who were then assembled at Annonay, were invited to the exhibition. The flaccid bag was suspended on a pole 35 feet high; straw and chopped wool were burnt under the opening at the bottom; the vapour, or rather smoke, soon inflated the bag, so as to distend it in all its parts; and, on a sudden, this immense mass ascended in the air with such a velocity, that in less than ten minutes it appeared to be about 1000 toises above the heads of the spectators. A breeze carried it about 1200 toises from the spot whence it departed; and then the vapour, either escaping through some loop-holes that had been accidentally left in the construction, or being condensed by the coldness of the circumambient air, the globe descended gradually on a vineyard, with so little pressure, that none of the flakes were broken, and scarce any of the branches of the vines bent.

The rumour of this successful experiment soon reached the metropolis, and roused the emulation of the Parisian philosophers. Without waiting for particular instructions from the inventors, they reflected on a method of their own; and resolved, instead of vapour, to use inflammable air; the specific weight of which, when pure, they knew to be to that of common air nearly as ten to one.

The process of producing this air being very expensive, a subscription was set on foot; and a sufficient sum being soon raised, M. Charles, professor of experimental philosophy, and M. Robert a mathematical-instrument maker, were set to work: and they constructed a globe of lutestring (tassetas), glazed

over with elastic gum dissolved in some kind of spirit or essential oil. After many difficulties and disappointments, which will ever attend first essays, they succeeded in two days to fill this globe with inflammable air, produced from 1000 lb. of iron-sfilings, and 498 lb. of vitriolic acid, diluted in four times its quantity of water. This globe measured 12 feet 2 inches in diameter, its solid contents were 943 feet 6 lines cubic, and its power of ascension was found equal to 35 lb.

The 27th of August 1783 having been fixed on for the exhibition of this experiment, the balloon was conveyed, in the preceding night, floating in the air, from a court near the Place des Victoires, where it had been constructed, to the Champ de Mars. The concourse of people, on foot and in carriages, was so immense, that a large body of troops were drawn out to prevent disturbances. At five o'clock in the afternoon, a signal having been given by the firing of a mortar, the cords that confined the globe were cut, and it rose in less than two minutes to a height of near 500 toises. It here entered a cloud, but soon appeared again, ascending to a much greater height; and at last it was lost among other clouds.

In this experiment, too much inflammable air, and even some common air, had been introduced into the globe, which being closed on all sides, left no room for the expansion of this elastic fluid when it should arrive to a more rarefied medium. We find, in fact, that it must have burst in consequence of this expansion; since, after having floated about three quarters of an hour, it fell in a field near Gonesse, a village about five leagues N. N. W. of the Champ de Mars. It must be allowed, that the mere evaporation of the air could not well have been the cause of its descending so soon. Many periodical papers have already entertained the public with ludicrous accounts of the astonishment of the peasants who found it, and of the rough treatment it received at their hands.

It may easily be imagined, that these brilliant successes animated the zeal of all the curious in the metropolis, and that many essays were made to repeat the same experiments upon a smaller scale. A number of secondary attempts accordingly were made; upon which we shall dwell no longer, than only to observe, that they succeeded with globes made of gold-beater's skin, and only 12 inches in diameter; which being thought the least that could be made to ascend, considering that the proportionate weight of the materials increase as the bulk is diminished, were called *mini-*

models.

M. Montgolfier junior having arrived at Paris a few days before the experiment at the Champ de Mars, was desired by the Royal Academy of Sciences to repeat the experiment of Annonay. He accordingly constructed, in a garden in the Faubourg of St Germain, a balloon of an elliptical form, 70 feet high, and 40 feet in diameter. It was lined both inside and outside with paper. Its power of ascension was found upon calculation to be about 1250 lb. It was filled in ten minutes, by the burning of 50 lb. of straw and 10 lb. of chopped wool. It was loaded with a weight of 500 lb. and ascended, fastened to ropes, on the 12th of September, in the presence of the deputies of the

Air.

Royal Academy. But it proving a very rainy day, the whole apparatus was so essentially damaged, that it was not thought proper to set it loose.

We come now to the experiment made on the 10th of September, in the presence of the king and queen, the court, and all the Parisians who could procure a conveyance to Versailles. This balloon was 57 feet high, and 41 in diameter. Its power of ascension, allowing for a wicker cage, containing a sheep, a cock, and a duck, which was suspended to it, was equal to 696 lb. As only four days had been allowed for the making this machine, it could not therefore be lined with paper. M. M. had predicted, that it would remain in the air about twenty minutes, and with a moderate wind might float to a distance of about 2000 toises. But, beside some imperfection in the construction, owing to the great hurry in which it had been made, a sudden gust of wind, while it was inflating, made two rents seven feet long near the top, which could not but in some measure prevent the promised effect. It swelled, however, in eleven minutes sufficiently to raise it about 240 toises; it floated to the distance of nearly 1700 toises; and after having been in the air about eight minutes, it subsided gradually in the wood of Vaucresson. The animals in the cage were safely landed. The sheep was found feeding; the cock had received some hurt on one of his wings, probably from a kick of the sheep; the duck was perfectly well.

M. Montgolfier determined now to repeat the experiment under more favourable circumstances, and more at his leisure. He therefore made a new balloon in a garden in the Fauxbourg St Antoine, which measured 70 feet in height and 46 feet in diameter. A gallery of wicker was contrived round the aperture at the bottom; under which an iron grate or brasier was suspended, and port-holes opened on the inside of the gallery towards the aperture, through which any person *cui robur et æs triplex circa pectus fuerit*, who might venture to ascend, might feed the fire on the grate, and thus keep up the vapour, smoke, or, as we rather apprehend, the *dilatation of the air*, in this vast cavity.

On the 15th of October, M. Pilatre de Rozier, no doubt the most intrepid philosopher of the age, placed himself in the gallery, ascended about 80 feet from the ground, and there kept the balloon afloat for some time, by repeatedly throwing straw and wool upon the fire. In this experiment it was found, that the descent of a globe (provided no extraordinary accident happened to it) must necessarily be gradual; and that it will always light softly upon the ground, since, in fact, in every part of its descent, it enters a denser medium; whence its velocity in falling will rather be retarded than accelerated. On the 19th of October, M. P. Rozier ascended a second time about 250 feet. After continuing stationary about eight minutes, a gust of wind carried the balloon among some trees, where it entangled itself so as to endanger its being torn to pieces: but on M. R. throwing some fresh straw upon the fire, it immediately reascended, amid the loud acclamations of a vast multitude of people, who little expected to see so sudden a recovery. The balloon was then hauled down, and M. Giron de Villlette placed himself in the gallery opposite to M. R.

Air.

They were once more let up; and for some time hovered over Paris, in the sight of all its inhabitants, at the height of 324 feet.

Matters seemed now ripe for a *free aerial navigation*. A smoke balloon, very similar to the one last described, was prepared to go off at La Muette, a royal palace in the Bois de Boulogne, where, we are informed, the king's children now usually reside. All things being ready, on the 21st of November M. Pilatre de Rozier took his post in the gallery, and the Marquis d'Arlandes, a major of infantry, placed himself on the opposite side of this gallery, as a counterpoise to preserve the equilibrium of the machine. After repairing some damage done to the balloon in a first essay, it was, at 54 minutes after one, absolutely abandoned to the element; and it ascended with great rapidity.

When these bold adventurers were about 250 feet in the air, they waved their hats to the astonished multitude; but they soon rose too high to be distinguished, and are thought to have soared to an elevation of about 3000 feet. The history of this navigation is, in fact, the history of the alarms of the Marquis d'Arlandes. When he found himself so high that he could no longer distinguish the objects upon earth, he thought both his ambition and his curiosity sufficiently gratified, and desired his companion to cease laying straw upon the fire, that they might descend. M. P. de Rozier, however, deaf to these remonstrances, continued his operations, and the Marquis continued murmuring. At length, being at the highest elevation above mentioned, the latter perceived some holes burst in the sides of the balloon, and likewise heard some cracks near the top of the machine, which seemed to menace instant destruction. He then became outrageous; quickly clapped wet sponges to the burning holes; and vowed, that if his companion would now descend, he would take upon himself the whole blame of having thus shortened their navigation. M. Rozier at length listened to his urgent solicitations: but on approaching the earth, they found that they were descending immediately over the Seine; and fearing lest they might be carried away by the current of air that generally attends streams of water, the Marquis was glad to assist in throwing fresh straw upon the fire; and thus they rose again to a considerable height. On their next approach to the earth, the Marquis seeing the danger they were in of being spitted on the weather-cock of the Invalids, hastily threw a fresh bundle of straw upon the fire, and even spread it, in order to raise a greater blaze. This carried them over a great part of Paris, where they took care to clear all the steeples, &c. and passing the Boulevard, they landed safely in a field near Bicêtre, without having experienced the least real inconvenience. The distance they went was between 4 and 5000 toises. They were in the air about 25 minutes. The collective weight of the whole apparatus, including that of the two travellers, was between 16 and 1700 lb. and when they landed, they had two thirds of their combustibles still left in store.

A more remarkable experiment than any of these hitherto mentioned, was made by Messrs Charles and Robert. The globe prepared for this expedition was made like that of the Champ de Mars, of gores of silk,

Air. silk, alternately red and white, and glazed with some sort of gum. It was spherical, and measured 26 feet in diameter. It was filled with inflammable air; the making of which alone cost 5000 livres. The expence of the whole apparatus amounted to no less than 10,000 livres. A net was spread over the upper hemisphere, which supported a loop that surrounded the middle. To this hoop was suspended, by means of several cords, a boat, that swung at a small distance below the bottom of the globe, and which was so finely ornamented, as to deceive, in this respect, the name they gave it at Paris of a Triumphant Car. In order to prevent the bursting of the globe in a rarefied medium, an opening had been left, with a valve to it, which gave vent to the interior air, but suffered none of the exterior to enter. A long silken pipe or gut proceeded from this aperture; the farther end of which one of the navigators held in his hand, and thereby obtained a considerable command over the inflammable air. The car was ballasted with sand-bags. By these means they hoped, and in fact they succeeded, to guide themselves in point of elevation; for by letting some of the air escape, they naturally descended; and on discharging some of their ballast, they were sure to ascend.

The 1st of December 1783 was fixed upon for this pompous display. Two hundred thousand people assembled in and near the garden of the Thuilleries. The apparatus stood on a scaffolding raised for the purpose, in the middle of a piece of water, to prevent its being approached by the multitude. Upon this it rested, merely by the weight of the ballast in the car. The friends of the navigators had stored it with plenty of provision and clothing; beside which, proper instruments were also embarked. A small balloon, which had been prepared for the purpose, was offered to M. Montgolfier, who, at the request of M. Charles, cut the string by which it was held, and, by this allegory, tacitly received the tributary homage due to him and his brother as the authors of the invention.

At forty minutes past one, Messrs Charles and Robert ascended the Car. They threw out 19 lb. of ballast, and instantly rose, with an accelerated velocity, to the height of about 300 toises. No acclamation, no sound was heard; for the multitude stood silent with fear and amazement. The navigators, however, gave signals of their security, by frequently waving two pennants; and M. Charles apprised his friends below that they were easy and happy, by a note he threw down among the crowd. After continuing a short time stationary, they perceived themselves moving nearly horizontally, in the direction of N. N. W. Finding that some of the inflammable air evaporated, they discharged some ballast; and soon after observing that the heat of the sun dilated the inflammable air, they suffered some of it to escape; and thus they kept pretty nearly in the same level. In this manner they floated twice across the Seine; and over many towns and villages, the surprise of whose inhabitants can more easily be conceived than described. About 56 minutes after their departure, they found themselves out of sight of Paris. They then descended so low as to skim along the surface of the ground, and conversed with several labourers in the fields. Seeing a hill before them, they cast some of their superfluous

cloathing out of the car, and thus cleared the eminence. They now made a comfortable meal. Finding themselves near the Isle d'Adam, where the prince of Conti has a palace, they again approached the ground, inquired after the prince, and were told that he was at Paris. At 45 minutes after three, they found themselves over Nefle, a small town about nine leagues from Paris. And there, after sliding a little way along the surface of the ground, they alighted gently, and without the least shock or concussion, in a field.

Of a great number of those who had galloped after the balloon from the Thuilleries, only the dukes de Chartres and Fitz-James, and Mr Farrer an English gentleman, who had relays posted in the direction of the wind, arrived a few minutes after the landing. The others either lamed or killed their horses, or grew tired of the pursuit. After the warmest congratulations, an affidavit was drawn up, and signed by all the parties present.

Mr Charles now declared his intention to reascend alone; but to this the duke de Chartres consented, only on condition that he would return in half an hour. M. Robert alighted; and by the diminution of his weight, the machine acquired a power of ascension equal to about 100 lb.

Mr Charles's account of this second ascent we shall give in his own words: "Thirty peasants held down the machine. I asked for some earth to ballast it, having not above four or five pounds left. A spade was not at hand, nor were there any stones in the meadow, where the machine had alighted. The sun was near setting. I made a hasty calculation of the time requisite for the alteration of weight, and gave a signal for the peasants to quit their hold. I sprang up like a bird. In 20 minutes I was 1500 toises high, out of sight of all terrestrial objects. I had taken the necessary precautions against the explosion of the globe, and prepared to make the observations which I promised myself. In order to observe the barometer and thermometer placed at the ends of the chariot, without altering the centre of gravity, I kneeled down in the middle, stretching forwards my body and one leg, holding my watch and paper in the left, and my pen and the string of the valve in my right hand, waiting for the event. The globe, which at my first setting out was rather flaccid, swelled insensibly. The air escaped in great quantities at the valve. I drew the valve from time to time to give it two vents; and I continued to ascend, still losing air, which issued out hissing, and became visible, like a warm vapour in a cold atmosphere. The reason of this phenomenon is obvious. On earth the thermometer was seven degrees above the freezing point; after 10 minutes ascent, it was five degrees below. The inflammable air had not time to recover the equilibrium of its temperature. Its elastic equilibrium being quicker than that of the heat, there must escape a greater quantity than that which the external dilatation of the air could determine by its least pressure. For myself, though exposed to the open air I passed in 10 minutes from the warmth of spring to the cold of winter, I felt at first nothing disagreeable in the sudden change. When the barometer ceased to rise, I marked exactly 18 inches 10 lines; the mercury suffering no sensible oscillation.

cillation. From this height I deduce an elevation of 1524 toises, or thereabouts, till I can be more exact in my calculation. In a few minutes more my fingers were benumbed by the cold, so that I could not hold my pen. I was now stationary, and moved only in an horizontal direction. I rose up in the middle of the chariot, to contemplate the scene around me. At my setting out, the sun was set on the vallies; but he soon rose for me alone, who was the only luminous body in the horizon, and all the rest of nature in the shade. The sun himself presently disappeared; and I had the pleasure of seeing him set twice in the same day. I beheld, for a few seconds, the circumambient air and vapours rising from the vallies and rivers. The clouds seemed to rise from the earth, and collect upon one another, still preserving their usual form, only their colour was grey and monotonous from the want of light in the atmosphere. The moon alone enlightened them, and showed me that I was tacking about twice; and I observed certain currents that brought me back again. I had several sensible deviations, and observed with surprise the effects of the wind, and saw the streamers of my banners point upwards. This phenomenon was not the effect of the ascent or descent; for I then moved horizontally. At that instant I conceived, perhaps a little too hastily, the idea of being able to steer one's own course. In the midst of my transports, I felt a violent pain in my right ear and jaw, which I ascribed to the dilatation of the air in the cellular construction of these organs, as much as to that of the external air. I immediately put on a woollen cap; yet the pain did not go off but as I gradually descended. For seven or eight minutes I had ceased to ascend; the condensation of the inflammable air rather made me descend. I now recollected my promise to return in half an hour; and, pulling the upper valve, I came down. The globe was now so much emptied, that it appeared only an half globe. When I was between 20 and 30 toises from the earth, I threw out hastily two or three pounds of ballast, and became for a moment stationary, till I descended gently on the field, above a league from the place whence I set out. The frequent deviations and turnings make me imagine that this voyage was about three leagues; and I was gone about 35 minutes."

These successful attempts soon produced the emulation of others. M. Montgolfier, whose method had been so successfully tried by M. Pilatre de Rosier, undertook the construction of a balloon, upon his own principles, much larger than any that had hitherto appeared; and it was given out by his friends, that with this machine he intended to set out from Lyons with a quantity of goods, either for Paris or Marseilles, as the wind should serve. This balloon was composed of double canvas, with three layers of paper between the folds; but, at the desire of M. Rosier, the upper part was changed for a simple cotton cloth. The balloon was 100 feet in diameter transversely, and 126 high, and weighed in all about 8000 pounds. The departure was announced for the 10th of January last; but when the attempt was then made, the globe swelled only partially, and could not be raised. Several other attempts were made on succeeding days, but with equally bad success; and in one of these unsuccessful attempts, part of the canvas was burnt. This damage,

however, was soon repaired; and on the 19th of January the projectors were ready for another trial, when the globe filled in 17 minutes. Seven persons embarked in the machine annexed to it, and ascended amidst the acclamations of 100,000 spectators. The globe first took a N.W. direction, but soon after took to the S. E. It had not floated fifteen, or according to some accounts five minutes, when it descended with a velocity that alarmed the spectators, and alighted in a field not far from the place whence it was set off.

In the next experiment we have to describe, an apparatus was to be applied to a balloon filled with inflammable air, for steering it both horizontally and vertically, and even against a current of air. M. Blanchard of Paris had some years ago announced that he was preparing wings, with which he meant soon to take a flight. The late discovery seemed to hasten the execution of his project. His globe is said to have been only 14 feet 2 inches in diameter: but this must certainly be a mistake; for the weight of air contained in such a globe cannot be supposed equal to that of two people, even of the smallest dimensions, with all their necessary apparatus. Be this as it will, a globe was prepared, which actually was sufficient to raise the necessary weight. To this globe was suspended a car; between the car and the globe was fixed an umbrella 12 feet in diameter, the intention of which was to break the fall in case of any accident: hence it was called *parachute*. To the car were adapted four wings, two on each side, and behind a rudder, all made of taffety dilated by means of whalebone ribs. All this was to be worked by a machinery of M. Blanchard's invention. He was to ascend himself for the purpose of navigating the machine; and Dom. Pech, a Benedictine, was also to ascend for the purpose of making various aerological observations and experiments. Every thing was ready on the 2d of March, in the Champ de Mars. A party of M. Blanchard's friends had assembled at a country-house where he had promised to meet them through the air. The navigators were embarked, and ready to soar, when a young man, a pupil of the *ecole militaire*, suddenly rushed through the crowd, threw himself into the car, and insisted on sharing in the expedition. A scuffle ensued, in which Blanchard was wounded in the hand, the parachute and wings destroyed, and the purpose of the experiment entirely defeated. This madman was at last overpowered, and the two adventurers determined to take a chance flight. They rose accordingly; but their power of ascension was not sufficient to carry them to any height, for which reason they soon landed. Dom. Pech alighted, and Blanchard instantly ascended with great rapidity. The wind being east, he was carried to the westward. The account he gives of his navigation is, that he rose about 2000 toises from the ground; that he found himself at times stationary in a perfect calm, during which the heat of the sun was scorching; that he at different times felt currents of wind in different directions, in some of which the cold was intense; that during these cold intervals he felt an almost unconquerable desire to sleep; that clouds collected under his feet; and that it appeared to him that he was at different times carried towards different parts of the compass. He continued in the air one hour and a quarter; after which

he landed safely near Jev, about five miles from the spot whence he ascended.

These are the most remarkable experiments that have yet been made with respect to this new and extraordinary navigation. The principles on which it is accomplished are those of common hydrostatics; but though the specific lightness of inflammable air easily shows why globes filled with it should rise, the principle on which Montgolfier's balloons ascend seem not to be so generally understood. In an original paper, said to be written by a foreign gentleman of great learning, (Appendix to Monthly Review, vol. lxi.), we find the following reasoning on the subject: "The ingredients used for inflating the machine that was let off at Versailles, consisted of 50 pounds of straw and 5 pounds of wool: and, in a work published by M. Faujas de St Fond on the subject, we are informed, that the gas which inflated the bag was produced by burning these ingredients. Now, in as far as simple combustion is here concerned, the experiments of Dr Priestley, since repeated in a thousand different ways, plainly evince, that the effect of combustion is indeed at first to produce a very light aeriform fluid, viz. inflammable air; but that this air, meeting immediately with atmospheric air, takes fire by its union with the dephlogisticated air; and that the residuum of this, being thus mixed with fixed air, does thereby become specifically heavier than it was before. Thus all that modern chemistry hath hitherto taught us concerning combustion, can point out nothing to us as the immediate result of M. Montgolfier's operation, but a mass of air specifically heavier than common atmospheric air, mixed for an instant with some fuliginous vapours which collect into foot on the sides of the bag, and some aqueous vapours, which likewise condense on those sides and become water. It is impossible therefore to discover *a priori*, in the process of M. Montgolfier, the formation of any gas, or of any aeriform fluid, which in its nature can be specifically lighter than atmospheric air; but, on the contrary, we perceive in his operation the cause of some augmentation in the specific weight of the atmospheric air produced by the combustion.

"These arguments *a priori* are so strongly corroborated by the fact, that no doubt can well be entertained concerning their validity. It appears, that the solid contents of the machine let off at Versailles measured 37,500 cubic feet; that the weight of the common air that is displaced, was 3102 pounds; and as the gas of M. Montgolfier was thought to be about one half lighter than common air, it is there said that this gas weighed only 1596 pounds. Weighed only!—But was it considered, that this gas must have been the produce of no more than 50 pounds of straw and 5 pounds of wool? Is it likely that substances weighing in all 55 pounds, should yield 1596 pounds of air? Is it not surprising that this philosophical paradox should have hitherto escaped unnoticed?

"But let us attend to a particular circumstance mentioned in the account of the experiment, and we shall perhaps find the true cause of the ascension of the machine. The manner in which this large bag was filled, is said to have been by piling it upon a circular stage, and contracting it as much as possible, that very little common air might remain in it. Its orifice was

spread over an aperture in the middle of the stage, and straw was burnt under it. The effect of this operation is thus described: "As soon as the machine began to swell, a rapid current of air immediately took place, which coming from without, rushed into the machine with such force, that before the necessary precautions could be taken, the cloth, which was spread upon the stage and round the fire, in the form of a cylindrical funnel, was agitated with great violence." This account itself clearly points out the cause that swelled and buoyed up the machine: it was filled with common air dilated by heat, in the same manner as if the current of air that passes up a chimney were collected in a large empty bag; which being let loose, would certainly rise and float in the air, until the warm air within, losing its heat, be reduced to the temperature of the surrounding air.

"The sanguine hopes that are entertained of the useful application of this discovery may be gathered from a table, in which the dimensions a machine must have to enable it to raise a certain weight, are set forth upon elaborate calculations. These calculations are founded on the principles, That the air produced by M. Montgolfier is one-half lighter than common atmospheric air, and that the weight of the bag is at the rate of two ounces for each square foot. A formula is hence deduced, in which the proportion between the solid contents and the surface of the sphere are the only elements.

"We must here observe, that if, as appears to us very probable, it be merely the heat that diminishes the weight of air in the experiment, the diminution of one-half seems to be greatly exaggerated. It follows from the observations made by M. de Luc on the dilatation of air by the heat of the atmosphere, that if a certain quantity of air passes from the temperature of 32° of Fahrenheit to that of boiling water, that is, 212°, the original bulk of that quantity will be increased $\frac{7}{10}$ parts of the whole; this therefore is the effect of 180° of Fahrenheit. That a given quantity of air may become one-half lighter, its bulk must be doubled; whence we infer, that a mass of air whose bulk is 500, in order to acquire a bulk of 1000, must increase in heat $\frac{180 \times 500}{186} = 484^\circ$. Now, it is by no

means probable, that the air contained in the machine of M. Montgolfier had ever acquired so considerable a degree of heat. This estimate, therefore, of a specific gravity, one-half less than that of the atmospheric air, manifestly requires to be farther investigated.

"Some inductions on this head may be derived from the circumstances of the experiment made at Versailles. According to the computation of M. Faujas, the weight of the lower air displaced by the inflated machine was 3102 lb. According to the observation of M. Gentil, made at the Royal Observatory, the machine must have ascended 240 toises. By an estimate, as nearly approaching to truth as possible (according to the rules of the measurement of heights by the barometer), of the density of the air at the elevation at which the globe ceased to ascend, this density must have been $\frac{1}{3}$ less than that of the place whence it first rose. Thus, at that elevation, the weight of the air displaced by the machine was only 3015 lb. The machine, together with the air contained in it, weighed

weighed therefore likewise 3015 lb. since it there ceased to rise. But of this total weight 900 lb. was the weight of the bag and its appendages; there remains therefore 2115 lb. for the air. But the air displaced by the machine near the ground weighed 3192 lb. The density therefore of the air contained in the machine, was to that of the air near the ground nearly as 2 to 3, instead of the supposed proportion of 1 to 2. And the excess of its heat above that of the outward air, altho' considerable, is thus found to have been one-half less than that above stated, namely,

$$\frac{180 \times 250}{186} = 243^\circ.$$

"This heat, it seems, may be much less still, and yet carry the machine very high, if such intrepid men as M. Pilatre de Rozier and the marquis d'Arlandes will ascend with it, and keep up the fire at its aperture. For, in fact, as the machine rises, it will undoubtedly, if the same degree of heat be constantly kept up in its cavity, continually emit part of the air it contains. Thus, as soon as the heat of the internal air shall be sufficient to raise the machine from the ground, it must continue to rise without any further increase of that heat, and consequently without there being much more difference between the temperature of the interior and exterior air, than what is necessary to compensate for the weight of the bag and its appendages.

"But a second consideration, that appears to us materially to affect the table above-mentioned, (in which, on the supposition of a constant given specific gravity, nothing is considered but the proportion between the solid contents of the bag and its weight), is, that it can only be applicable to a real gas, and by no means to an air dilated by heat. For the effects of fire of a given intensity in heating its surrounding air, are in the inverse ratio of the squares of the distances: whence it appears that the fire must be increased, not in the simple ratio of the solid contents, but in a much greater one; which it will be very difficult to determine, since there are many other considerations that are to be taken into the computations. Every machine, of whatever kind and of whatever dimensions, may no doubt be inflated by conveying into its cavity the current of air produced by the flame; but this would only be a manner of inflating it similar to that which would be produced by opening the bag to the wind. Now this current of air, thus directed by the flame, would preserve but a small degree of dilatation; and a machine of so immense a size as that for which a subscription is said to be now open at Paris, will probably raise but a small weight, and certainly disappoint the expectations of those who have undertaken to construct it.

"If a farther proof were required, that the balloons of Messrs Montgolfier rise only by the rarefaction of the interior air, we should find it in the account given of the descent of that which was launched at Versailles. "Two game-keepers, who were at about ten yards distance from the place where it subsided, assures us," says M. Faujas, "that it came down remarkably slow, gradually contracting itself as it came nearer the ground." Had this balloon been filled with gas lighter than the atmospheric air, it would not have been thus contracted in its descent: nothing but a change of air could have weighed it down; and in a balloon open at the bottom, this change

would have happened by the entrance of a heavier air, which would have driven the lighter air upwards, and forced it out through the rents in the bag, without suffering it to collapse. But a mass of air dilated by heat, contracts on cooling; and the bag, in that case, being compressed by the outward air, will naturally collapse, or be contracted in its dimensions."

In the Review for March 1784, we find the same kind of reasoning continued with regard to the great balloon at Lyons. "Thus much (says the author of the paper) appears certain, that the success was by no means adequate to the sanguine hopes of the projectors; and indeed, if we recollect how rapidly the effect of fire decreases in proportion to the increase of the distances, and that, in this instance, assuming the effect of the fire at the distance of one foot to be as unit, it could at the top of the balloon, when distended, be no more than $\frac{1}{17776}$ of that unit, we shall not be surprised at the difficulties that occurred, nor at the sudden descent after the globe had reached a cold and rarefied stratum of the atmosphere (even though there had been no rent), in which the necessary dilatation of the internal air would have required a fire much more intense than would have been compatible with the safety of the apparatus."

On reading these observations it immediately occurs, that no fair argument can be drawn from the expansibility of common air to that of air which had passed through fire. The latter contains a great deal of fixed and phlogisticated air, along, no doubt, with some inflammable air which escapes during combustion; perhaps not without a mixture of some kinds of acid, as well as alkaline air, rendered incapable of union by their being so much enveloped with others. Besides all these, there must undoubtedly be also a very great quantity of phlogistic and aqueous vapours, the precise specific gravity of which is altogether unknown. We are not, however, to judge merely from the specific gravities: the degree of expansion to which each of these are subject by the same degree of heat must be taken into consideration; and this makes the calculation *a priori* of the force by which any balloon will ascend, very difficult, if not impossible. To understand this in some measure, however, let us compare the different powers of ascension of one cubic foot of fixed air with a cubic foot of common air, when both are heated to the degree of 212 of Fahrenheit, or to the boiling-point of water. With regard to the common air, it has been determined, that by the heat of boiling-water it is expanded one-third of its bulk. A cubic foot of this element (supposing it 800 times lighter than water, and that a cubic foot of water weighs 1000 ounces or 62½ pounds) will weigh an ounce and a quarter, or 600 grains. By the third part of this weight, therefore, or 200 grains, the cubic foot of rarefied air will rise; and if we could form any vessel to contain it which would weigh less than 200 grains, such vessel would arise along with it. The specific gravity of fixed air is to that of atmospheric air, as 220 to 152, and must therefore weigh $868\frac{8}{17}$ grains. But the expansibility of fixed air is to that of common air, as 220 to 132. By the heat of boiling-water, therefore, a cubic foot of fixed air must lose 333 grains of its weight, which would reduce it to nearly 535 grains; and therefore a cubic foot even of this air, though so much

Air. much heavier than common atmospheric air, would have a power of ascension by means of the heat of boiling-water, almost equal to 65 grains.

Phlogificated air is to common air in specific gravity, as 140 to 152; in expansibility, as 165 to 132: a cubic foot of it, therefore, will weigh only $552\frac{1}{2}$ grains. By a boiling heat it would lose, according to the above-mentioned proportion, 250 grains. A cubic foot of phlogificated air, then, heated to the degree of boiling-water, would weigh only between 202 and 203 grains, and consequently would have an ascensive power equivalent to 397 grains.

With regard to the other kinds of air which are lighter than phlogificated air, the case is still more evident. However, supposing even the balloon to be filled by means of the fuel with equal quantities of fixed and phlogificated air, it is plain that this mixture, when exposed to the heat of boiling-water, must have a considerably greater power of ascension than common atmospheric air; for the cubic foot of fixed air would have an ascensive power of 65, and the phlogificated air of 397, which added together make 462; while two cubic feet of common air, heated to the same degree, would have only an ascensive power of 400.—It is impossible to ascertain the proportions of the different kinds of air which compose the elastic fluid issuing from burning fuel, but it is easy to see that they cannot be in the proportions assumed above; for the phlogificated air is certainly in the greatest quantity; and hence our author's calculations must be vastly erroneous. The error, however, does not lie altogether here, but likewise in supposing heat to decrease when confined in a close place in the same proportion as in the open air. Without entering into any investigation of the causes, it is a well-known fact that heat *ascends* and *accumulates* in the upper part of any close place, as evidently as water *descends* and *is accumulated* in the lower part of any vessel into which it is poured. In any balloon, therefore, which is raised and kept up by fire, the upper part will constantly be hotter than the lower; excepting, indeed, those places which are immediately adjoining to the fire. The fire, therefore, is by no means to be increased in proportion to the cubical contents of the balloons, otherwise it would be impossible to preserve them from destruction. The following experiments were made with a view to determine these matters, as far as they can well be determined in miniature.

Three different parallelpipeds were prepared, by pasting writing paper over slight wooden frames. Externally the smallest measured 6 inches square, and 12 inches in height; the under-part being left quite open. Its cubical contents thus were 432 inches, or the fourth-part of a cubic foot; but by reason of the space occupied by the wood-work, it could not be estimated at more than 417 inches. The second measured exactly a cubic foot; and, deducting for the space occupied by the wood, measured 1710 inches. The third was one foot square, and two feet in height, and contained two cubical feet; and, deducting the wood as before, measured 3430 inches. The weight of air, therefore, contained in the least, was nearly $144\frac{1}{2}$ grains; in the second, $593\frac{1}{5}$; and in the third, $1186\frac{1}{5}$. The first being suspended in a balance and exactly counterpoised, a lighted candle was held under the open part

at bottom. The machine instantly rose, and required 30 grains to bring it again into balance. A thermometer held within the cavity with the bulb upwards, stood, when taken out, at 118°. The second being now suspended in like manner, and exactly counterpoised, required 75 grains to bring it into balance; the thermometer standing at 106 within its cavity. The third, with the same candle, and treated in every respect in a similar manner, required 90 grains to bring it back to an equilibrium; the thermometer standing at 88.—On using a stronger heat, the first required 75, the second 255, and the third 405 grains to restore the equilibrium; the thermometer standing in the two first at 170, and in the last at 135.

From these experiments, it is evident, that the rarefaction of air which passes through fire, cannot in any manner of way be calculated from the rarefaction of common air by heat alone. In the first set of experiments, 417 cubic inches of air were rarefied one-fifth by the flame of a small candle; 1710 inches, by the same rule, were rarefied about an eighth; and 3430 inches were rarefied one-thirteenth. But in the common mode of computation, if the flame of the candle had rarefied the first quantity of air one-fifth, it ought to have rarefied the second, which was four times greater, only one-twentieth, and the third only one-fortieth part. Nay, according to the assertion above-quoted, that “the fire must be increased, not only in proportion to the cubical contents, but in a much greater proportion,” the effects of the candle ought to have been still much less than we have calculated them. But this is not all. The room in which these experiments were made was warm, and the thermometer stood at 70°. By an expansion of 48° only, one-fifth part was rarefied; but if 180° of Fahrenheit give very little more than one-third of rarefaction, 48 degrees ought to have given scarce a fourth-part of that third, or a twelfth part instead of a third. In like manner, when the strong heat was used, the weight raised by its means indicated a rarefaction of more than one-half, though by the thermometer it ought not to have been one-third.

It now remains only to give some instructions for making balloons. 1. For those who intend only to construct a small balloon merely to enjoy the sight of its ascent in the air, inflammable gas will be found most eligible. Indeed it is almost the only kind that can be used; for the other kinds are so little inferior in specific gravity to the common atmosphere, that it will require a very capacious bag to rise when filled with them. The lightest materials are to be procured; and it is a matter of no small difficulty to determine what these materials are. Thin silk covered with elastic gum dissolved in æther has been found to answer the purpose of confining inflammable air more perfectly than any other thing; but as this material is excessively dear, a varnish made of linseed oil has been tried, and found to answer tolerably well. Indeed, instead of silk, thin paper varnished may be used: for as neither silk nor paper will contain inflammable air by themselves, it is plain, that the only use of these materials is to support the varnish; and while this can be done, it is no matter by what means. In fact, the widest gauze may be covered with isinglass or gums properly dissolved,

Air.

solved, in such a manner as to be capable of containing inflammable air; and the thinner and lighter the materials are, the less may be the diameter of the intended balloon.

With regard to the form, that of a sphere is most proper, as a body of this kind meets with less resistance in passing through the air than any other. A small aperture is always to be left, for the purpose of admitting the inflammable air with which the balloon is to be filled. From this aperture a gut or pipe ought to proceed, of such a length as to admit of being easily and closely tied when the vessel in which the inflammable air was produced shall be removed.

The balloon being fully prepared, its sides are to be squeezed together as completely as possible; but at the same time very gently, lest the varnish should be cracked. This is done to get out of it all the common air which it originally contained; for the less of this that remains in it, the more easily will the balloon ascend, and the greater weight it will be able to carry up. To fill it with inflammable air, a sufficient quantity of vitriolic acid and filings of iron or zinc must be procured. For a globe of three feet diameter the following proportions have been recommended; 40 ounces of vitriolic acid, 90 of iron-filings, and 450 of water. The most proper vessel for mixing these ingredients is a copper-still, perforated at top for the convenience of pouring in more acid or water as shall be necessary. This metal is to be chosen in preference to any other, on account of its not being easily affected by fire, and being likewise insoluble in diluted vitriolic acid. The still is to be fitted with a refrigeratory and worm, in order to condense any aqueous vapour that may arise along with the air. This condensed vapour must be received into a small vessel exactly fitted to the worm; and into the upper part of which must be closely inserted a tube of tin or some other solid material capable of conducting the air, without losing it, into the balloon. The acid diluted with the water is first to be put into the still, and the iron gradually added through the hole in the top. An effervescence will immediately ensue, and the balloon will swell considerably; but as the dilatation advances, the resistance of the external air rather increases at the same time that the propelling force of the inflammable air is lessened. Fire must therefore be applied to the still; which will soon expel all the inflammable air, and would even burst the balloon if long continued. Unless a valve is applied to let out part of the inflammable air when it ascends into the higher regions, it will be improper to fill the balloon very full; because of the danger of bursting in a more rarefied air. A method of making balloons ascend to a prodigious height, would be to have a valve opening outwards, and confined by a spring, the elasticity of which could be overcome by the expansion of the air, without bursting the globe. This valve ought to open into another flaccid balloon, by which means the air that escaped from the former would not be lost, but dilate the second; so that both would have the same propensity to ascend that the single one had. On their entrance into a region where the air was still more rare, both would be diffended; and thus by connecting three, four, or more bags with one another, it seems practicable in theory to raise them to any height whatever.

Air,
Albians

2. The other kind of balloons, which are raised by means of air passing through fire, seem scarcely proper for experiments except of the higher kind, where some person ascends with them, and regulates their motion by increasing or diminishing the fire by which they are supported. With regard to the construction of these, little can as yet be said, excepting what may be inferred from the experiments of M. Montgolfier and Rosier. The descriptions of these already given sufficiently show the method of constructing *fire balloons*, as they are called. The only remark that can well be made on them at present is, that in these, as well as the others, the whole power of ascension lies on the top; because there the pressure of the atmosphere is considerably less than at bottom; whereas the expansive power of the air within continues the same over the whole. In the great balloon constructed at Lyons, which was 126 feet in height, the difference between the external and internal pressure must have been very great. Every cubic foot of air weighs about an ounce and a quarter. Of consequence, upon every cube of one foot, the air presses with one ounce and a quarter less weight on the upper than on the under part. Nevertheless, if we suppose the cube hollow, and filled with air, the internal air will press upon that which lies below it with a force equal to one ounce and a quarter; of consequence, the cube will neither have any inclination to ascend or descend; but if we lighten the internal air by any given quantity, suppose half an ounce, while we preserve the same elasticity with the external air, it is plain, that the upper and internal part of the cube will be pressed upwards by half an ounce more than it is pressed downward by the external air. Hence it is evident, that the upper part of these machines, instead of being weaker, ought to be stronger than the under parts. This is evident from what happened to the balloon at Lyons. At the height of 126 feet, there must have been a difference of no less than 9 pounds 13 ounces upon every square foot, between the internal and external pressure. From this indeed the weight of the internal column must be deducted; but supposing the air to have been but very little rarefied, the difference must have been immense. In fact, this difference is the very power of ascension itself; and we see that this was sufficient to overcome 8000 pounds weight, for the machine itself, besides that of seven people, whom we cannot well suppose to have weighed less than 1000 pounds. Now, as the diameter of the balloon was 100 feet, we see that the whole pressure rested upon a circle of cotton cloth, whose diameter was 100 feet, and area 7850. The pressure therefore was more than a pound upon every square foot, and how much more we do not know, unless the machine had been perfectly in *equilibrium* with the atmosphere. But this it was not: for it ascended with great velocity; and the power by which this velocity was occasioned, exerted itself upon the upper parts. The consequence was, that the cloth was torn; having been imprudently changed by M. Rosier from double canvas to single cotton.

ALBINUS (Bernhard Siegfried), a celebrated physician and anatomist, was born, of an illustrious family, at Francfort on the Oder in 1697. His father was then professor of the practice of medicine in the university of Francfort; but in the year 1702 he repaired to Leyden,

pus,
bugo.

den, being nominated professor of anatomy and surgery in that university. Here his son had an opportunity of studying under the most eminent masters in Europe, who, from the singular abilities which he then displayed, had no difficulty in prognosticating his future eminence. But while he was distinguished in every branch of literature, his attention was particularly turned to anatomy and surgery. His peculiar attachment to these branches of knowledge gained him the intimate friendship of Ruyfch and Rau, who at that time flourished in Leyden; and the latter, so justly celebrated as a lithotomist, is said to have seldom performed a capital operation without inviting him to be present. Having finished his studies at Leyden, he went to Paris, where he attended the lectures of Du Verney, Vaillant, and other celebrated professors. But he had scarce spent a year there, when he was invited by the curators of the university of Leyden, to be a lecturer in anatomy and surgery at that place. Though contrary to his own inclination, he complied with their request, and upon that occasion was created Dr of physic without any examination. Soon after, upon the death of his father, he was appointed to succeed him as professor of anatomy; and upon being admitted into that office on the 9th of November 1721, he delivered an oration, *De vera via ad fabricæ humani corporis cognitionem ducentes*; which was heard with universal approbation. In the capacity of a professor, he not only bestowed the greatest attention upon the instruction of the youth entrusted to his care, but in the improvement of the medical art. With this view, he published many important discoveries of his own; and by elegant editions, turned the attention of physicians to works of merit, which might otherwise have been neglected. By these means his fame was soon extended over Europe; and the societies of London, Peterburgh, and Harlem, cheerfully received him as an associate. In 1745, he was appointed professor of the practice of medicine at Leyden, and was succeeded in the anatomical chair by his brother Frid. Bern. Albinus. He was twice rector of the university, and as often he refused that high honour when it was voluntarily offered him. At length, worn out by long service and intense study, he died on the 9th of September 1770, in the 74th year of his age.

ALBUGO. *Dele* the marginal note.

Some distinguish this disorder by *nubecula*, when its seat is superficial; and *albugo*, when it is deep. Others make the following distinctions, viz. when the speck appears of a shining white, and without pain, it is called a *cicatrice*; when of an opaque whiteness, an *albugo*. Seated superficially, it hath been termed a *speck*; and more deeply, a *dragon*. If an abscess was the cause, its contents hardening between the laminae of the cornea, causes it to project a little; and then it is called a *pearl*.

The causes are various; as inflammation in the eye, abscess in the cornea, erosion, measles, small-pox, wounds, burns, &c.

When deep, the cure is difficult; when the consequence of a wound or ulcer, they are rarely cured; when caused by an imprudent use of vitriolic collyriums, and when they alter the natural shape of the eye, the prognostic is as unfavourable. Those which follow an inflammation, generally disappear spontaneously.

Happening after the small-pox, measles, or other inflammatory causes, the utmost haste should be made to relieve, by bleeding, purging, blistering, diuretics, and an abstemious diet. Avoid cold and astringent collyriums; but the fumes of coffee, or of the decoction of the woods, may be useful. When these specks *Motherby*, are very small, they often ulcerate; but these ulcers *Med. Dis.* are soon healed by the application of the *pulv. rad. irid. paucul. fac. chrysal.* or, as is justly preferred by many, the *agg. sapph.* If the disorder hath been of long standing, the cure is very difficult; however, the following methods may be attempted: expose the diseased part of the eye to the fumes of camphorated spirit of wine directed through a quill: this, by a continued use, may abrade the speck. This method seldom fails to excite some degree of inflammation, by which the cure is effected; though when the inflammation is thus produced, it must be removed by the common methods with all possible speed. To this end, the following have been also applied with some degree of success, viz. the juice ofcelandine, the gall of elcs, or of the pike, or of a partridge, and the oil of box: if these prove too sharp, let them be diluted with water, or with a thin solution of gum dragon: apply any of these once in 24 hours; and half an hour after the application, wash it off with a little brandy and water. The *ag. sapph.* alone sometimes succeeds. When the film is very tough, and the eye not inflamed, common glass finely levigated may be blown upon it through a quill, and repeated once in a day or two.

ALBURNUM, the soft white substance which in trees is found between the liber or inner bark and the wood, and in progress of time acquiring solidity, becomes itself the wood. From its colour and comparative softness, it has been styled by some writers the fat of trees, *adeps arborum*.

The alburnum is found in largest quantities in trees that are vigorous; though in such as languish, or are sickly, there is a greater number of beds. In an oak six inches in diameter, this substance is nearly equal in bulk to the wood. In a trunk of one foot diameter, it is as one to three and a half; of two and a half feet diameter, as one to four and a half, &c. but these proportions vary according to the health and constitution of the trees.—The alburnum is frequently gnawed in pieces by insects which lodge in the substance, and are nourished from it.

ALDER, (*Encycl.*) The bark of the black berry-bearing alder is said to be the most certain purge for the horned cattle in obstinate constipations of the bowels. Gunner says, that horses do not eat the leaves, but that cows sometimes will, and that it greatly increases the quantity of the milk.

ALGÆ, FLAGS; one of the seven families or natural tribes into which the whole vegetable kingdom is divided by Linnaeus, in his *Philosophia Botanica*. They are defined to be plants, whose root, leaf, and stem are all one. Under this description are comprehended all the sea-weeds, and some other aquatic plants. In the sexual system, they constitute the third order of the 24th class *cryptogamia*; in Tournefort, the second genus of the second section, *marines, aut fluviatiles*, of the 17th class, *asperma vulgo habita*; and the 57th order in Linnaeus's Fragments of a Natural Method. The discoveries made in this part of the vegetable kingdom are

Albugo
Alge.

uncertain, and imperfect; and the attempts, in particular, to arrange flags by the parts of the fructification, have not been attended with great success. Dillenius has arranged this order of plants from their general habit and structure; Michelius from the parts of fructification.—Each has considerable merit.

ALIMENT. Marginal note, for n° 438, &c. read 440—442.

A considerable change has now taken place in the vegetables made use of as food by the ancients, by substituting, instead of what were then used, a number of more bland, agreeable, and nutritive juices. The acorns and nuts of the primitive times have given way to a variety of sweeter farinaceous seeds and roots. To the malvaceous tribe of plants so much used by the Greeks and Romans, hath succeeded the more grateful spinach; and to the blite, the garden orach. The rough borage is supplanted by the acefcent sorrel; and asparagus has banished a number of roots recorded by the Roman writers under the name of *bulbs*; but Linneus is of opinion, that the parsnip has undeservedly usurped the place of the skirret. The bean of the ancients, improperly so called, being the roots, as well as other parts of the *nymphaea nelumbo*, or Indian water-lily, is superseded by the kidney-bean. The garden rocket, eaten with, and as an antidote against the chilling qualities of the lettuce, is banished by the more agreeable cress and tarragon; the apium by the meliorated celery; the pomponi, and others of the cucurbitaceous tribe, by the melon; and the fumach berries, by the fragrant nutmeg. The silphium, or succus Cyrenaicus, which the Romans purchased from Persia and India at a great price, and is thought by some to have been the asafetida of the present time, is no longer used in preference to the alliaceous tribe.

To turn from the vegetable to some of the animal substitutes, we may mention the carp among fishes, as having excluded a great number held in high estimation among the Romans. The change of oil for butter; of honey for sugar; of mulsu, or liquors made of wine, water, and honey, for the wines of modern times; and that of the ancient zythus for the present improved malt liquors; not to mention also the *calida* of the Roman taverns, analogous to our tea and coffee.

ALKADARII, a sect among the Mahometans, who deny any eternal, fixed, divine decrees, and are asserters of free will. The word is formed from the Arabic *alkadar*, which signifies "decree." The Alkadarii are a branch of Motazalites, and stand opposed to the Algiabarii. See ALGIABARII, (*Encycl.*)

ALKALI, (*Encycl.*) Alkalies comprehend one class of the chemical elements, or component parts or neutral salts, as acids do another. Concerning the origin of alkalies there have been a great number of various conjectures, as well as concerning that of acids; but nothing certain has been, or in all probability will be, discovered. They are distinguished from other bodies of the saline kind by the following properties.

1. They combine with acids more readily than any other known substance, excepting the pure ponderous earth, occasioning an effervescence and heat. 2. When they are in a concrete form, into which they may be easily reduced by evaporation; if exposed to the open air, they attract the moisture from it, though not so strongly as concentrated acids; and generally deliquesce,

that is, become a fluid: But if they are mixed with water all at once, a considerable degree of heat is produced. 3. They generally change the blue and red colour of vegetables to a green; whereas the acids change it to red, or to a stronger red. 4. They have an acid burning taste, which has something of urinous. 5. They partly exhale with water, especially when boiled in open vessels. 6. They may be fused by a moderate heat; and in that state they dissolve all sorts of earths, especially those called *vitrisifiables*; and if the heat is sufficient, they and the earth form a brittle substance called *glass*; and upon this principle common glass is made.

Alkalies are principally distinguished into *fixed* and *volatile*; the former being not so easily dissipated even by a strong fire; for which reason they are commonly employed in making glass, and other compositions. But the volatile alkalies are so easily dissipated, that they may be almost entirely evaporated by a much less degree of heat than that of boiling water. Notwithstanding that various sorts of alkali are enumerated, it is supposed that there is but one alkaline principle in nature, which, by being variously combined with sundry substances, assumes various particular properties. However, an alkali is never found pure in nature, but it is always combined with other substances, from which it must be separated by art, in order to obtain it sufficiently pure. The fixed alkali is obtained either from sea-salt, or from vegetables; hence it is called *fixed mineral alkali* in the first case, and *fixed vegetable alkali* in the second. The volatile alkali is obtained, by means of decomposition and putrefaction, from all animal substances, and may be also obtained by decomposition and other means from some vegetable and a few other matters. Fixed alkali, whether vegetable or mineral, has always the same principal properties; yet they differ from one another in degree, viz. the mineral alkali possesses the alkaline properties in a less degree than the vegetable alkali; for when it is exposed to the open air, it will not attract the moisture from it in such a quantity as to deliquesce; when mixed with water, it will not occasion so much heat as the fixed vegetable alkali, &c.—Its affinity with other substances is exhibited below:

- | | |
|---------------------------|---------------|
| 1. Vitriolic acid, | 8. Oils, |
| 2. Nitrous acid, | 9. Tin, |
| 3. Marine acid, | 10. Lead, |
| 4. Phosphoric acid, | 11. Copper, |
| 5. Acid of sugar, | 12. Gold, and |
| 6. Other vegetable acids, | 13. Water. |
| 7. Sulphur, | |

The fixed vegetable alkali has an affinity with the following substances:

- | | |
|---------------------------|---------------|
| 1. Vitriolic acid, | 8. Oils, |
| 2. Nitrous acid, | 9. Tin, |
| 3. Marine acid, | 10. Lead, |
| 4. Phosphoric acid, | 11. Copper, |
| 5. Acid of sugar, | 12. Gold, and |
| 6. Other vegetable acids, | 13. Water. |
| 7. Sulphur, | |

Alkaline salts are of great use in chemistry, not only because they counteract the action of acids, but also because they are powerful solvents; and, when combined with other substances, communicate to them part of their saline properties. Thus, when they are com-

combined with sulphur, they make a compound called *hepar sulphuris*, or liver of sulphur, which is dissolvable in water, whereas sulphur by itself is not; and when they are combined with oils, form compounds called *saps*, which are dissolvable in water, whereas oil by itself is not. The fixed alkali, more commonly used, by reason of its greatest purity, is that extracted from tartar, which is a substance found adhering to the sides of casks that have contained wine, and is considered as the essential salt of that liquor. This alkali, when it is in a liquid form by its combination with a sufficient quantity of water, is commonly, but improperly, called *oil of tartar*.

Volatile alkali, when first extracted from animal or vegetable substances, is very impure; but by proper methods it may be purified to a great degree; and in that purified state it differs from fixed alkali, principally because it is very volatile: it has a strong penetrating smell, which occasions coughs, suffocation, &c.—The hart's-horn drops commonly used, the smell of which almost every body knows, are a volatile alkali.

ALKENNA, in botany. See LAWSONIA, (*Encycl.*)

ALLODIUM, (*Encycl.*) See also FEE and FEODAL System, (*Encycl.*)

ALL-SPICE, PIMENTO, or Jamaica Pepper. See PIMENTO, (*Encycl.*)

ALOE, (*Encycl.*) The *mitre-shaped aloe*, so termed from the figure of its leaves, is a kind of symbolic plant to the Mahometans, especially in Egypt, and in some measure dedicated to the offices of religion; for whoever returns from a pilgrimage to Mecca, hangs it over his street-door, as a token of his having performed that holy journey. The superstitious Egyptians believe, that this plant hinders evil spirits and apparitions from entering the house; and on this account, whoever walks the streets in Cairo, will find it over the doors both of Christians and Jews. From the same plant the Egyptians distil a water, which is sold in the apothecaries shops at Cairo, and recommended in coughs, hysterics, and asthma. An unexperienced French surgeon, says Hasselquist, gave a Coptite, 40 years old, affected with the jaundice, four tea-cups full of the distilled water of this species of aloe, and cured him in four days. This remedy, unknown to our apothecaries, is not difficult to be obtained, as the plant might easily be raised in the warm southern parts of Europe. The Arabians call it *sabbara*.

The under leaves of a species of aloe, termed by Linnaeus *aloe disticha*, are of a dark-green colour, spotted with white, somewhat resembling the colour of soft soap; whence it is sometimes distinguished by the name of *soap-aloe*.

The name of *pearl aloe* is given to a certain species, the leaves of which are closely fludded with white beautiful protuberances.

Of the leaves of the Guinea aloe, mentioned by Mr Adanson in his voyage to Senegal, the negroes make very good ropes, not apt to rot in the water.

Dr Sloane mentions two sorts of aloe; one of which is used for fishing-lines, bow-strings, stockings, and hammocks; the other has leaves which, like those of the wild-pine and banana, hold rain-water, and thereby afford a very necessary refreshment to travellers in hot countries, where there is generally a scarcity of wells and water.

The substance known among druggists and apothecaries by the name of *aloe*, is a thick, or inspissated juice, drawn from the plants by expression or incision. Of this substance there are three sorts, which differ in purity, and, according to most authors, are the produce of the same plant.

The manner of collecting and preparing the juice, is thus explained by J. Bauhin: having cut the herb in pieces, they bruise it, and squeeze out the juice, which they put up into a vessel of a long and round shape, suffering it to stand for the space of 25 days; in the meanwhile they take care to clear off the useless-scum, and throw it away, as also the upper part of the juice, until such time as some difference appears in its colour and consistence. The purer part of this juice being concreted, or hardened, is called *fuccotrine aloe*; the remaining part, being of a dark liver-colour, is called *hepatic aloe*; and from the dregs or settlings, is made that sort called *caballine* or *horse aloe*.

Notwithstanding the contrary opinion of Columna, Bauhin, Ray, and other naturalists, we are now sufficiently certain, that the three kinds of aloe just mentioned, are the juices of three different plants: the fuccotrine, of the *aloe vera* of Miller; the hepatic, of the *aloe vulgaris* of Bauhin, also *Discordis et aliorum* of Sloane, and *aloe barbadensis* of Miller; the caballine, of the *aloe Guineensis caballina, vulgari similis, sed tota maculata*, of Commelin.

The finest or purest is the fuccotrine aloe; so called, says Pomet, either because the substance itself is a concreted juice, or, which is most probable, because the best comes from Socotora, or Zocotra, an island in the streights of Babelmandel. Succotrine aloe, when broken, is transparent; and when powdered, of a fine yellow golden colour, with a bitter taste, and a smell like that of myrrh. From the root and leaves of the West-India, or Barbadoes aloe, is prepared the second sort, called from its colour, which is a dark-red like that of a liver, *hepatic aloe*. This sort, which is coarser than the former, and seldom used in medicine except for horses, is brought up in gourds or calabashes of different sizes and weight. It is of a liver colour, clear, and not very fetid in smell.

The third sort, by much the coarsest, black, hard to break, and frequently adulterated, is called *caballine aloe*; because, like the second sort, it is solely appropriated to the use of horses. This sort is generally sold in the shops for the true hepatic aloe.

The month of March, says Mr Hughes in his Natural History of Barbadoes, is the properest season to make the aloe; which is done in the following manner: Each negro has by him three or four portable tubs, into which the leaves are thrown with their broken ends downwards. These being full of large longitudinal veins, or vessels, yield an easy passage to the juice, which is of a greenish yellow colour, to drip out. The juice being boiled for about five hours in a copper or kettle, the watery particles evaporate, and the remainder comes to a consistency, and thickens as sugar doth when sufficiently boiled. The way to know when it is enough boiled, is to dip a stick in the liquor, and observe whether the aloe, sticking to it when cold, breaks short; if it does, then it is boiled to perfection, and fit to be poured into gourds, calabashes, or other vessels for use.

Alopecia
Amalgama-
tion.

Succotrine aloes, which is the only sort now prescribed in medicine, is seldom or never administered in potion, by reason of its extreme bitterness; but is often given in pills, being in fact the basis of the greatest part of the purgative pills now in use. The Francfort or angelic pill is entirely composed of it. In the city of Goa, as Garcias relates, aloes well bruised and mixed with milk, is prescribed with success, to such as are afflicted with ulcers in the kidneys or bladder, and void purulent urine. The herbs which produce the three medicines just mentioned, are by no means to be confounded with the tree from which is procured the precious, valuable, and rare wood called *wood of aloes*.

ALOPECIA, (*Encycl.*) *Dele* the marginal note.

The term is used among physicians to denote a total falling off of the hair from certain parts, occasioned either by the defect of nutritious juice, or by its vicious quality corroding the roots of it, and leaving the skin rough and colourless.

The word is formed from *αλωπε*, *vulpes*, "a fox;" whose urine, it is said, will occasion baldness; or because it is a disease which is common to that creature.

The alopecia properly differs from *desuvium capilorum*; as in the former certain parts or patches are left entirely bald, whereas in the latter, the hair only grows immoderately thin. It also differs from the ophiasis, as this latter creeps in spies about the head, like the windings of a serpent; whereas the former is not confined to any figure.

The remedies which remove the proximate cause of this malady, are called *μετασυνκριτικά, metasthcrítica*. Here, first, if any corrupt hairs still remain, they are to be drawn out either with tweezers, or by dropacism; or the place must be shaved by a razor. Then the head is to be washed every night at going to bed with a ley, prepared by boiling the ashes of vine branches in red wine. A powder made by reducing hermodactyls to fine flour, is also recommended for the same purpose.

In cases where the baldness is total, a quantity of the finest burdock roots are to be bruised in a marble mortar, and then boiled in white wine until there remains only as much as will cover them. This liquor, carefully strained off, is said to cure baldness, by washing the head every night with some of it warm. A ley made by boiling ashes of vine branches in common water, is also recommended with this intention. A fresh cut onion, rubbed on the part until it be red and itch, is likewise said to cure baldness.

A multitude of such remedies are every where to be found in the works of Valerius de Taranta, Rondeletius, Hollerius, Trincavellius, Celsus, Senertay, and other practical physicians. See *Buxus*, (*Encycl.*)

ALTERANTS. In the marginal note, for MEDICINE, &c. read MATERIA MEDICA, p. 4475. col. 1. par. 2.

ALTHÆA. Marginal note, for n° 90, read *The Table*.

ALUM. Marginal note, for n° 91, read *The Table*.

AMALGAMATION, (*Encycl.*) The proper method of making amalgams is, by first melting the metal with as little heat as possible, and then pouring the quicksilver into it. During this operation part of the metal undergoes a kind of calcination, whence the sur-

face of some amalgams become black and dusky in a very short time. This is effectually prevented by adding a small quantity of tallow or hog's-lard to the mixture whilst hot; which restores the phlogiston lost by the metal, and preserves the mixture always of a metalline splendor. This is especially necessary in making an amalgam with zinc, which is found to excite the electrical power of glass more than any other. It requires at least four parts of zinc to one of mercury.

AMAUROSIS. Marginal note, for 790, read 455.

AMBERGRISE, (*Encycl.*) In the Philosophical Transactions we meet with an account of the origin of substance, very different from the commonly received one of its being a natural bitumen. This account was communicated to the Society by Paul Dudley, Esq; who had it from an American shipmaster. It is in substance the same with the account given by Doctor Douglas in his Historical and Political Summary of the English Colonies, vol. i. p. 57. "Ambergrise," says he, "is now fully discovered to be some production of the spermaceti whale; for some time it was imagined some peculiar concreted juice lodged in a peculiar cystis, in the same manner as is the castoreum of the beaver or fiber canadensis, and the zibethum of the civet-cat or hyæna, in cystises on both sides in the ani rima. Thus, not long since, some of our Nantucket whalers imagined, that in some (very few and rare) of these male or bull-whales, they had found the gland or cystis in the loins near the spermatic organs: late and more accurate observations seem to declare it to be some part of the ordure, dung, or alvine excrement of the whale. Squid fish, one of the Newfoundland baits for cod, are sometimes in Newfoundland cast ashore in quantities; and as they corrupt and fry in the sun, they become a jelly or substance of an ambergrise smell; therefore, as squid bills are sometimes found in the lumps of ambergrise, it may be inferred, that ambergrise is some of the excrement from squid food, with some singular circumstances or dispositions that procure this quality seldom concurring. Thus the Nantucket whalers, for some years last past, have found no ambergrise in their whales."

In the sixth volume of Goldsmith's Natural History, we find an account somewhat different from the foregoing. He tells us, that it is found in the cachalot or spermaceti whale, in the place where the seminal vessels are usually situated in other animals. It is found in a bag of three or four feet long, in round lumps, from one to 20 pounds weight, floating in a fluid rather thinner than oil, and of a yellowish colour. There are never more seen than four at a time in one of these bags; and that which weighed 20 pounds, and which was the largest ever seen, was found single. These balls of ambergrise are not found in all fishes of this kind, but chiefly in the oldest and strongest. In the 73d volume of Philosophical Transactions, Dr Schewdiner gives an account very similar to the former one.

AMERICA. Marginal note, n° 11. for *cool*, read *moderate*.

AMNIOS, (*Encycl.*) See GENERATION, footnote (c), (*Encycl.*)

AMOMUM. At the end, for n° 97, read *The Catalogue of Simples*.

AMPUTATION. Marginal note, for n° 28, 29. read *sect. xviii. p. 8453.*

AMSTER-

Amanreia
Amputation.

AMSTERDAM ISLAND, (*Encycl.*) laid there, by mistake, not to be taken notice of in our later discoveries. It was visited by capt. Cook in his late voyages. Its greatest extent from east to west is about 21 miles, and from north to south about 13. It is broad at the east end, and runs taper towards the west, where it turns, and runs to a point due north. It is about six leagues to the west of Middleburgh. The shore is surrounded by a coral rock, and its most elevated parts are not above six or eight yards above the level of the sea. S. Lat. 21. 11. W. Long. 175. It is wholly laid out in plantations, in which are cultivated some of the richest productions of nature.

Here are bread-fruit, cocoa-nut trees, plantains, bananas, shaddocks, yams, and some other roots; sugar-canes, and a fruit like a nectarine, called by the natives *fighega*. There did not appear an inch of waste ground: the roads occupied no more space than was absolutely necessary: the fences did not take up above four inches each; and even these were not wholly lost, for in many grew some useful trees or plants: it was every where the same, change of place altered not the scene: nature, assisted by a little art, nowhere appeared in more splendor than on this island. Water is not so plentiful here as at the Society-islands; but the chief pointed out a pool of fresh water unasked, to supply the ships with that necessary article. Casuarinas, pandangs, and wild sago-palms, appear here with their various tints of green, and barringtonia as big as the loftiest oaks. The bread-fruit does not, however, thrive here with the same luxuriance as at the Society-islands, the coral rock, which composes the basis of this spot, being much more thinly covered with mould.

Both men and women are of the common size of Europeans, and their colour is that of a lightish copper; they are well-shaped, have regular features, are active, brisk, and lively. They have fine eyes, and in general good teeth, even to an advanced age. The women are the merriest creatures imaginable, and incessant talkers. In general, they appear to be modest; although there was no want of those of a different stamp. Among the natives, who swam about the ship very vociferously, were a considerable number of women, who wanted in the water like amphibious creatures, and were easily persuaded to come on board perfectly naked; but none of them ventured to stay there after sunset, but returned to the shore to pass the night, like the greater part of the inhabitants, under the shade of the wild wood which lined the coast. There they lighted great fires, and were heard conversing almost the whole night. The hair of both sexes in general is black, but especially that of the women; both sexes wear it short, except a single lock on the top of the head, and a small quantity on each side. The men cut or shave their beards quite close, which operation they perform with two shells. The hair of many was observed to be burnt at the ends, and strewed with a white powder, which was found, on examining it, to be lime made of shell or coral, which had corroded or burnt the hair; some made use of a blue powder, and others, both men and women, of an orange-coloured powder made of turmeric.

The dress of both sexes consists of a piece of cloth or matting wrapped round the waist, and hanging

down below the knees. From the waist upwards they are generally naked, and it seems to be a custom to anoint these parts every morning. The practice of tattooing, or puncturing the skin, likewise prevails. The men are tattooed from the middle of the thigh to above the hips; the women have it only on their arms and fingers, and on those parts but very slightly. Their ornaments are amulets, necklaces, and bracelets, the bone, shells, and beads of mother-of-pearl, tortoise-shell, &c. which are worn by men as well as women. The women also wear on their fingers neat rings made of tortoise-shell, and pieces in their ears about the size of a small quill: but here ornaments are not commonly worn, though all have their ears pierced. They have also a curious apron, made of the out-side feathers of the cocoa-nut shell, and composed of a number of small pieces, sewed together in such a manner as to form stars, half-moons, little squares, &c.; it is studded with beads and shells, and covered with red feathers, so as to have a pleasing effect. They make the same kind of cloth, and of the same materials, as at O-Taheitee, though they have not such a variety, nor do they make any so fine; but as they have a method of glazing it, it is more durable, and will resist rain for some time, which the other cloth would not. Their colours are black, brown, yellow, purple, and red; all made from vegetables. They make various sorts of matting, some of a very fine texture, which is generally used for cloathing; and the thick and stronger sort serves to sleep upon, and to make sails for their canoes, &c. Among other useful utensils, they have various sorts of baskets, some made of the same materials as their mats, and others of the twisted fibres of cocoa-nuts. These are not only durable, but beautiful, being generally composed of different colours, and studded with beads made of shells or bones. They have many little nicknacks among them, which show that they neither want taste to design, nor skill to execute, whatever they take in hand. Their fishing implements are much the same as in other islands: here was purchased a fish-net made like our casting-nets, knit of very firm though slender threads.

Notwithstanding their very friendly disposition, these people have very formidable weapons; some of their spears have many barbs, and must be very dangerous weapons when they take effect. A large flat shell or breastplate was purchased, made of a roundish bone, white and polished like ivory, about 18 inches in diameter, which appeared to have belonged to an animal of the whale tribe.

AMYGDALUS. At the end of the article, for n° 99. read *The Catalogue of Simples*.

AMYLACEOUS, from *amylum*, "starch;" a term applied to the fine flour of farinaceous seeds, in which consists their nutritive part. See **BREAD**, (*Encycl.*)

ANACARDIUM, (*Encycl.*). See also **CASHEW-NUT**, (*Encycl.*)

ANALYSIS, (*Encycl.*) Rhetorical analysis, is that which examines the connections, tropes, figures, and the like, inquiring into the proposition, division, passions, arguments, and other apparatus of rhetoric.

Several authors, as Freigius and others, have given analyses of Cicero's Orations, wherein they reduce them to their grammatical and logical principles; strip them of all the ornaments and additions of rhetoric which

Analysis
||
Antimony.

which otherwise disguise their true form, and conceal the connection between one part and another. The design of these authors is to have those admired harangues just such as the judgment disposed them, without the help of imagination; so that here we may coolly view the force of each proof, and admire the use Cicero made of rhetorical figures to conceal the weak part of a cause.

A collection has been made of the analyses formed by the most celebrated authors of the 16th century, in 3 vols folio.

ANALYSIS is also used, in chemistry, for the decomposing of a mixed body, or the separation of the principles and constituent parts of a compounded substance.

To analyze bodies, or resolve them into their component parts, is indeed the chief object of the art of chemistry. Chemistry furnishes several means for the decomposition of bodies, which are all founded on the differences of the properties belonging to the different principles of which the body to be analyzed is composed. If, for example, a body be composed of several principles, some of which have a great, and others a moderate degree of volatility, and, lastly, others are fixed, its most volatile parts may be first separated by a gradual heat in distilling vessels; and then the parts which are next in volatility will pass over in distillation; and lastly, those parts which are fixed, and capable of resisting the action of fire, will remain at the bottom of the vessel.

ANALYSIS is also used for a kind of syllabus, or table of the principal heads or articles of a continued discourse, disposed in their natural order and dependency. Analyses are more scientific than alphabetical indexes; but they are less used, as being more intricate.

ANALYSIS is likewise used for a brief, but methodical, illustration of the principles of a science; in which sense it is nearly synonymous with what we otherwise call a *synopsis*.

ANASARCA, (*Encycl.*) *See* the references.—In this distemper the water is contained in the cellular membrane between the skin and flesh. Its cure is the same with that of the ascites. *See* MEDICINE, n° 441—444. and p. 4870. col. 2. (*Encycl.*)

ANEMONE, (*Encycl.*) Horned cattle, when removed from the higher grounds into woods and woody pastures, frequently eat the wood-anemone; and, according to Linnæus and Gunner, many observations have proved that it causes the bloody flux among them.

Sea-ANEMONE. *See* ANIMAL-Flower and SEA-*Anemone*, (*Encycl.*)

ANETHUM. For n° 103. read *Catalogue of Simples*.

ANEURISM. For n° 38. read p. 8416.

ANGELICA. For n° 104. read *The Catalogue of Simples*.

ANGINA PECTORIS. *See* MEDICINE, n° 70, 480. (*Encycl.*)

ANTIMONIALS. For "References at *Materia Medica*, n° 110." read "See *Materia Medica*, *The Catalogue of Simples*."

ANTIMONY. For *References*, &c. read "See *Materia Medica*, *The Catalogue of Simples*."

ANTIQUITIES. Marginal note: For VII. read *Antiquities* III.

ANVIL, (*Encycl.*) a smith's utensil, serving to place their work on to be hammered or forged. The face or uppermost surface of the anvil must be very flat and smooth, without flaws; and so hard that a file will not touch it.—At one end is sometimes a pike, bickern or beak-iron, for the rounding of hollow work. The whole is usually mounted on a firm wooden block.

APHIS*, (*Encycl.*) These insects are found in great numbers on the stems, leaves, and even roots of many trees and plants. Those trees that are most loaded with the insects, suffer greatly from them. The plant-lice thrust their sharp-pointed rostrum into the substance of the leaf to draw out their sustenance, which warps the stems and leaves, and occasions in the latter cavities underneath, and swellings above; nay, even in some, a kind of hollow gall filled with insects, as is often seen on elm-leaves.

It appears astonishing, that the slight puncture of so small an animal should so greatly disfigure a plant: but it must be remembered, that plant-lice always live in numerous associations, which increase visibly by the prodigious fruitfulness of those insects; so that altho' each puncture be slight, yet the number of them is so great, so reiterated, that it is no longer a wonder the leaves should be disfigured. And indeed lovers of gardening and plants seek to free and cleanse their trees from this vermin; but their care often proves unavailing, the insect is so fruitful that it soon produces a fresh colony. The best and surest method of extirpating it, is to put on the trees infested with them some larvæ of the plant-louse-lion, or aphidivorous flies †; for those voracious larvæ destroy every day a great number of the insects, and that with so much the more facility, as the latter remain quiet and motionless in the neighbourhood of these dangerous enemies, who range over heaps of plant-lice, which they gradually waste and diminish.

APIS, (*Encycl.*) *See* also BEE.—P. 515. col. 1. par. 2. for n° 2. read n° 21. And p. 554. col. 1. line 31. for fig. 12. read fig. 17.

APPLE, (*Encycl.*) For *Malus* read *Pyrus*.

The best method of preserving apples for winter use, is to let them hang upon the trees until there is danger of frost, to gather them in dry weather, and then to lay them in large heaps to sweat for a month or six weeks. They ought then to be carefully looked over, all which have the least appearance of decay taken out, the sound fruit wiped dry, and packed up in large oil jars, which have been thoroughly calded and dry, and then stopped close to exclude the air. If this plan is duly observed, the fruit will keep a long time sound, and their flesh remain plump; whereas, when exposed to the air, their skins will shrivel, and their pulp soften.

Among the various kinds of apples, some are used for the dessert, some for the kitchen, and some for cyder-making. Those used for the dessert are the following, placed as they successively ripen after one another: The white juncating, the margaret apple, the summer pearmain, the summer queening, the embroidered apple, the golden rennet, the summer white calville, the summer red calville, the silver pippen, the aromatic

Antiquities
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Apple.

* See Plate CCCXIII.

† See *Coccinella*, *Ichneumon*, *Hemerobius*, &c. (Appendix.)

Apple
||
rchbishop

aromatic pippen, *la reinette* apple, *la haute bonte*, the royal ruffletting. Wheeler's rufflet, Sharp's rufflet, the spine apple, the golden pippen, the nonpareil, *l'api* or *pomme d'api*.

Those for the kitchen use, in the order of their ripening are these: The codling, the summer margold, the summer red pearmain, the Holland pippen, the Kentish pippen, the courpendu, Loan's pearmain, the French rennet, the French pippen, the royal rufflet, the monstrous rennet, the winter pearmain, the *pomme violette*, Spencer's pippen, the stone pippen, and the oaken pippen.

Those most esteemed for cyder are, the Devonshire royal wilding, the redstreak apple, the whitfleur, the Herefordshire under-leaf, and the John apple, or *deux ames*, everlasting hanger, and genet moyle.

The apple is composed of four distinct parts, viz. the pill, the parenchyma, the branchery, and the core. The pill or skin is only a dilatation of the outermost skin or rind of the bark of the branch on which it grew. The parenchyma or pulp, as tender and delicious as it is found, is only a dilatation, or, as Dr Grew calls it, a *swellth* or superbiency of the inner part of the bark of the branch. This appears not only from the visible continuation of the bark from the one through the pedicle or stalk to the other, but also from the structure common to both. The branchery or vessels, are only ramifications of the woody part of the branch, sent throughout all the parts of the parenchyma, the greater branches being made to communicate with each other by insinuations of the less.

The apple core is originally from the pith of the branch; the sap of which finding room enough in the parenchyma through which to diffuse itself, quits the pith, which by this means hardens into core.

The juice of apples is a menstruum for iron. A solution of iron in the juice of the apples called *golden rennets*, evaporated to a thick consistence, proves an elegant chalybeate, which keeps well.

AQUA. For n° 501. read 541.

ARACHIS, (*Encycl.*) See also EARTH-NUT, (*Encycl.*)

ARBOR VITÆ. See THUYA, (*Encycl.*)

ARCHBISHOP, (*Encycl.*) Archbishops were not known in the east till about the year 320; and though there were some soon after this who had the title, yet that was only a personal honour, by which the bishops of considerable cities were distinguished. It was not till of late that archbishops became metropolitans, and had suffragans under them. Athanasius appears to be the first who used the title *archbishop*, which he gave occasionally to his predecessor; Gregory Nazianzen, in like manner, gave it to Athanasius; not that either of them were intitled to any jurisdiction, or even any precedence, in virtue of it. Among the Latins, Isidore Hispalensis is the first that speaks of archbishops. He distinguishes four orders or degrees in the ecclesiastical hierarchy, viz. patriarchs, archbishops, metropolitans, and bishops.

The archbishop, beside the inspection of the bishops and inferior clergy in the province over which he presides, exercises episcopal jurisdiction in his own diocese. He is guardian of the spiritualities of any vacant see in his province, as the king is of the tempo-

ralities; and exercises ecclesiastical jurisdiction in it, Archbishops He is intitled to present by lapse to all the ecclesiastical livings in the disposal of his diocesan bishop, if not filled within six months. He has likewise a customary prerogative, upon consecrating a bishop, to name a clerk or chaplain to be provided for by such bishop; in lieu of which it is now usual to accept an option. He is said to be enthroned when vested in the archbishopric; whereas bishops are said to be installed.

The archbishop of Canterbury had anciently, viz. till the year 1152, jurisdiction over Ireland as well as England, and was stiled a *patriarch*, and sometimes *alterius orbis papa*, and *orbis Britannici pontifex*. Matters were done and recorded in his name thus, *Ann pontificatus nostri primo*, &c. The first archbishop of Canterbury was Austin, appointed by king Ethelbert, on his conversion to Christianity, about the year 598. He was also *legatus natus*. He even enjoyed some special marks of royalty; as, to be patron of a bishoprick, which he was of Rochester; and to make knights, coin moneys, &c. He is still the first peer of England, and the next to the royal family; having precedence of all dukes and all great officers of the crown. It is his privilege, by custom, to crown the kings and queens of this kingdom. He may retain and qualify eight chaplains; whereas a duke is by statute allowed only six. He has, by common law, the power of probate of wills and testaments, and granting letters of administration. He has also a power to grant licences and dispensations in all cases formerly sued for in the court of Rome, and not repugnant to the law of God. He accordingly issues special licences to marry, to hold two livings, &c. and he exercises the right of conferring degrees. He also holds several courts of judicature; as, court of arches, court of audience, prerogative court, and court of peculiars.

The archbishop of York has the like rights in his province as the archbishop of Canterbury. He has precedence of all dukes not of the royal blood; and of all officers of state, except the lord high chancellor. He has also the rights of a count palatine over Hexamshire. The first archbishop of York was Paulinus, appointed by Pope Gregory about the year 622. He had formerly jurisdiction over all the bishops of Scotland; but in the year 1470, pope Sixtus IV. created the bishop of St Andrew's archbishop and metropolitan of all Scotland.

ARCTIUM. For "References at *Materia Medica*," read "MATERIA MEDICA, *Catalogue of Simples*."

AREIA, (*Encycl.*) There is another species; the holeracea, which is the true cabbage palm.

ARGENTUM VIVUM. For *References at Materia Medica*, read "MATERIA MEDICA, *Catalogue of Simples*."

ARGONAUTIC EXPEDITION. See THESSALY; (*Encycl.*) This celebrated voyage, which is the first epoch in the Grecian history upon which any stress can be laid, was undertaken, according to Archibishop Usher and the authors of the Universal History, 1280 B. C. Dr Blair places it 1263; and Sir Isaac Newton and Dr Priestley 936 years before the same period; but all chronologers agree in fixing this enterprise near a century before the Trojan war.

Dr Bryant rejects the history of the Argonautic expedition as a Grecian fable, founded indeed on a tradition.

Archbishop
||
Argonautic

Arillus, dition derived from Egypt, and ultimately referring to Armstrong.
 Noah's preservation, &c. in the ark.

ARILLUS, an improper term invented by Linnaeus, and defined to be the proper exterior coat or covering of the seed, which falls off spontaneously.

All seeds are not furnished with an arillus; in many, a dry covering, or scarf-skin, supplies its place. In Jessamy; hound's tongue, *cynoglossum*; cucumber; fraxinella, *dictamnus*; staff-tree, *calafirus*; spindle-tree, *eunymus*; African spiræa, *diosua*; and the coffee-tree, *coffea*; it is very conspicuous.

In the genus hound's tongue, four of these arilli, or proper coats, each inclosing a single seed, are affixed to the style or pointal; and in this circumstance, says Linnaeus, does the essence of the genus consist. In fraxinella, the arillus is common to two seeds. The staff-tree has its seeds only half involved with this cover.

The arillus is either

Baccatus, succulent, and of the nature of a berry; as in the spindle tree, *eunymus*.

Cartilagineus, cartilaginous, or gristly; as in the African spiræa, *diosua*.

Coloratus, coloured; as in the staff-tree.

Elasticus, endued with elasticity, for dispersing the seeds; as is remarkable in the African spiræa, *diosua*, and fraxinella.

Scaber, rough and knotty; as in hound's-tongue.

Although covered with an arillus, or other dry coat, seeds are said to be naked (*semina nuda*), when they are not inclosed in any species of pericarpium or fruit-vessel; as in the grasses, and the *labiati* or lipped flowers of Tournefort, which correspond to the *Didynamia Gynouspermia* of Linnaeus.

Seeds are said to be covered (*semina testæ*) when they are contained in a fruit-vessel, whether capsule, pod, or pulpy pericarpium, of the apple, berry, or cherry kind. See SEMEN, (*Encycl.*)

This exterior coat of the seed is, by some former writers, styled *Calyptra*. See CALYPTRA, (*Encycl.*)

The different skins or coverings of the seed, are adapted, say naturalists, for receiving the nutritive juices, and transmitting them within.

ARMSTRONG, (Dr John), an eminent physician, poet, and miscellaneous writer, was born in Castleon parish, Roxburghshire, where his father and brother were ministers; completed his education in the university of Edinburgh, where he took his degree in physic, Feb. 4. 1732, with much reputation; and published his theses, as the forms of that university require; the subject was *De tabe purulenta*. In 1735 he published a little humorous fugitive pamphlet in 8vo, entitled, *An Essay for abridging the Study of Physic; to which is added a Dialogue betwixt Hygeia, Mercury, and Pluto, relating to the Practice of Physic, as it is managed by a certain illustrious Society. As also an Epistle from Usbek the Persian to Joshua Ward, Esq.* This piece contains much fun and drollery; in the dialogue, he has caught the very spirit of Lucian. In 1737 he published *A Synopsis of the History and Cure of the Venereal Diseases*, 8vo. This was soon followed by the *Oeconomy of Love*: a poem which has much merit; but, it must be confessed, is too strongly tinged with the licentiousness of Ovid. It is said, however, that his maturer judgment expunged many of the luxuriances of youthful fancy, in an edition "re-

vised and corrected by the author" in 1768. It appears by one of the cases on literary property, that Mr Millar paid 50 guinea for the copy-right of this poem, which was intended as a burlesque on some didactic writers. It has been observed of Dr Armstrong, that his works have great inequalities, some of them being possessed of every requisite to be sought after in the most perfect composition, while others can hardly be considered as superior to the productions of mediocrity. The *Art of preserving Health*, his best performance, which was published in 1744, will transmit his name to posterity as one of the first English writers, has been honoured with the following testimony of a respectable critic. On this work we shall also transcribe a beautiful eulogium from an eminent physician*: "Of all the poetical performances on this subject that have come to my hands, Dr Armstrong's *Art of preserving Health* is by far the best. To quote every charming description and beautiful passage of this poem, one must transcribe the whole. We cannot, however, expect new rules, where the principal design was to raise and warm the heart into a compliance with the solid precepts of the ancients, which he has enforced with great strength and elegance. And, upon the whole, he has convinced us, by his own example, that we ought not to blame antiquity for acknowledging

One power of physic, melody, and song."

In 1746 Dr Armstrong was appointed one of the physicians to the hospital for lame and sick soldiers behind Buckingham house. In 1751 he published his poem on Benevolence, in folio; and in 1753, "Taste, an epistle to a young Critic." In 1758 appeared, "Sketches, or Essays on various subjects, by Launcelot Temple, Esq; in two parts." In this production which possesses much humour and knowledge of the world, and which had a remarkably rapid sale, he is supposed to have been assisted by Mr Wilkes. In 1760 he had the honour of being appointed physician to the army in Germany; where in 1761 he wrote a poem called "Day, an Epistle to John Wilkes of Aylesbury, Esq;" In this poem, which is not collected in his works, he wantonly hazarded a reflection on Churchill, which drew on him the serpent-toothed vengeance of that ferocious satirist, whose embalming or corrosive pen could deify or lampoon any man, according as he acquiesced with, or dissented from, his political principles. In 1770 Dr Armstrong published a collection of "Miscellanies in 2 vols; containing, 1. The Art of preserving Health. 2. Of Benevolence, an Epistle to Eumenes. 3. Taste, an Epistle to a young Critic, 1753. 4. Imitations of Shakspear and Spenser. 5. The Universal Almanac, by Nouredin Ali. 6. The Forced Marriage, a tragedy. 7. Sketches." In 1771 he published "A short Ramble through some Parts of France and Italy, by Launcelot Temple;" and in 1773, in his own name, a quarto pamphlet, under the title of *Medical Essays*; towards the conclusion of which, he accounts for his not having such extensive practice as some of his brethren, from his not being qualified to employ the usual means, from a ticklish state of spirits, and a distempered excess of sensibility. He complains much of the behaviour of some of his brethren, of the herd of critics, and particularly of the reviewers. He died in September 1779; and, to the

Armstrong.
 * Dr Mackenzie's History of Health.

the no small surpris of his friends, left behind him more than 300 l. saved out of a very moderate income arising principally from his half pay.

ART, line 13. for *properly* read *popularly*.

ARTOCARPUS, in botany. See BREAD-Fruit Tree and Botanical Table, (Encycl.)

ARUNDO, (Encycl.) See also REED, (Encycl.)

ASARUM. For n° 130. read the Catalogue of Simples.

ASHAM. See Bengal, (Encycl.)

ASP, (Encycl.) See also SERPENT in this APPENDIX.

ASPERIFOLIE PLANTÆ, rough leaved plants. The name of a class in Hermannus, Boerhaave, and Ray's Methods, consisting of plants which have four naked seeds, and whose leaves are rough to the touch.

In Tournefort's System, these plants constitute the third section or order of the second class; and in Linnaeus's Sexual Method, they make a part of the pentandria monogynia.

ASPHODELUS, (Encycl.) The Lancashire asphodel is thought to be very noxious to sheep, whenever, through poverty of pasture, they are necessitated to eat it; although they are said to improve much in their flesh at first, they afterwards die with symptoms of a diseased liver. This is the plant of which such wonderful tales have been told by Pauli, Bartholine, and others, of its softening the bones of such animals as swallow it; and which they thence called *gramen offfragum*. Horned cattle eat it without any ill effect.

ASSETS, in law, signifies goods enough to discharge that burthen which is cast upon the executor or heir, in satisfying the debts and legacies of the testator or ancestor. Assets are real or personal; where a man hath lands in fee simple, and dies seised thereof, the lands which come to his heir are assets real: and where he dies possessed of any personal estate, the goods which come to the executors are assets personal. Assets are also divided into *assets per descent*, and *assets inter maines*. Assets by descent is where a person is bound in an obligation, and dies seised of lands which descend to the heir, the land shall be assets, and the heir shall be charged as far as the land to him descended will extend. *Assets inter maines* is when a man indebted makes executors, and leaves them sufficient to pay his debts and legacies; or where some commodity or profit ariseth to them in right of the testator, which are called *assets in their hands*.

ASTERN, a sea-phrase, used to signify any thing at some distance behind the ship; being the opposite of AHEAD, which signifies the space before her. See AHEAD, (Encycl.)

ASTRINGENTS. For n° 36. read p. 4479.

ASTRONOMY. Marginal note, n° 187. for 6th Plate XLII. fig. 4. read 6th Plate XLII. fig. 5.—And in p. 752. col. 2. line 31. for 12000 read 1200.

ATMOSPHERE, (Encycl.) See also AIR in this APPENDIX.—The lately discovered art of navigating the atmosphere, has ascertained a fact formerly unknown, viz. that in the middle regions of the air, the wind most frequently blows in a direction contrary to that below; that there are there also a kind of eddies or currents which move in a circular direction. When M. Charles ascended by himself, as mentioned under the article AIR-Balloon, p. 9019. he was sensible of these currents; and the opposite direction taken by

the small globe sent off before their first journey ascertains the latter. In this journey also the electricity of the upper parts of the atmosphere was the cause of a curious phenomenon, viz. that the flags he carried with him as signals, instead of hanging down towards the earth, erected themselves in the air.

The Salubrity of the ATMOSPHERE at different heights and in different places has much engaged the attention of philosophers. The air on the tops of mountains is generally more salubrious than that in pits. Dense air indeed is always more proper for respiration than such as is more rare; yet the air on mountains, though much more rare, is more free from phlogistic vapours than that of pits. Hence it has been found, that people can live very well on the tops of mountains, where the barometer sinks to 15 or 16 inches. M. de Saussure, in his journey upon the Alps, having observed the air at the foot, on the middle, and on the summits of various mountains, observes, that the air of the very low plains seems to be the less salubrious; that the air of very high mountains is neither very pure, nor, upon the whole, seems so fit for the lives of men, as that of a certain height above the level of the sea, which he estimates to be about 200 or 300 toises, that is, about 430 or 650 yards.

Dr White, in the lxxviiith vol. of the Phil. Trans. giving an account of his experiments on air made at York, says, that the atmospheric air was in a very bad state, and indeed in the worst he had ever observed it, the 13th of September 1777; when the barometer stood at 30.30; the thermometer stood at 69°; the weather being calm, clear, and the air dry and sultry, no rain having fallen for above a fortnight. A slight shock of an earthquake was perceived that day.

The air of a bed-room at various times, viz. at night, and in the morning after sleeping in it, has been examined by various persons; and it has been generally found, that after sleeping in it, the air is less pure than at any other time. The air of privies, even in calm weather, has not been found to be so much phlogisticated as might have been expected, notwithstanding its disagreeable smell.

From this and other observations, it is thought that the exhalations of human excrements are very little if at all injurious, except when they become putrid, or proceed from a diseased body; in which case they infect the air very quickly.

Dr Ingenhoulz, soon after he left London, sent an account of his experiments made in the year 1779 upon the purity of the air at sea and other parts; which account was read at the Royal Society the 24th of April 1780, and is inserted in the lxxth vol. of the Phil. Trans. His first observations were made on board a vessel in the mouth of the Thames, between Sheerness and Margate, where he found that the air was purer than any other sort of common air he had met with before. He found that the sea air taken farther from the land, viz. between the English coast and Ostend, was not so pure as that tried before; yet this inferior purity seems not to take place always. The Doctor's general observations, deduced from his numerous experiments, are, "That the air at sea, and close to it, is in general purer, and fitter for animal life, than the air on the land, though it seems to be subject to some inconsistency in its degree of purity with that

of the land. "That probably the air will be found in general much purer far from the land than near the shore, the former being never subject to be mixed with land air."

The Doctor in the same paper transcribes a journal of experiments, showing the degree of purity of the atmosphere in various places, and under different circumstances; which we shall insert here in an abridged manner, thinking it of great use to other experimenters.

The method used in those experiments, was to introduce one measure of common air into the eudiometer-tube, and then one measure of nitrous air. The moment that these two sorts of elastic fluids came into contact, he agitated the tube in the water-trough, and then measured the diminution, expressing it by hundredths parts of a measure; thus, when he says that such air was found to be 130, it signifies, that after mixing one measure of it with one of nitrous air, the whole mixed and diminished quantity was 130 hundredths of a measure, viz. one measure and 30 hundredths of a measure more.

"The different degrees of salubrity of the atmosphere, as I found it in general in my country-house at Southall Green, ten miles from London, from June to September, lay between 103 and 109.

"I was surprised, when upon my return to town to my former lodgings in Pall-Mall Court, I found the common air purer in general in October, than I used to find it in the middle of summer in the country; for on the 22d of October, at nine o'clock in the morning, the weather being fair and frosty, I found that one measure of common air, and one of nitrous air, occupied 100 subdivisions in the glass tube, or exactly one measure. That very day, at two o'clock in the afternoon (it being then rainy weather), the air was somewhat altered for the worse. It gave 102.

"October the 23d, it being rainy weather, the air gave 102.

"October the 24th, the weather being serene, the air at nine o'clock in the morning gave 100.

"October the 25th, the sky being cloudy at 11 o'clock in the morning, the air gave 102. At 11 o'clock at night, from five different trials, it gave 105.

"October the 26th, the weather being very dark and rainy, the air gave 105, as before."

The air at Orlend was found by the Doctor to be generally very good, giving between 94 and 98.

At Bruges, the air taken at seven o'clock at night gave 103.

November the 8th, the air at Ghent at three in the afternoon gave 103.

November the 12th, the air of Brussels at seven o'clock P. M. gave 105½.

The next day the air of the lower part of the same city gave 106; that of the highest appeared to be purer, as it gave 104; which agrees with the common popular observation. November the 14th, both the air of the highest and that of the lowest part of the city appeared to be of the same goodness, giving 103. The weather was frosty.

November the 22d, the air of Antwerp in the evening gave 109½; the weather being rainy, damp, and cold.

November the 23d, the air of Breda gave 106. The next day about 11 o'clock the air gave 102; the weather being fair, cold, and inclining to frost. At seven

o'clock it gave 103. Next day, being the 25th, the air gave 104; the weather being cold and rainy. The 26th it gave 103; the weather being very rainy, cold, and stormy.

November the 27th, the air at the Moordyke close to the water gave 101½, the weather being fair and cold, but not frosty. This spot is reckoned very healthy.

November the 28th, the air of Rotterdam gave 103; the weather being rainy and cold.

November the 29th, the air of Delphit gave 103; the weather being stormy and rainy.

November the 30th, the air of the Hague gave 104; the weather being cold, and the wind northerly. The first of December the weather underwent a sudden change; the wind becoming southerly and stormy, and the atmosphere becoming very hot. The day after, Fahrenheit's thermometer stood at 54°; and the common air being repeatedly and accurately tried gave 116; and that preserved in a glass phial from the preceding day gave 117; and that gathered close to the sea gave 115.

December the 4th, the air of Amsterdam gave 103; the weather being rainy, windy, and cold. The day after, the weather continuing nearly the same, the air gave 102.

December the 10th, the air of Rotterdam gave 101; the weather being rainy.

December the 12th, being in the middle of the water between Dort and the Moordyke, the air gave 109; the weather being remarkably dark, rainy, and windy.

December the 13th, the air of Breda in the morning gave 109; the weather continuing as the day before. And in the afternoon, the air gave 106½; the weather having cleared up.

December the 16th, the air of the lower part of the city of Antwerp gave 105; that of the higher part, 104; the weather being rainy and temperate.

December the 17th, the air of Antwerp gave 107; the weather continuing nearly as in the preceding day.

December the 19th, the air of Brussels gave 109; the weather being rainy, windy, and rather warm.

December the 21st, the air of Brussels gave 106; the weather being dry and cold. The next day the air and weather continued the same.

December the 23d, the air of Mons gave 104; the weather being rainy and cold.

December the 24th, the air near Bouchain gave 104½; the weather being cloudy and cold.

December the 25th, the air of Peronne gave 102½; the weather being frosty.

December the 26th, the air of Cu villi gave 103; the weather frosty.

December the 27th, the air of Senlis gave 101½; the weather frosty.

December the 29th, the air of Paris gave 103; the weather frosty.

1780. January the 8th, the air of Paris gave 100; the weather frosty.

January the 13th, the air of Paris gave 98; hard frost.

Thus far with Dr Ingenhoufz's observations. His apparatus was a very portable one, made by Mr Martin, which in reality is the eudiometer-tube and measure as used by Mr Fontana, before he made his last improvement. "The whole of this apparatus

ratus (says Dr Ingenhoufz) was packed up in a box about ten inches long, five broad, and three and a half high. The glass tube or great measure, which was 16 inches long, and divided in two separate pieces, lay in a small compass, and could be put together by brass screws, adapted to the divided extremities. Instead of a water-trough, such as is used commonly, I made use of a small round wooden tub, &c."

The abbe Fontana, who has made a great number of very accurate experiments upon this subject, gives his opinion in the following words. "I have not the least hesitation in asserting, that the experiments made to ascertain the salubrity of the atmospherical air in various places in different countries and situations, mentioned by several authors, are not to be depended upon; because the method they used was far from being exact (A), the elements or ingredients for the experiment were unknown and uncertain, and the results very different from one another.

"When all the errors are corrected, it will be found that the difference between the air of one country and that of another, at different times, is much less than what is commonly believed; and that the great differences found by various observers are owing to the fallacious effects of uncertain methods. This I advance from experience; for I was in the same error. I found very great differences between the results of the experiments of this nature which ought to have been similar; which diversities I attributed to myself, rather than to the method I then used. At Paris I examined the air of different places at the same time, and especially of those situations where it was most probable to meet with infected air, because those places abounded with putrid substances and impure exhalations; but the differences I observed were very small, and much less than what could have been suspected, for they hardly arrived to one fiftieth of the air in the tube. Having taken the air of the hill called *Mount Valerian*, at the height of about 500 feet above the level of Paris, and compared it with the air of Paris taken at the same time, and treated alike, I found the former to be hardly one thirtieth better than the latter.

"In London I have observed almost the same. The air of Ilstington and that of London suffered an equal diminution by the mixture of nitrous air; yet the air of Ilstington is esteemed to be much better. I have examined the air of London taken at different heights, (for instance, in the street, at the second floor, and at the top of the adjoining houses), and have found it to be of the same quality. Having taken the air at the iron gallery of St Paul's cupola, at the height of 313 feet above the ground, and likewise the air of the stone gallery, which is 202 feet below the other; and having compared these two quantities of air with that of the street adjoining, I found that there was scarce any sensible difference between them, although taken at such different heights.

"In this experiment a circumstance is to be considered, which must have contributed to render the above-mentioned differences more sensible: this is, the agitation of the air of the cupola; for there was felt a pretty brisk wind upon it, which I observed to be stronger and stronger the higher I ascended; whereas in the

street, and indeed in all the streets I passed through, there was no sensible wind to be felt. This experiment was made at four in the afternoon, the weather being clear. The quicksilver in the barometer at that time was 28.6 inches high, and Fahrenheit's thermometer stood at 54°."

A few lines after, Mr Fontana proceeds thus:—"From this we clearly see, how little the experiments hitherto published about the differences of common air are to be depended upon. In general, I find that the air changes from one time to another; so that the differences between them are far greater than those of the air of different countries, or different heights; for instance, I have found that the air of London in the months of September, October, and November, 1778, when treated with the nitrous air, gave 11,1, 1,90, and 11,11, 2,25, which is a mean result of many experiments, which differed very little from each other. The 26th day of November last, I found the air for the first time much better, for it gave 11,1, 1,80, and 11,11, 2,20; but the 14th of February, 1779, the air gave 11,1, 1,69, and 11,11, 2,21; from whence it appears, that the air of this 14th of February was better than it had been for six months before.

"There can be no doubt of the accuracy of the experiments, because I compared the air taken at different times with that which I had first used in the month of September, and which I had preserved in dry glass-bottles accurately stoppered."

This difference in the purity of the air at different times, Mr Fontana farther remarks, is much greater than the difference between the air of the different places observed by him; notwithstanding this great change, as he observed, and as he was informed by various persons, no particular change of health in the generality of people, or facility of breathing, was perceived.

Mr Fontana lastly concludes with observing, that "Nature is not so partial as we commonly believe. She has not only given us an air almost equally good every where, at every time, but has allowed us a certain latitude, or a power of living and being in health in qualities of air which differ to a certain degree. By this I do not mean to deny the existence of certain kinds of noxious air in some particular places; but only say, that, in general, the air is good every where, and that the small differences are not to be feared so much as some people would make us believe. Nor do I mean to speak here of those vapours and other bodies which are accidentally joined to the common air in particular places, but do not change its nature and intrinsic property. This state of the air cannot be known by the test of nitrous air; and those vapours are to be considered in the same manner as we should consider so many particles of arsenic swimming in the atmosphere. In this case it is the arsenic, and not the degenerated air, that would kill the animals who ventured to breathe it."

ATTACHMENTS, COURT of. See FOREST Courts, (Encycl.)

ATROPA, (Encycl.) For a remedy against the poison, see the article NIGHTSHADE, (Encycl.)

AVIGATO, or AVOCADO Pear. See the next article.

45 N 2

AVO-

(A) It is plain that Dr Ingenhoufz's method is not implied in this remark; since the Doctor's experiments were made long after, and the method used by him was properly that of Mr Fontana.

AVOCATO-PEAR *Tree*, or *Laurus Persea*; a species omitted to be described under the article *LAURUS*. (*Encycl.*)

It is a native of the West Indies. In form and thickness the fruit resembles a pear. The pulpy and fleshy part is of a pale green, with little or no consistence when ripe, and melts in the mouth like marrow, which it greatly resembles in taste. The skin is smooth and thin, but of a strong tough substance, and of a beautiful green colour, which does not become yellow till the fruit is perfectly ripe. The fruit, by reason of its softness, may be eaten out of the surrounding skin with a tea-spoon, like jelly and marmalade. It is frequently served up in the West Indies on a plate, with sugar, rose-water, and orange-flowers; most commonly, however, it is mixed with sugar and the juice of limes, which render it extremely palatable.

The unripe fruit too is frequently plucked and eaten in thin slices, with pepper and salt. In this stage, the taste of the avocado greatly resembles that of artichokes. Every preparation of this fruit is esteemed highly nourishing; as it warms, exhilarates, and fortifies the stomach.—It is particularly recommended in dysenteries.

In the middle of the pulpy part of the fruit lies the nut or seed, which is very large, almost round, of a pale russet colour, a little wrinkled, contains no kernel within it, and whose degree of hardness does not exceed that of a chestnut divested of its skin. This nut, about an hour after it is separated from the fruit, splits of itself into two or three pieces. If committed to the ground in this state, no vegetation ensues, because the embryo of the seed is broken; so that such as would propagate these plants from seed must sow the nuts the moment they are taken out of the pulp, in which case they will begin to germinate in eight or ten days after.

The bark and wood of this tree, which rises to a considerable height, are of a greyish colour. The leaves are long, pointed, of a substance like leather, and of a beautiful green colour. The flowers are produced in large knots or clusters at the extremities of the branches, and consist each of six petals disposed in the form of a star, and of a dirty white or yellow colour, with an agreeable odour, which diffuses itself to a considerable distance. The tree begins to bear fruit

two years and a half, or at most three years after being planted; and like most of the trees in warm climates, bears twice a year.

The buds of the avocado tree are said to be used with success in pitans against the venereal disease. An infusion of them in water, drank in the morning fasting, is strongly recommended for dissolving coagulated blood in the stomach produced by a fall or a severe stroke on that important entrail. “The wild boars in the East Indies (says Labat) eat greedily of the mammees and avigato pears, which give their flesh a luscious and most agreeable flavour.”

AURORA, one of the New Hebrides islands in the South Sea, in which Mr Foster supposes the *Peak d’Etoile* mentioned by Mr Bougainville to be situated. The island is inhabited; but none of its inhabitants came off to visit captain Cook. The country is woody, and the vegetation seemed to be excessively luxuriant. It is about 12 leagues long, but not above five miles broad in any part; lying nearly north and south. The middle lies in S. Lat. 15. 6. E. Long. 168. 24.

AURUM FULMINANS, (*Encycl.*) See *Fulminating GOLD*.—It has been thought that this substance, which explodes with an astonishing violence, and makes a very sharp report, would produce a far greater effect than gun-powder, if it were cheap enough to be used as a substitute for fire-arms. But repeated experiments have shown, that when fulminating gold is confined in the barrel of a pistol, in a hollow iron ball, or the like, its effects are much inferior to those of gun-powder; and the reason is, because fulminating gold produces an incomparably less quantity of elastic fluid than gun-powder does. The surprising effects produced by it when fulminating in the open air, according to Mr Cavallo, must be owing to the sudden generation of the elastic fluid, and not to the quantity of it produced. Bergman says, that the elastic fluid generated by fulminating gold is scarcely equal to four times the bulk of the fulminating gold. He also says, that half a drachm of fulminating gold, fired in a close vessel, makes a report hardly audible; and that the elastic fluid it generates, extinguishes flame, is noxious to animals, is not absorbed by water, nor renders lime-water turbid.—These are the characteristic properties of phlogisticated air.

B.

BACHELOR, (*Encycl.*) See also *BATCHELOR*, (*Encycl.*)

Knights BACHELOR. See *Knights BATCHELOR*, (*Encycl.*)

BACTRIA. Marginal note, for *Khorasan* read *Chorasan*.

BALDNESS, (*Encycl.*) See also *ALOPECIA* (*Appendix*).

BALSAM-APPLE. See *MOMORDICA*, (*Encycl.*)

BAMBOO. See *ARUNDO* and *BAMBOO*, (*Encycl.*) This tree, the *ily* or *illi* of the *Hortus Malabaricus*, grows naturally in sandy places, and on the banks of rivers in both Indies; where it frequently attains a height exceeding even that of the cocoa-tree. The root is not very different from the stem, unless that it is of a whitish colour, and consists of several ra-

dicles or fibres. From the joints of the main root are emitted small jointed stalks, which again emit others from their joints; and from these, as from so many new roots, arise several stalks joined together; which being planted with their radicles or string-roots, serve to perpetuate the species. These stalks are round, have a green bark; are hard, emit from the joints new branches and twigs, and are armed in the joints themselves with one, two, or more, rigid and acute thorns of an oblong figure. It is to be observed, however, that the stalks in question, arising, as we have said, immediately from the root, have attained in their native soil the height of two or three men, and the thickness of almost a span, before they send forth any lateral branches. These, when young and tender, are nearly solid, pervious only in the middle by a small tube

bamboo.

tube. The older stalks and branches are hollow within, being shut, however, at the joints with a woody partition, and covered internally with a slender whitish membrane that is composed of hard white woody filaments. The colour of the stalks, when young, is a brownish green; when older, a shining yellow, with a shade of white. The leaves are long, narrow, seated on short foot-stalks, streaked with longitudinal veins, and rough on the edges if rubbed downwards. The flowers grow in long scaly spikes, which proceed in great numbers from the joints of the stalks. Rheede mentions a tradition prevailing on the coast of Malabar, that the bamboo vegetates till its 60th year; at which period of its growth, and nearly a month before the flowers emerge from their scaly covers, the tree is divested of all its leaves; and after it has ceased to flower, immediately dies. This tree or reed is termed by the inhabitants of Ceylon, *unaghar*, that is, "fever-tree," from an opinion generally entertained in that island, that a fever is the certain consequence of bathing in any river into which the flowers or leaves of the bamboo have fallen. By the Arabians it is named *tabaxir*; as is likewise a milky humour or sugar produced in it. The Indians call it *mambu*; whence vulgarly, and by corruption, its European name of *bambu* or *bamboo*. In the island of Madagascar, and particularly in the province of Galemoulou, by the testimony of Flacourt, it is produced in such abundance as to give name to the province, for in those parts it is termed *voulu*. The size of this tree in India is generally so great, that houses are built of it. In the porch of the acedemical garden at Leyden are suspended some fragments, a present of the celebrated Piso, the largest of which exceeds 28, the least 26, feet in length. That they must, however, have been double that size before they were broken off, appears probable from this circumstance, that the thickness of one extremity scarce differs from that of the other. It is likewise wonderful that so immense a reed should be clothed with so very small leaves; the largest of the dried ones in the collection of Professor Syens at Leyden, mentioned by Rheede in his *Hortus Malabaricus*, scarcely exceeding a span in length, or the breadth of a finger in width. The stalks, when old, are entirely covered in the cavity with a sort of calx, which is esteemed useful in the stranguary, and to such as are troubled with purulent urine. Bamboo being burnt, affords very fertile ashes, in which plants of all kinds thrive remarkably. Whilst burning, the stalks emit a very loud explosion; the air contained in their cavity being rarefied by the heat, and desiring a larger space, breaks thro' the partitions at the joints, and violently seeks a passage whereby to escape. Kempter relates, in the *Amenitates Exoticæ*, that in a province of Japan called *Omi*, which has a slimy bottom, the roots of bamboo luxuriate with such wonderful beauty, that, being dug out of the ground and disentangled from the strings which encompass them, they serve, as the stalks with us, for walking-sticks, commonly called *relang*. From this curious reed several conveniences are obtained besides those which have been mentioned. The reader is referred for a more minute detail, to the *Mantissa Aromatica* of Piso; where, besides a very accurate description of the *tabaxir* or sugar mentioned above, he will also learn, that the tender branches or twigs,

particularly those near the root, being macerated in salt and vinegar, afford, with the addition of garlic and the pods of capscum, a sort of pickle, which is esteemed excellent, and constitutes not the least valuable part of those famous condita commonly termed *acbar* and *atjaar*, and well known in Europe for exciting the appetite and promoting digestion.

BAMFF, (*Encycl.*) By mistake, this place was said to have no harbour. The following account is given by Mr Pennant: "It is pleasantly situated on the side of a hill; has several streets; and that with the town-house in it, adorned with a new spire, is very handsome. This place was erected into a borough by virtue of a charter from Robert II. dated October 7. 1372, endowing it with the same privileges, and putting it on the same footing with the burgh of Aberdeen; but tradition says it was founded in the reign of Malcolm Canmore. The harbour is very bad, as the entrance at the mouth of the Devon is very uncertain, being often stopped by the shifting of the sands, which are continually changing in great storms; the pier is therefore placed on the outside. Much salmon is exported from hence. About Troophead some kelp is made; and the adventurers pay the lord of the manor 50*l.* per annum for the liberty of collecting the materials."

BANDITTI, (*Encycl.*) from the Italian *bandito*; persons proscribed, or, as we call it, outlawed: sometimes denominated *banitti* or *foris-banitti*. It is also a denomination given to highwaymen or robbers who infest the roads in troops, especially in Italy, France, and Sicily. Mr Brydone, in his Tour through Sicily, informs us, that in the eastern part, called *Val Demoni*, from the devils that are supposed to inhabit Mount *Ætna*, it has ever been found altogether impracticable to extirpate the banditti; there being numberless caverns and subterraneous passages round that mountain, where no troops could possibly pursue them; besides, they are known to be perfectly determined and resolute, never failing to take a dreadful revenge on all who have offended them. Hence the prince of Villa Franca has embraced it, not only as the safest, but likewise as the wisest and most political scheme, to become their declared patron and protector: and such of them as think proper to leave their mountains and forests, though perhaps only for a time, are sure to meet with good encouragement and a certain protection in his service, where they enjoy the most unbounded confidence, which, in no instance, they have ever yet been found to make an improper or a dishonest use of. They are clothed in the prince's livery, yellow and green, with silver lace; and wear likewise a badge of their honourable order, which entitles them to universal fear and respect from the people.

In some circumstances, these banditti are the most respectable people of the island, and have by much the highest and most romantic notions of what they call their point of honour. However criminal they may be with regard to society in general; yet, with respect to one another, and to every person to whom they have once professed it, they have ever maintained the most unshaken fidelity. The magistrates have often been obliged to protect them, and pay them in court, as they are known to be perfectly determined and desperate, and so extremely vindictive, that they

Bamff,
Banditti.

Bandy,
Barilla.

will certainly put any person to death that has ever given them just cause of provocation. On the other hand, it never was known that any person who had put himself under their protection, and showed that he had confidence in them, had cause to repent of it, or was injured by any of them in the most minute trifle; but, on the contrary, they will protect him from impositions of every kind, and scorn to go halves with the landlord, like most other conductors and travelling servants, and will defend him with their lives if there is occasion. Those of their number who have thus enlisted themselves in the service of society, are known and respected by the other banditti all over the island; and the persons of those they accompany are ever held sacred. For these reasons, most travellers choose to hire a couple of them from town to town; and may thus travel over the whole island in safety.

BANDY-LEGGED. See *VALGUS*, (*Encycl.*)

BARILLA, or **BARILLA**, the name of a plant cultivated in Spain for its ashes, from which the purest kinds of mineral alkali are obtained.

There are four plants, which, in the early part of their growth, bear so strong a resemblance to each other as would deceive any but the farmers and nice observers. These four are, *barilla*, *gazul*, (or, as some call it, *algazul*), *soza*, and *salicornia* or *salicor*. They are all burnt to ashes; but applied to different uses, as being possessed of different qualities. Some of the roguish farmers mix more or less of the three last with the first; and it requires a complete knowledge of the colour, taste, and smell of the ashes to be able to detect their knavery.

Barilla is sown afresh every year. Its greatest height above ground is four inches: each root pushes out a vast number of little stalks, which again are subdivided into smaller sprigs resembling samphire; and all together form a large spreading tufted bush. The colour is bright green; as the plant advances towards maturity, this colour vanishes away till it comes at last to be a dull green tinged with brown.

Gazul bears the greatest affinity to *barilla*, both in quality and appearance: the principal difference consists in its growing on a still drier saltier earth, consequently it is impregnated with a stronger salt. It does not rise above two inches out of the ground, spreading out into little tufts. Its sprigs are much flatter and more pulpy than those of *barilla*, and are still more like samphire. It is sown but once in three, four, or five years, according to the nature of the soil.

Soza, when of the same size, has the same appearance as *gazul*; but in time grows much larger, as its natural soil is a strong salt marsh, where it is to be found in large tufts of sprigs, treble the size of *barilla*, and of a bright green colour, which it retains to the last.

Salicor has a stalk of a deep green colour inclining to red, which last becomes by degrees the colour of the whole plant. From the beginning it grows upright, and much resembles a bush of young rosemary. Its natural soil is on the declivities of hills near the salt marshes, or on the edges of the small drains or channels cut by the husbandmen for the purpose of watering the fields: before it has acquired its full growth, it is very like the *barilla* of those seasons in which the ground has been dunged before sowing. In those years of manuring, *barilla*, contrary to its usual na-

ture, comes up with a tinge of red; and when burnt falls far short of its wonted goodness, being bitter, more impregnated with salts than it should be, and raising a blister if applied for a few minutes to the tongue. *Barilla* contains less salt than the others; when burnt, it runs into a mass resembling a spongy stone, with a faint cast of blue.

Gazul, after burning, comes as near *barilla* in its outward appearance as it does while growing in its vegetable form; but, if broken, the inside is of a deeper and more glossy blue. *Soza* and *salicor* are darker, and almost black within, of a heavier consistence, with very little or no sign of sponginess.

All these ashes contain a strong alkali; but *barilla* the best and purest, though not in the greatest quantity. Upon this principle, it is fittest for making glass and bleaching linen; the others are used in making soap. Each of them would whiten linen; but all, except *barilla*, would burn it. A good crop of *barilla* impoverishes the land to such a degree, that it cannot bear good *barilla* a second time, being quite exhausted. For this reason the richer farmers lay manure upon the ground, and let it lie fallow for a season; at the end of which it is sown afresh without any danger, as the weeds that have sprung up in the year of rest have carried off all the pernicious effects of the dung. A proper succession of crops is thus secured by manuring and fallowing the different parts of the farm, each in their turn. The poorer tribe of cultivators cannot pursue the same method for want of capital; and are therefore under the necessity of sowing their lands immediately after manuring, which yields them a profit just sufficient to afford a present scanty subsistence, though the quality and price of their *barilla* be but trifling.

The method used in making *barilla* is the same as that followed in Britain in burning kelp. The plant as soon as ripe is plucked up and laid in heaps, then set on fire. The salt juices run out below into a hole made in the ground, where they run into a vitrified lump, which is left about a fortnight to cool. An acre may give about a tun.

BAROMETER, (*Encycl.*) A considerable improvement on the wheel-barometer† is that of Mr† See *Barometer*, n° 24. Fitzgerald, F. R. S. It is furnished with two pulleys that move on friction-wheels; each of which turns an index on the centre of a graduated circle. The smaller circle is four inches in diameter, and divided into three equal parts, each of which is again subdivided decimally; and the changes corresponding to the rise or fall of the mercury from 28 to 31 inches, are marked on the margin of it, as they are on the scales of common barometers. The larger circle is divided into 300 equal parts; and being about 30 inches in circumference, the index belonging to it will mark distinctly the 600th part of an inch in the rise or fall of the mercury. On the centre of this circle two registers are fixed, which are placed along the index when the instrument is adjusted; one of them is carried round with the index, and left behind on its return; so that their distance will determine the limits of the variation from one observation to another.

Mr Passlemon, an ingenious artist at Paris, has invented a *marine barometer*, by twisting the middle part of the common one into a spiral consisting of two revolv-

Barilla,
Barometer.

volutions. Thus the impulses which the mercury receives from the motions of the ship are destroyed, by being transmitted in contrary directions.

Notwithstanding the amazing pains which Mr de Luc has taken to remove every inaccuracy in the barometer, it is not yet entirely free from error; nor do the observations made by different persons altogether correspond. Considerable improvements have been made by Col. Roy and Sir George Shuckburgh, of which an account is given in the 67th and 68th vols of the *Philosophical Transactions*.

FIRE-BARRELS. See *FIRE-Ship*, note B, (*Encycl.*)

BASKERVILLE (John), an eminent artist, especially in letter-founding and printing, of the present century. He was born in 1706 at Woverley in Worcester-shire, and was heir to an estate of about 60 l. a-year; the whole of which income he allowed to his parents till their deaths. In his early years he conceived a love for fine writing, and cutting in stone; and being brought up to no particular profession, he commenced writing master in Birmingham when about 20 years of age. The improvements in different manufactures there soon drew his attention, and he applied to the Japan business, which he carried on for a long time with distinguished excellence and success. In 1750 he applied himself to letter-founding, the bringing of which to perfection cost him much labour and expence. In a few years he proceeded to printing; and his first work was an edition of Virgil on royal quarto, which now sells for three guineas. In a short time he obtained leave from the university of Cambridge to print a Bible in royal folio, and editions of the Common Prayer in three sizes; for which he paid a large sum to the university. He afterwards printed Horace, Terence, Catullus, Lucretius, Juvenal, Sallust, and Florus, in royal quarto; Virgil in octavo; and several books in duodecimo. He published likewise some of the English classics. The best testimonies of the merit of these performances are themselves; and Mr Baskerville's name is deservedly ranked among those who, in modern times, have brought the art of printing to its greatest perfection. Not meeting, however, with that encouragement from the booksellers which he expected, he set up a letter-foundry for sale a little before his death; which business is now carried on by his widow. He died without issue in July 1775.

BASTARD. (*Encycl.*) This article contains the state of the matter according to the law of England. How it stands in the law of Scotland, see *LAW*, Part III. N° clxxxii. 3. 4. and clxi. 33.

KNIGHTS of the BATH, a military order in England, supposed to have been instituted by Richard II. who limited their number to four; however, his successor Henry IV. increased them to 46. Their motto was *Tres in uno*, signifying the three theological virtues.

This order received its denomination from a custom of bathing before they received the golden spur. It is seldom conferred but at the coronation of kings, or the inauguration of a prince of Wales, or duke of York. They wear a red ribband beltwise.—The order of the Bath, after remaining many years extinct, was revived under George I. by a solemn creation of a great number of knights.

BAVINS. See *FIRE-Ship*, note D, (*Encycl.*)

BENARES. See *OBSERVATORY*, (*Encycl.*)
King's-BENCH, (*Encycl.*) See also *KING'S-BENCH*, (*Encycl.*)

Benares
Blackstone.

BERWICK. (*Encycl.*) The town of Berwick upon Tweed was originally part of the kingdom of Scotland; and, as such, was for a time reduced by king Edward I. into the possession of the crown of England; and, during such its subjection, it received from that prince a charter, which (after its subsequent cession by Edward Baliol, to be for ever united to the crown and realm of England) was confirmed by king Edward III. with some additions; particularly, that it should be governed by the laws and usages which it enjoyed during the time of king Alexander, that is, before its reduction by Edward I. Its constitution was new-modelled, and put upon an English footing by a charter of king James I. and all its liberties, franchises, and customs, were confirmed in parliament by the statutes 22 Edw. IV. c. 8. and 2 Jac. I. c. 28. Though, therefore, it hath some local peculiarities, derived from the ancient laws of Scotland; yet it is clearly part of the realm of England, being represented by burgesses in the house of commons, and bound by all acts of the British parliament, whether specially named or otherwise. And therefore it was (perhaps superfluously) declared by stat. 20 Geo. II. c. 42. that where England only is mentioned in any act of parliament, the same notwithstanding hath and shall be deemed to comprehend the dominion of Wales and town of Berwick upon Tweed. And though certain of the king's writs or process of the courts of Westminster do not usually run into Berwick, any more than the principality of Wales; yet it hath been solemnly adjudged, that all prerogative writs (as those of *mandamus*, prohibition, *habeas corpus*, *certiorari*, &c.) may issue to Berwick as well as to every other of the dominions of the crown of England, and that indictments and other local matters arising in the town of Berwick may be tried by a jury of the county of Northumberland.

BEZOAR MINERAL. Line 2d from the end, for *tin*, &c. in *dispute*, read *tin*, &c. *all now in dispute*.

BILE. (*Encycl.*) See also *GALL*, (*Encycl.*)

BISHOP. (*Encycl.*) See also *EPISCOPACY*, (*Encycl.*)

BIOGRAPHY. (*Encycl.*) See further the article *HISTORY*, n° 85, (*Encycl.*)

BLACKSTONE (Sir William), an eminent English lawyer, was born at London in July 1723. His father, Mr Charles Blackstone, a silk-man, citizen, and bowyer of London, died some months before the birth of our author, who was the youngest of four children; and their mother died before he was 12 years old.

Even from his birth, the care both of his education and fortune was kindly undertaken by his maternal uncle Mr Thomas Bigg, an eminent surgeon in London, and afterwards, on the death of his elder brothers, owner of the Chilton estate, which is still enjoyed by that family. In 1730, being about seven years old, he was put to school at the Charter-house; and in 1735 was, by the nomination of Sir Robert Walpole, on the recommendation of Charles Wither of Hall in Hampshire, Esq; his cousin by the mother's side, admitted upon the foundation there. In this excellent seminary he applied himself to every branch of youthful education, with the same assiduity which

Blackstone.

Blackstone.

accompanied his studies through life. His talents and industry rendered him the favourite of his masters, who encouraged and assisted him with the utmost attention: so that at the age of 15 he was at the head of the school, and although so young, was thought well qualified to be removed to the university. He was accordingly entered a commoner at Pembroke college in Oxford, on the 30th of November 1738, and was the next day matriculated. At this time he was elected to one of the Charter-house exhibitions by the governors of that foundation, to commence from the Michaelmas preceding; but was permitted to continue a scholar there till after the 12th of December, being the anniversary commemoration of the founder, to give him an opportunity of speaking the customary oration which he had prepared, and which did him much credit. About this time also he obtained Mr Benfon's gold prize-medal of Milton, for verses on that poet. In the February following, the society of Pembroke college unanimously elected him to one of Lady Holford's exhibitions for Charter-house scholars in that house. Here he prosecuted his studies with unremitting ardour; and although the classics, and particularly the Greek and Roman poets, were his favourites, they did not entirely engross his attention: logic, mathematics, and the other sciences, were not neglected. At the early age of 20, he compiled a treatise entitled *Elements of Architecture*, intended for his own use only, and not for publication; but esteemed by those judges who have perused it, in no respect unworthy his maturer judgment and more exercised pen.

Having determined on his future plan of life, and made choice of the law for his profession, he was entered in the Middle Temple on the 20th of November 1741. He now found it necessary to quit the more amusing pursuits of his youth, for the severer studies to which he had dedicated himself; and betook himself seriously to reading law. He expressed his disagreeable sensations on this occasion in a copy of verses, since published by Doddsley in vol. 4th of his miscellanies, intitled *The Lawyer's Farewell to his Muse*; in which the struggle of his mind is expressed so strongly, so naturally, with such elegance of sense and language, and harmony of versification, as must convince every reader that his passion for the muses was too deeply rooted to be laid aside without much reluctance; and that, if he had pursued that flowery path, he would perhaps have proved inferior to few of our English poets.

Several little fugitive pieces besides this, have at times been communicated by him to his friends; and he left (but not with a view of publication) a small collection of juvenile pieces, both originals and translations, inscribed with this line from Horace,

Nec lassus pudet, sed non incidere ludum.

Some notes on Shakespeare, which just before his death he communicated to Mr Steevens, and which were inserted by him in his last edition of that author, show how well he understood the meaning, as well as the beauties, of that his favourite among the English poets.

In November 1743, he was elected into the society of All-Souls college; and in the November following, he spoke the anniversary speech in commemoration of archbishop Chicheley the founder, and the other benefactors to that house of learning, and was admitted actual fellow.

From this period he divided his time between the university and the Temple, where he took chambers in order to attend the courts: in the former he pursued his academical studies, and on the 12th of June 1745 commenced bachelor of civil law; in the latter he applied himself closely to his profession, both in the hall and in his private studies, and on the 28th of November 1746 was called to the bar. Though he was little known or distinguished in Westminster-hall, he was actively employed, during his occasional residence at the university, in attending to its interests, and mingling with and improving its interior concerns.

In May 1749, as a small reward for his services, and to give him further opportunities of advancing the interests of the college, Mr Blackstone was appointed steward of their manors. And in the same year, on the resignation of his uncle Seymour Richmond, Esq; he was elected recorder of the borough of Wallingford in Berkshire, and received the king's approbation on the 30th of May.

The 26th of April 1750, he commenced doctor of civil law, and thereby became a member of the convocation, which enabled him to extend his views beyond the narrow circle of his own society, to the general benefit of the university at large.

In the summer 1753, he took the resolution of wholly retiring to his fellowship and an academical life, still continuing the practice of his profession as a provincial counsel.

His Lectures on the Laws of England appears to have been an early and favourite idea; for in the Michaelmas term, immediately after he quitted Westminster-hall, he entered on the province of reading them at Oxford; and we are told by the author of his life, that even at their commencement, such were the expectations formed from the acknowledged abilities of the lecturer, they were attended by a very crowded class of young men of the first families, characters, and hopes; but it was not till the year 1758, that the lectures in the form they now bear were read at the university.

Mr Viner having by his will left not only the copyright of his abridgment, but other property to a considerable amount, to the university of Oxford, to found a professorship, fellowships, and scholarships of common law, he was on the 20th of October 1758 unanimously elected Vinerian professor; and on the 25th of the same month read his first introductory lecture, which he published at the request of the vice-chancellor and heads of houses, and afterwards prefixed to the first volume of his Commentaries.

His lectures had now gained such universal applause, that he was requested by a noble personage who superintended the education of our present sovereign, then prince of Wales, to read them to his Royal Highness; but as he was at that time engaged to a numerous class of pupils in the university, he thought he could not, consistently with that engagement, comply with this request, and therefore declined it. But he transmitted copies of many of them for the perusal of his royal highness; who, far from being offended at an excuse grounded on so honourable a motive, was pleased to order a handsome gratuity to be presented to him.

It is doubtful whether the Commentaries were originally intended for the press; but many imperfect and incorrect copies having got abroad, and a pirated edition

edition of them being either published, or preparing for publication in Ireland, the learned lecturer thought proper to print a correct edition himself; and in November 1765 published the first volume, under the title of *Commentaries on the Laws of England*; and in the course of the four succeeding years, the remaining parts of this admirable work.

It ought to be remarked, that before this period the reputation his lectures deservedly acquired him had induced him to resume his practice in Westminster-hall; and in a course somewhat inverted from the general progress of his profession, he who had quitted the bar for an academic life, was sent back from the college to the bar, with a considerable increase of business. He was likewise elected into parliament, first for Hindon, and afterwards for Westbury in Wilts; but in neither of these departments did he equal the expectations his writings had raised.

The part he took in the Middlesex election drew upon him the attack of some persons of ability in the senate, and likewise a severe animadversion of one of the keenest polemical writers * in the paper-war of that day. This circumstance probably strengthened the aversion he professed to parliamentary attendance; "where, (he said) amidst the rage of contending parties, a man of moderation must expect to meet with no quarter from any side:" and when, on the resignation of Mr Dunning in 1770, he was offered the place of solicitor-general, he refused that office; but shortly afterwards, on the promotion of Sir Joseph Yates to a seat in the court of common-pleas, accepted a seat on the bench, and by the death of Sir Joseph succeeded him there also.

As a judge, he was not inactive; but, when not occupied in the duties of his station, was generally engaged in some scheme of public utility. The act for detached houses for hard labour for convicts, as a substitute for transportation, owed its origin in a great measure to him.

It ought not to be omitted, that the last augmentation of the judges salaries, calculated to make up the deficiencies occasioned by the heavy taxes they are subject to, and thereby render them more independent, was obtained in a great measure by his industry and attention. This respectable and valuable man died on the 14th of February 1780, in the 50th year of his age.

BIRCH, (Dr Thomas), an eminent historical and biographical writer, was born in London in 1705. His parents were both of them Quakers; and his father, Joseph Birch, was a coffee-mill maker by trade. Thomas being put to school, was indefatigable in his application, and stole many hours from sleep to increase his stock of knowledge. By this unremitting diligence, though he had not the happiness of an university education, he soon became qualified to take holy orders in the church of England, to the surprise of his acquaintance. In 1728 he married the daughter of the Rev. Mr Cox, to whom he was curate: but his felicity was of short duration, Mrs Birch dying of a puerperal fever in less than 12 months after their marriage; an event which he deploras in a very elegant and pathetic poem, preserved in Nichols's Collection. In 1732 he was recommended to the friendship and favour of the late lord high chancellor Hardwicke, then attorney-general; to which

noble peer, and to the present Earl of Hardwicke, he was indebted for all his preferments. The first proof he experienced of his patron's regard, was the living of Ulting in the county of Essex, in the gift of the crown, to which he was presented 1732. In 1734 he was appointed one of the domestic chaplains to the unfortunate Earl of Kilmarnock, who was beheaded 1746. Mr Birch was chosen a member of the Royal Society, Feb. 20. 1734-5; and of the Society of Antiquaries, Dec. 11. 1735, of which he afterwards became director till his death. Before this, the Marischal college of Aberdeen had conferred on him, by diploma, the degree of Master of Arts. In 1743, by the interest of Lord Hardwicke, he was presented by the crown to the sinecure rectory of Landewy Wel'rey in the county of Pembroke; and in 1743-4 was preferred, in the same manner, to the rectory of Sidington St Peter's, in the county and diocese of Gloucester. We find no traces of his having taken possession of this living; and indeed it is probable that he quitted it immediately for one more suitable to his inclinations and to his literary engagements, which required his almost constant residence in town; for on the 24th of February 1743-4, he was instituted to the united rectories of St Michael Woodstreet and St Mary Staining; and in 1745-6 to the united rectories of St Margaret Pattens and St Gabriel, Fenchurch-street, (by lord chancellor Hardwicke, in whose turn the presentation then was). In January 1752, he was elected one of the secretaries of the Royal Society, in the room of Dr Cromwell Mortimer, deceased. In January 1753 the Marischal College of Aberdeen created him doctor of divinity; and in that year the same degree was conferred on him by archbishop Herring. He was one of the trustees of the British Museum; for which honour he was probably indebted to the present Earl of Hardwicke, as he was for his last preferment, the rectory of Depden in Essex, to which he was inducted Feb. 26. 1761. In the latter part of his life he was chaplain to the princess Amelia. In 1765 he resigned his office of secretary to the Royal Society, and was succeeded by Dr Morton. His health declining about this time, he was ordered to ride for the recovery of it; but being a bad horseman, and going out Jan. 9. 1766, he was unfortunately thrown from his horse, on the road betwixt London and Hampstead, and died on the spot, in the 61st year of his age, to the great regret of the Doctor's numerous literary friends; and was buried in St Margaret Pattens. Dr Birch had in his lifetime been very generous to his relations; and none that were nearly allied to him being living at his decease, he bequeathed his library of books and manuscripts, with his picture painted in 1735, and all his other pictures and prints not otherwise disposed of by his will, to the British Museum. He likewise left the remainder of his fortune, which amounted to not much more than 5000, to be laid out in government-securities, for the purpose of applying the interest to increase the stipend of the three assistant librarians: thus manifesting at his death, as he hath done during his whole life, his respect for literature, and his desire to promote useful knowledge. To the Royal Society he bequeathed his picture painted by Wills in 1737, being the original of the mezzotinto print done by Fauber in 1741. His principal publications were, 1. "The General Dic-

Birch.

Birch,
Black.

tionary, Historical and Critical;" including a new translation of Mr Bayle, and interspersed with several thousand new lives. Dr Birch's associates in this undertaking were, the Rev. John Peter Bernard, Mr John Lockman, and Mr George Sale. The whole design was completed in 10 volumes folio. 2. Dr Cudworth's "Intellectual System" (improved from the Latin edition of Mosheim), his discourse on the true notion of the Lord's Supper, and two sermons, with an account of his life and writings, 2 vols 4to, 1743. 3. "The life of the Hon. Robert Boyle, 1744;" prefixed to an edition of that excellent philosopher's works, revised by Dr Birch. 4. "The lives of Illustrious Persons of Great Britain," annexed to the engravings of Houbraken and Vertue, 1747—1752. 5. "An Inquiry into the Share which King Charles I. had in the transactions of the Earl of Clarendon, 1747," 8vo. 6. An edition of "Spenser's Fairy Queen, 1751," 3 vols 4to, with prints from designs by Kent. 7. "The Miscellaneous Works of Sir Walter Raleigh;" to which was prefixed the Life of that great, unfortunate, and injured man, 1751, 2 vols 8vo. 8. "The Theological, Moral, Dramatic, and Poetical Works of Mrs Catherine Cockburn; with an Account of the Life of that very ingenious Lady, 1751," 2 vols 8vo. 9. "The Life of the Most Reverend Dr John Tillotson, Lord Archbishop of Canterbury. Compiled chiefly from his original Papers and Letters, 1752" 8vo. 10. "Milton's Prose Works, 1753," 2 vols 4to, with a new Life of that great Poet and Writer. 11. "Memoirs of the Reign of Queen Elizabeth, from the year 1581 till her death. In which the secret intrigues of her court, and the conduct of her favourite Robert Earl of Essex, both at home and abroad, are particularly illustrated. From the original papers of his intimate friend Anthony Bacon, Esq; and other manuscripts never before published, 1754," 2 vols 4to. 12. "The History of the Royal Society of London for improving natural knowledge, from its first rise. In which the most considerable of those papers, communicated to the Society, which have hitherto not been published, are inserted in their proper order, as a supplement to the Philosophical Transactions, 1756 and 1757. 4 vols 4to." 13. "The Life of Henry Prince of Wales, eldest Son of King James I. Compiled chiefly from his own papers and other manuscripts, never before published. 1760." 8vo. His numerous communications to the Royal Society may be seen in the Philosophical Transactions; and his poetical talents are evident from the verses already referred to.

BLACK-CAP, in ornithology, a species of *MOTACILLA*, under which article it was omitted to be described. It is a small bird, scarce weighing half an ounce. The crown of the head in the male is black; the hind part of the neck a light ash-colour: the back and coverts of the wings are of a greyish green: the quill-feathers and tail dusky, edged with dull green: the breast and upper part of the belly are of a pale ash-colour: the vent feathers whitish: the legs of a lead colour. The female is distinguished from the male by the spot on the head, which in that is of a dull rust-colour. The black-cap is a bird of passage, leaving us before winter. It sings very finely; and on that account is called in Norfolk the *mock-nightingale*.

Black,
Blackwall.

gale. It has usually a full, sweet, deep, loud wild pipe; yet the strain is of short continuance, and his motions are desultory: but when that bird sits calmly, and in earnest engages in song, he pours forth very sweet but inward melody; and expresses great variety of sweet and gentle modulations, superior perhaps to those of any of our warblers, the nightingale excepted.

The black-cap frequents orchards and gardens. Mr Pennant discovered the nest of this bird in a spruce fir, about two feet from the ground; the outside was composed of the dried stalks of the goose grass; with a little wool and green moss round the verge; the inside was lined with the fibres of roots, thinly covered with black horse hair. There were five eggs of a pale reddish brown, mottled with a deeper colour, and sprinkled with a few dark spots.

BLACK-JACK, a kind of mineral found in the Derbyshire mines. It was some time ago employed in Wales for mending the roads; but is now found to answer the purpose of calamine for making brass.—Monf. Van Swab, in 1738, was the first person who distilled zinc from Black-jack; and it is said that some English manufacturers purchased the secret from him when he was in England; though they might possibly have taken the hint from a work which he erected for the purpose above mentioned.

BLACKWALL, (Anthony, A. M.), a learned author, after completing his academical education at Emanuel college, Cambridge, was appointed head master of the free school at Derby, and lecturer of All-hallows there, where he first distinguished himself in the literary world by an edition of *Tueognis*, printed at London in 1706, and was afterwards head master of the free school at Market-Bosworth in Leicestershire. The Grammar whereby he initiated the youth under his care into Latin, was of his own composing, and so happily fitted for the purpose, that he was prevailed on to make it public, though his modesty would not permit him to fix his name to it, because he would not be thought to prefer to other instructors of youth. It is intitled, "A New Latin Grammar; being a short, clear, and easy Introduction of young Scholars to the Knowledge of the Latin Tongue; containing an exact Account of the two first Parts of Grammar." In his "Introduction to the Classics," first published in 1718, 12mo, he displayed the beauties of those admirable writers of antiquity, to the understanding and imitation even of common capacities; and that in so concise and clear a manner, as seemed peculiar to himself. But his greatest and most celebrated work was, "The Sacred Classics defended and illustrated; or, An Essay humbly offered towards preserving the Purity, Propriety, and True Eloquence of the Writers of the New Testament," in 2 vols. Mr Blackwall had the felicity to bring up many excellent scholars in his seminaries at Derby and Bosworth; among others, the celebrated Richard Dawes, author of the *Miscellanea Critica*. A gentleman who had been his scholar, being patron of the church of Clapham in Surrey, presented him to that living as a mark of his gratitude and esteem. This happening late in life, and Blackwall having occasion to wait upon the bishop of the diocese, he was somewhat pertly questioned by a young chaplain as to the extent of his learning. "Boy, (replied the indignant veteran), I have forgot more than ever you knew!"

knew!" He died at Market-Bosworth, April 8. 1730.

BLAKE, p. 1173. l. 3 for his read their.

BLEEDING. For chap. i. read n° 356. et seq.

BLOOD, last line of n° 27. for bringtons read lime-stones.

Mr Brown has made a number of experiments on solutions of the different metals precipitated by alkalis impregnated with the phlogiston of blood, as in the making of Prussian blue. This lixivium being poured into a solution of silver in aquafortis, produces a coagulum of a pure flesh-colour. The like lixivium made with flesh instead of blood, produces, in this case, a white coagulum; and simple oil of tartar being used in the same experiment, by way of comparison with these lixivia, afforded a much whiter sediment. Spirit of salt being added severally to all the three mixtures, the bloom of the flesh-colour was taken off in the first; but it suffered no other change. In the second, the coagulum was tinged a little blue; and in the third, the whiteness was evidently improved. The bluish tinge in the second case is not wholly to be attributed to the flesh; but perhaps might be owing to an alloy of copper in the silver, from which it is seldom entirely freed.

The same liquors were made use of to form a precipitate from corrosive sublimate of mercury dissolved in water: the consequence of which was, that the lixivium with the blood produced a pure yellow; that with flesh, an orange colour; and the simple oil of tartar, a dingy red. The addition of spirit of salt afterwards to these made some very odd alterations; for the first changed its yellow into an orange colour, and the second its orange colour to a blue, while the third became without any colour. The blue colour in the lixivium with the flesh, when mixed with this solution, may be accounted for from the vitriol in this preparation; but it is not so easy to say, why the same vitriol should not have produced also a blue in a lixivium with blood.

Copper, when dissolved in aquafortis, makes the water of a green colour; and on pouring to this the two lixivia of blood and of flesh, the coagula are much alike; that is, they are white, tinged with green; but on adding spirit of salt to them, they become of a colour not unlike that of copper before the solution. Oil of tartar gives a pale green solution; and the spirit of salt clears up the liquor, and restores it to its former colour.

Bismuth dissolved in aquafortis, and mixed with a lixivium of blood, produces a milky coagulum, which, after a short time standing, with the addition of some spirit of salt, becomes of a pale blue. The lixivium of flesh, and of crude salt of tartar, produced both white coagula, when the spirit of salt made no alteration in. From these experiments it appears, that not any of these metallic bodies would produce a fine blue colour with the lixivium of the blood; but a solution of iron answers all the experiments that are made with the solution of vitriol, and produces as fine a blue colour as that made in the common way.

BLUE JOHN, among miners, a kind of mineral which has lately been fabricated into vases and other ornamental figures. It is of the same quality with the cubical spar, with respect to its solubility in the fire. It loses its colour, and becomes white in a moderate

heat: the weight of a cubic foot of the bluest kind is 3180 ounces, and that of the least blue is 3140 ounces. This substance began first to be applied to use about 18 years ago at one of the oldest mines in Derbyshire, called *Odin* mine, probably from its being dedicated to *Odin* the great god of the northern nations, at the foot of a high mountain called *Mam-Tor* in Castleton. Here the greatest quantities are still found; the largest pieces are sold for 9l. a ton, the middle-sized for 6l. and the least for 50s.

BLUSHING, a suffusion or redness of the cheeks, excited by a sense of shame, on account of consciousness of some failing or imperfection.

Blushing is supposed to be produced from a kind of consent or sympathy between several parts of the body, occasioned by the same nerve being extended to them all. Thus the fifth pair of nerves being branched from the brain to the eye, ear, muscles of the lips, cheeks, palate, tongue, and nose; a thing seen or heard that is shameful affects the cheeks with blushes, driving the blood into the minute vessels thereof; at the same time that it affects the eye and ear. For the same reason it is, as Mr Derham observes, that a savoury thing seen or smelt affects the glands and parts of the mouth; if a thing heard be pleasing, it affects the muscles of the face with laughter; if melancholy, it exerts itself on the glands of the eyes, and occasions weeping, &c. And to the same cause Dr Willis ascribes the pleasure of kissing.

BOILING FOUNTAIN. See ICELAND, and Plate CLVII.

BONITO, in ornithology. See SCOMBER, (*Encycl.*)

BOLETUS, (*Encycl.*) Horned cattle are fond of the brown boletus, and eat it greedily; but it is believed that it vitiates the milk, and lessens the quantity of it.

BONES, (*Encycl.*) From a discovery made by Mr Scheele, of a method of producing the phosphoric acid in large quantity from bones, it has been asserted, that this acid is naturally contained in the bones, united with a calcareous earth. From many experiments, however, it appears that no acid is naturally contained in calcined bones; nor can the acid of phosphorus be extracted from them but by means of the vitriolic acid: whence it seems probable, that the phosphoric acid in this case is produced by the combination of a certain quantity of earth with the vitriolic acid.—With regard to the earth of bones itself, it appears to be very different from the calcareous kind: it is much more soluble in the vitriolic acid, and may be precipitated from that or any other by means of the caustic volatile alkali, which cannot be done with the calcareous earth.

BOTANICAL TABLE, (*Encycl.*) In this table it was omitted to mark with their proper numbers, as proposed, the genera included in the 58 Orders belonging to Linnæus's Fragments of a Natural Method of Classification. In the following recapitulation of those genera, that omission is supplied; the figures added to each genus denoting the natural order to which it belongs: and these numbers or figures may be marked with the pen at the corresponding genera in the Table itself.

Abrus 32	Acer 23
Acalypha 38	Achras 43
Acanthus 40	Achyranthes 54

45 O 2

Acnida

Acnida 53
 Aconitum 26
 Acorus 2
 Acrostichum 55
 Actæa 26
 Adanfonia 37
 Adelia 38
 Adenanthera 33
 Adiantum 55
 Adonis 26
 Adoxa 13
 Ægilops 4
 Ægopodium 45
 Æsculus 23
 Æschynomene 32
 Æthusa 28
 Agaricus 58
 Agave 10
 Agrimonia 35
 Agrostemma 22
 Agrostis 4
 Aira 4
 Ajuga 42
 Aizoon 13
 Albua 10
 Alcea 37
 Alchemilla 35
 Aldrovanda 14
 Aletris 10
 Alisma 5
 Allium 9
 Aloe 10
 Alopecurus 4
 Alpina 8
 Aline 22
 Alstromeria 11
 Althæa 37
 Alyssum 39
 Amaranthus 54
 Amaryllis 9
 Ambrosia 2
 Amethystea 42
 Ammania 17
 Ammi 45
 Amomum 8
 Amorpha 32
 Amygdalus 36
 Anabasis 12
 Anacardium 12
 Anagallis 20
 Anagyris 32
 Anaktatica 39
 Anchusa 41
 Andrachne 38
 Andromeda 18
 Andropogon 4
 Androsace 21
 Anemone 26
 Anethum 45
 Angelica 45
 Anguria 34
 Annona 51
 Anthericum 10
 Antholyza 6
 Anthospermum 47

Anthoxanthum 4
 Anthyllis 32
 Aphanes 35
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Bots
 ||
 Bowyer.

BOTTS, (*Encycl.*) See also OESTRUS, (*Encycl.* and *Appendix.*)

BOW-LEGGED. See VALGUS, (*Encycl.*)

BOWYER (William), the most learned printer of his age, was born at White Fryars in London, Dec. 17. 1699. His father, whose name also was William, had been eminent in the same profession; and his maternal grandfather (Icabod Dawks) was employed in printing the celebrated Polyglott bible of bishop Walton. At a proper age, he was placed for grammatical education under the care of Mr Ambrose Bonwicke, a nonjuring clergyman of known piety and learning, who then lived at Headly, near Leatherhead in Surry. Here Mr Bowyer made great advances in literature, and a firm attachment commenced betwixt him and his master. On the 30th of January 1713, the whole property of the elder Mr Bowyer was destroyed by fire; on which occasion Mr Bonwicke generously undertook the education of his pupil for one year. In 1716, young Mr Bowyer was admitted a sizar at St John's college, Cambridge, where Dr Robert Jenkin was at that time master. He continued at the college of Cambridge under the tuition of the reverend Dr John Newcome till June 1722, during which period he probably took his degree of Bachelor of Arts; and it appears that he was desirous of obtaining a fellowship, though it is not certain that he ever stood a candidate for that honour. Soon after this he had an opportunity of repaying the kindness which Mr Bonwicke had shewn him, by officiating some time after his death in the capacity of a schoolmaster for the benefit of his family.

Mr Bowyer now entered into the printing-business along with his father. One of the first books which received the benefit of his correction was the complete edition of Selden in three volumes folio by Dr David Wilkins. This edition was begun in 1722, and finished in 1726; and Mr Bowyer's great attention to it appeared in his drawing up an epitome of Selden's *Synedriis*, as he read the proof-sheets. In 1727, he drew up an excellent sketch of William Baxter's Glossary of the Roman Antiquities. This was called "A view of a book intitled *Reliquie Baxterianæ*. In a letter to a friend." A single sheet 8vo. By this first public proof of Mr Bowyer's abilities, Dr Wotton and Mr Clarke were highly pleased; but as it was never published, and very few copies printed, it is very seldom found with the glossary.

In 1727 Mr Bowyer lost his mother; on which occasion he received a letter of consolation from Mr Chifhull the learned editor of the *Antiquitates Asiaticæ*. In October 1728 he married Miss Ann Prudom, his mother's niece, a very accomplished lady, by whom he had two sons, William and Thomas; the former of whom died an infant, and the latter survived his father. In 1729 Mr Bowyer published a curious treatise, intitled, "A Pattern for young Students in the Uni-

Uni-

Bowyer. University; set forth in the Life of Ambrose Bowwicke, some time scholar of St John's College, Cambridge:" but though this treatise was generally ascribed to Mr Bowyer, it was in reality the production of Mr Ambrose Bowwicke the elder. About this time it appears, that Mr Bowyer had written a pamphlet against the Separatists, though neither the title nor the occasion of it are now remembered. The same year, through the friendship of the Right Hon. Arthur Onslow, he was appointed printer of the Votes of the House of Commons; which office he held, under three successive speakers, for near 50 years.

In 1731 Mr Bowyer published, and, it is believed, translated, Voltaire's Life of Charles XII. This year also his wife died; on which occasion his friends Mr Clarke and Mr Chisholm wrote him very affectionate and Christian letters. He remained a widower till 1747, when he married; a very benevolent and worthy woman, Mrs Elizabeth Bill, by whom he had no children. In 1733 he published a piece in two sheets 4to, intitled, "The Beau and the Academic;" being a translation from a Latin poem recited that year at the Sheldonian theatre; and in 1736 he was admitted into the Society of Antiquarians, where he became an active and useful member.

In 1737 Mr Bowyer lost his father; and on this occasion Mr Clarke again addressed to him a letter of consolation. In 1742 our author published a translation of Trapp's Latin Lectures on Poetry, in which he was assisted by Mr Clarke, though the latter had a contemptible opinion of the performance.

In 1749, Mr Bowyer, along with Dr Burton, was virulently attacked by Dr King in a piece intitled *Elogium sancti inserviens Jacci Etoneusis five Gigantis*: or, "The praises of Jack Eaton, commonly called Jack the Giant."—This abuse was probably occasioned by Mr Bowyer's having hinted in conversation some doubts concerning the Doctor's skill in Latin. Our author drew up some strictures in his own defence, which he intended to insert at the conclusion of a preface to Montaigne's Reflections; but by Dr Clarke's advice they were omitted. In 1750, a prefatory critical dissertation and some notes were annexed by our author to Kuster's Treatise *De usu verborum mediæ ævæ*; a new edition of which, with farther improvements, appeared in 1773. He wrote likewise about the same time a Latin preface to Leedes's *Veteres poete citati*, &c.—Being soon after employed to print an edition of Col. Bladen's translation of Cæsar's Commentaries, that work received considerable improvements from Mr Bowyer's hands, with the addition of such notes in it as are signed TYROGA. In the subsequent editions of this work, though printed by another person during our author's lifetime, the same signature, though contrary to decorum, and even to justice, was still retained. In 1751, he wrote a long preface to Montaigne's "Reflections on the rise and fall of the Roman Empire;" translated the dialogue between Sylla and Socrates; made several corrections to the work from the Baron's "Spirit of Laws;" and improved it with his own notes. A new edition, with many new notes, was printed in 1759. In 1751 he also published the first translation that ever was made of Rousseau's paradoxical oration, which gained the prize at the academy of Dijon in 1750; and which first announced that singu-

lar genius to the attention and admiration of Europe. On the publication of the third edition of Lord Orrery's "Remarks on the Life and Writings of Dr Swift," in 1752, Mr Bowyer wrote and printed, but never published, "Two Letters from Dr Bentley in the Shades below, to Lord Orrery in a Land of thick darkness." The notes signed B, in the ninth quarto volume of Swift's works, are extracted from these Letters. In 1753, he endeavoured to allay the ferment occasioned by the Jew bill; with which view he published, in quarto, "Remarks on the speech made in common-council, on the bill for permitting persons professing the Jewish religion to be naturalized, so far as prophecies are supposed to be affected by it." This little tract was written with spirit, and well received by those who were superior to narrow prejudices. Its design was to show, that whatever political reasons might be alleged against the bill, Christianity was in no danger of being prejudiced by the intended protection promised to the Jews. The same year some of Mr Bowyer's notes were annexed to Bishop Clayton's translation of "A Journal from Grand Cairo to Mount Sinai and back again."—In 1754, Mr Bowyer, with a view of lessening his fatigue, entered into partnership with a relation; but some disagreement arising, the connection was dissolved in three years. On the death of Mr Richardson in 1761, Mr Bowyer succeeded him as printer to the Royal Society, through the favour of the late Earl of Macclesfield; and, under the friendship of five successive presidents, enjoyed that office till his death.

In 1763, Mr Bowyer published an excellent edition of the Greek Testament, in two vols 12mo. It appeared under the following title: *Novum Testamentum Græcum; ad fidem Græcorum solum Codicum MSS. nunc primum impressum, adjuvantibus Joanne Jacobo Wettsteno, juxta Sôlutiones J. Alberti Bengelii dicijum; et nova interpretatione sæpius illustratum. Accessere in altero volumine, Emendationes conjecturales virorum doctissimorum undecunque collectæ.* This fold with great rapidity: the Conjectural Emendations were well received by the learned, and are thought to be a valuable work. The president and fellows of Harvard college in Cambridge expressed their approbation of this edition in very high terms. In a letter to Mr Bowyer, written in the year 1767, "This work, (say they), though small in bulk, we esteem as a rich treasure of sacred learning, and of more value than many large volumes of the commentators." A second edition of the Conjectures on the New Testament, with very considerable enlargements, was separately published, in one vol. 8vo, in 1772. Bishop Warburton having censured a passage in the former edition, Mr Bowyer sent him a copy of this book, with a conciliatory letter. Dr Warburton's Divine Legation had received very considerable advantage from Mr Bowyer's corrections; and this even in an edition which was necessarily given to another press. In 1761 he was employed to print his Lordship's Doctrine of Grace. A second edition being soon wanted, and Mr Bowyer not having been intrusted with the care of it, he prepared a series of letters to the bishop in his own defence; of which, together with a few he had formerly received from that great writer, he afterwards printed twelve copies, of which ten have since been destroyed. However, there

is the best authority for asserting, that notwithstanding any little alterations which happened, Dr Warburton always retained a sincere regard for our author.

In 1765, at the request of Thomas Hollis, Esq; Mr Bowyer wrote a short Latin preface to Dr Wallis's *Grammatica Lingue Anglicanae*. He wrote also a larger English preface for the same work, which, however, still remains unprinted. In 1766 he entered into partnership with Mr Nichols, who had been trained by him to the profession, and had for several years assisted him in the management of his business. The same year, Mr Bowyer wrote an excellent Latin preface to *Joannis Harduini, Jesuitæ, ad Censuram Scriptorum veterum Prolegomena. Juxta Autographum*. In 1767 he was appointed to print the Journals of the House of Lords and the Rolls of Parliament. This year he printed Mr Clarke's excellent and learned work on "The Connection of the Roman, Saxon, and English Coins;" and wrote some notes upon it, which are interperfed throughout the volume with those of the author. Part of the Dissertation on the Roman seltence was likewise Mr Bowyer's production; and the index, which is an uncommonly good one, was drawn up by him entirely.

In January 1771 Mr Bowyer lost his second wife, and again received a letter of consolation from his old friend Mr Clarke, who had sent him one almost forty years before on a similar occasion. In the Philosophical Transactions for this year was printed a very ingenious "Inquiry into the Value of the ancient Greek and Roman Money," by the late Matthew Raper, Esq. But his opinions not coinciding with those of Mr Bowyer, he printed a small pamphlet, intitled, "Remarks, occasioned by a late Dissertation on the Greek and Roman money."

In 1773 three little tracts were published by him, under the title of "Select Discourses. 1. Of the correspondence of the Hebrew months with the Julian, from the Latin of Professor Michaelis. 2. Of the Sabbatical years, from the same. 3. Of the years of jubilee, from an anonymous writer in *Maillon's Histoire Critique de la Republique des Lettres*." In 1774 he corrected a new edition of Schrevelius's Greek Lexicon; to which he has added a number of words, distinguished by an asterisk, which he himself had collected in the course of his studies. Considerable additions, still in manuscript, were made by him to the lexicons of Hederic and Buxtorf, the Latin ones of Faber and Littleton, and the English Dictionary of Bailey; and he left behind him many other proofs of his critical skill in the learned languages. In 1774 was published, "The Origin of Printing, in two Essays. 1. The substance of Dr Middleton's Dissertation on the Origin of Printing in England. 2. Mr Meerman's Account of the Invention of the Art at Haerlem, and its progress to Mentz, with occasional Remarks, and an Appendix." The original idea of this valuable tract, was Mr Bowyer's, but it was completed by Mr Nichols.

Although our author, during the last ten years of his life had been afflicted with the palsy and stone, he not only preserved a remarkable cheerfulness of temper, but was enabled to support the labour of almost incessant reading; and he regularly corrected the learned works, especially the Greek books, which came

from his press. This he continued to do till within a few weeks of his death, which happened in November 1777, when he had nearly completed his 78th year.

For more than half a century Mr Bowyer was unrivalled as a learned printer; and many of the most masterly productions of this kingdom have come from his press. To his literary and professional abilities he added an excellent moral character; and he was particularly distinguished by his inflexible probity, and an uncommon alacrity in relieving the necessitous.

BRAMINS, (*Encycl.*) See also OBSERVATORY, (*Encycl.*)

To BREAM, to burn off the filth, such as grafs, ooze, shells, or sea-weed, from a ship's bottom, that has gathered to it in a voyage, or by lying long in a harbour. This operation is performed by holding kindled furze, faggots, or such materials, to the bottom, so that the flame incorporating with the pitch, sulphur, &c. that had formerly covered it, immediately loosens and throws off whatever filth may have adhered to the planks. After this, the bottom is covered anew with a composition of sulphur, tallow, &c. which not only makes it smooth and slippery, so as to divide the fluid more readily, but also poisons and destroys those worms which eat through the planks in the course of a voyage. Breaming may be performed either when the ship lies aground after the tide has ebbed from her, or by docking, or by careening.

BRITAIN, (*Encycl.*) No 454, for *Antigallican privateer*, read the *Active and Favourite king's ships*.

BROWN (Dr John), a clergyman of the church of England, and an ingenious writer, was born at Rothbury in Northumberland in November 1715. His father John Brown, was a native of Scotland, of the Browns of Colstown near Haddington; and at the time of his son's birth was curate to Dr Thomlinson rector of Rothbury. He was afterwards collated to the vicarage of Wigton in Cumberland; to which place he carried his son, who received the first part of his education there. Thence he was removed, in 1732, to the university of Cambridge, and entered of St John's college, under the tuition of Dr Tunstall. After taking the degree of bachelor of arts with great reputation (being amongst the list of wranglers, and his name at the head of the list) he returned to Wigton, and received both deacon's and priest's orders from Sir George Fleming bishop of Carlisle. Here he was appointed by the dean and chapter a minor canon and lecturer of the cathedral church. For some years he lived here in obscurity; and nothing farther is known concerning him, than that in 1739 he went to Cambridge to take his degree of master of arts. In 1745 he distinguished himself as a volunteer in the king's service, and behaved with great intrepidity at the siege of Carlisle. After the defeat of the rebels, when several of them were tried at the assizes held at Carlisle in the summer of 1746, he preached at the cathedral church of that city two excellent discourses, on the mutual connection between religious truth and civil freedom; and between superstition, tyranny, irreligion, and licentiousness.

Mr Brown's attachment to the royal cause and to the Whig party procured him the friendship of Dr Ombaldeston, who was the only person that continued to

BRAMINS
Brown.

be his friend through life, the peculiarities of Mr Brown's temper, or some other cause, having produced quarrels with every one else. When Dr Osbaldeston was advanced to the see of Carlisle, he appointed Mr Brown to be one of his chaplains.

It was probably in the early part of his life, and during his residence at Carlisle, that Mr Brown wrote his poem intitled *Honour*, inscribed to the Lord Viscount Londale. Our author's next poetical production was his *Essay on Satire*; and which was of considerable advantage to him both in point of fame and fortune. It was addressed to Dr Warburton; to whom it was so acceptable, that he took Mr Brown into his friendship, and introduced him to Ralph Allen, Esq; of Prior Park, near Bath, who behaved to him with great generosity, and at whose house he resided for some time.

In 1751 Mr Brown published his "Essays on the Characteristics of Lord Shaftesbury, &c." dedicated to Ralph Allen, Esq. This was received with a high degree of applause, though several persons attempted to answer it. In 1754, our author was promoted by the earl of Hardwicke to the living of Great Horkeley in Essex.

In 1755, our author took the degree of Doctor of Divinity at Cambridge. This year he published his tragedy of *Barbarossa*; which, under the management of Mr Garrick, was acted with considerable applause; but when it came to be published, it was exposed to a variety of strictures and censures. This tragedy introduced our author to the acquaintance of that eminent actor; by whose favour he had a second tragedy, named *Athelstan*, represented at Drury-Lane play-house. This was also well received by the public; but did not become so popular as *Barbarossa*, nor did it preserve so long the possession of the stage.

In 1757 appeared his famous "Estimate of the manners and Principles of the Times." The reception which this work met with from the public was very flattering to his vanity; no fewer than seven editions of it having been printed in little more than a year. The chief design of this performance was to show, that a vain, luxurious, and selfish effeminacy in the higher ranks of life marked the character of the age; and to point out the effects and sources of this effeminacy. Several antagonists appeared, some of whom were neither destitute of learning nor ingenuity; though Mr Brown himself asserted that Dr Wallace, a clergyman of Edinburgh, was the only candid and decent adversary that appeared against him. The testimony given by M. de Voltaire to the effect which the Estimate had on the conduct of the nation, is very honourable to Dr Brown. "When Marshal Richlieu, in 1756, (says that celebrated writer) laid siege to Port Mahon, the capital of Minorca, the British sent out admiral Byng with a strong naval force, to drive the French fleet off the island, and raise the siege. At this time there appeared a book, entitled *An Estimate of the Manners of the Times*; of which there was no less than five editions printed off in London in the space of three months. In this treatise the author proves that the English nation was entirely degenerated;—that it was near its ruin;—that its inhabitants were no longer so robust and hardy as in former times;—and that its soldiers had lost their courage. —This work roused the sensibility of the English na-

tion, and produced the following consequences. They attacked, almost at one and the same time, all the sea-coasts of France, and her possessions in Asia, Africa, and America." In 1758, our author published the second volume of his *Estimate of the Manners and Principles of the Times*; containing additional remarks on the ruling manners and principles, and on the public effects of those manners and principles. The design of this volume was, to retract such mistakes as he thought he had committed; to prove such points as were affirmed and not proved; to illustrate those particulars which were hinted, but not explained; to reply to such capital objections as had been made to his general system by preceding writers on the same subject; and to display the consequences which might be fairly deduced from his principles, and through a designed brevity were omitted in the first volume. But it unfortunately happened that the Doctor's self-opinion, which gave so much offence in his first volume, broke out in the second with still greater violence. The consequence of this was, that he exposed himself to general censure and dislike; and the prejudices against him occasioned the real excellencies of the work to be very much overlooked. The periodical critics, whom he had gone needlessly out of his way to abuse, treated him with uncommon severity; and such a multitude of antagonists rose against him, so many objections were urged upon him, by friends as well as enemies, that he seems to have been deeply impressed, and to have retired for a while into the country. From the country it was that he wrote, in a series of letters to a noble friend, "An Explanatory Defence of the Estimate of the Manners and Principles of the Times; being an Appendix to that Work, occasioned by the Clamorous lately raised against it among certain Ranks of Men."

But while Dr Brown thus distinguished himself as a political writer, he was advanced to no higher dignity in the church; nay, on some disgust, it is supposed, he resigned his living in Essex; however, in recompence, Dr Osbaldeston procured him the rectory of St Nicholas in Newcastle on Tyne. He would probably have received further favours from this prelate, had not the latter died soon after his promotion to the see of London.

In 1760 our author published an Additional Dialogue of the Dead, between Pericles and Aristides; being a sequel to a dialogue of Lord Lyttelton's between Pericles and Cosmo. One design of this additional dialogue was to vindicate the measures of Mr Pitt, against whose administration Lord Lyttelton had been supposed to have thrown out some hints. Our author's next publication, in 1763, was "The cure of Saul," a sacred ode; which was followed in the same year by "A Dissertation on the Rise, Union, and Power, the Progressions, Separations, and Corruptions of Poetry and Music." This is one of the most pleasing of Dr Brown's performances, and abounds with a variety of critical discussions. A number of strictures on this piece were published; and the Doctor defended himself in a treatise intitled *Remarks on some Observations on Dr Brown's Dissertations on Poetry and Music*. In 1764 our author published, in octavo, "The History of the Rise and Progress of Poetry through its several Species;" which is no more than the substance given in the dissertation abovementioned. The same year Dr Brown published

list of a volume of sermons, dedicated to his patron Dr Osbaldeston bishop of London; but most, if not all of these, had been separately published, excepting the first three, which were on the subject of education. In the beginning of the year 1765, the Doctor again returned to politics, and published "Thoughts on Civil Liberty, Licentiousness, and Faction." At the conclusion of this work the author prefaced a code of education, upon which Dr Priestley made remarks at the end of his "Essay on the Course of a Liberal Education for civil and active Life." The same year he published a sermon "On the Female Character and Education," preached on the 16th of May, 1765, before the guardians of the asylum for deserted female orphans. His last publication was, in 1766, "A Letter to the Rev. Dr Lowth, occasioned by his late Letter to the Right Reverend Author of the Divine Legation of Moses." This was occasioned by Dr Lowth's having *clearly*, though *indirectly*, pointed at Dr Brown as one of the extravagant adulators and defenders of bishop Warburton. Besides these works, Dr Brown published a poem on Liberty, and two or three anonymous pamphlets. At the end of several of his later writings, he advertised his design of publishing "Christian Principles of Legislation," but was prevented from executing it by his death; though the work appears to have been completed.

We come now to the concluding events of our author's life; concerning which the following is the most authentic intelligence that can be procured. Whilst Dr Dumarsq resided in Russia in the year 1765, to which he had been invited the preceding year to give his advice and assistance for the establishment and regulation of several schools which her Imperial majesty intended to erect, he received a letter from a lady of distinguished character in England, recommending to him Dr Brown as a proper correspondent on this occasion. Dr Dumarsq then wrote a letter to Dr Brown, telling him the occasion of his application, and the difficulties that occurred. He had imagined that nothing more would be wanted of him than what concerned classical learning, and a general foundation for the sciences; as that had been the common introduction to every kind of useful knowledge in the western parts of Europe. But on his arrival he found that a much more extensive scheme was required; and such as extended not only to learning properly so called, but also to matters military and naval, civil and commercial. But having stated his difficulties in executing this plan to Dr Brown, the latter proposed a scheme still more extensive; and which was no less than a general plan of civilization throughout the whole Russian empire. In this plan, however, though it showed very enlarged ideas and great strength of mind, there were several defects which rendered it, as Dr Brown himself was afterwards convinced, impracticable. He had laid greater stress upon the support, energy, and efficacy of absolute power in princes when exerted in a good cause, than experience would warrant; and he was ready to imagine that the bulk of the Russian nation, just emerging out of barbarism, was like a *tabula rasa*, upon which any characters might be written. At last the Doctor's letter was laid before the empress, who was so pleased with it that she immediately invited him to Russia. He accepted the invitation, and

procured his Majesty's leave to go: 1000 l. were ordered for his expence, and he actually received 200 l. But when he was on the point of setting out, an attack of the gout and rheumatism, to which he had been all his lifetime subject, so impaired his health, that his friends dissuaded, and at last succeeded in preventing him from going. The money was returned, excepting 97 l. 6 s. which had been expended in necessities for the intended journey. But though he thus declined the journey, a long letter which he afterwards wrote to the empress, and which does honour to his abilities, shows that he had not abandoned his intention of being serviceable. The affair, however, taken in all its circumstances, did no doubt greatly agitate his mind; and his being obliged at length to give up the journey, must have been no small disappointment to a man of his sanguine expectations. This disappointment concurring with the general state of his health, and perhaps the recollection of some other failures that had happened, was followed by a dejection of spirits; in consequence of which he put an end to his life on the 23d of September 1766, in the 51st year of his age. On the morning of that day his servant came into his bed-chamber, and asked him what fort of a night he had had? to which he replied, "A pretty good one." The servant having quitted the bedside for a few minutes, heard a noise in the Doctor's throat, which he imagined to be owing to some obstruction occasioned by phlegm. Going to assist his master, he found him speechless, and bleeding profusely, having cut the jugular vein with a razor; and this he had done so effectually, that death speedily ensued. Such was the unhappy end of this ingenious writer; but the manner of it, when some previous circumstances of his life are understood, will call no stain on his character. He had a tendency to insanity in his constitution; and from his early life, had been subject at times to some disorder in his brain, at least to melancholy in its excess. Mrs Gilpin of Carlisle, soon after Dr Brown's decease, wrote in the following terms in a letter to a friend. "His distemper was a frenzy, to which he had by fits been long subject; to my own knowledge, above 30 years. Had it not been for Mr Farish frequently, and once for myself, the same event would have happened to him long ago. It was no premeditated purpose in him; for he abhorred the thought of self-murder; and in bitterness of soul expressed his fears to me, that one time or another some ready mischief might present itself to him, at a time when he was wholly deprived of his reason."

BRUCHUS, (*Encyel.*) See Plate CCCXIII.

BUBONOCELE. For n° 13. read p. 8388, 8422.

BUG, (*Encyel.*) Early in the spring, even in February, the larva of these creatures begins to burst from the egg; and it is at this season that attention is so very requisite. The bed ought to be stripped of all its furniture; which should be washed, and even boiled, if linen; if stuff, it should be hot-pressed. The bedstead should be taken to pieces, dusted, and washed with spirit of wine in the joints; for in those parts the females lay their eggs. This done, the joints, crevices, cavities, &c. should be well filled with the best soft soap mixed with verdigrise and Scots snuff. On this substance the larva, if any escape the cleaning, or

Bursera
||
Calcareous.

any, which is common in old houses, creep into the bedstead, will feed at first, and of course be destroyed: this last will effect the purpose in houses where these vermin are not so numerous, by repeating the operation every three months.—Professor Kalm † mentions, that from repeated trials, he has been convinced that sulphur, if it be properly employed, entirely destroys bugs and their eggs in beds or walls, though they were ten times more numerous than the ants on an ant-hill. His translator, Dr. Forster, adds, that a still more effectual remedy is, to wash all the infected furniture with a solution of arsenic. See further the article CIMICIFUGA, below.

BURSERA, in botany, a genus of the monogynia order, belonging to the hexandria class of plants. There is but one species, the gummifera, or gum-clim. This is a large tree. The leaves are pennate, the middle rib five or six inches long, with the pinne set opposite to one another on footstalks half an inch long. The blossoms

are succeeded by purple-coloured berries bigger than large peas, hanging in clusters on a stalk of about five inches long, to which each berry is joined by a foot-stalk of half an inch long. The seed is hard, white, and of a triangular figure, inclosed within a thin capsule, which divides in three parts, and discharges the seed. This tree produces a large quantity of gum, of a brown colour, and of the consistence of turpentine. It is esteemed a good vulnerary, and is much used for horses. Most of the Bahama islands abound with these trees.

BUTTERWORT, (*Encycl.*) Wherever this plant, called also *Yorkshire fanicle*, is found, it is a certain indication of a boggy soil. It has long had the reputation of being noxious to sheep. The country people believe that it gives them the rot whenever they eat it, which they will not do but from great necessity. Hence this plant has been called the *white rot*.

C.

CABBAGE BARK-TREE. See GEOFFRÆA, below.

CABINDA, the chief port of the kingdom of Angoy in Loango in Africa. It is situated at the mouth of a river of the same name about five leagues north of Cape Palmerino, on the north side of the mouth of the river Zaire. The bay is very commodious for trade, wooding, and watering.

CACHEXY. For *Index subjoined to Medicine*, read, p. 4810.

CACTUS. For CERES, read CEREUS.

CÆSARIAN OPERATION. For chap. vi. read chap. xv.

CALAMUS, in botany, a genus of the monogynia order, belonging to the hexandria class of plants. There is but one species, the rotang, or true Indian cane. The stem is without branches, has a crown at top, and is every where beset with straight spines. This is the true Indian cane, which is not visible on the outside; but the bark being taken off discovers the smooth stick, which has no marks of spine on the bark, and is exactly like those which the Dutch sell to us; keeping this matter very secret, lest travellers going by should take as many canes out of the woods as they please. Sumatra is said to be the place where most of these sticks grow. Such are to be chosen as are of a proper growth between two joints, suitable to the fashionable length of canes as they are then worn: but such are scarce.

CALASH. For n° 76. read n° 73.

CALCAREOUS EARTH, (*Encycl.*) Though this kind of earth cannot be vitrified by itself in the heat of our common furnaces, it is remarkable, that by mixing it with argillaceous earth, which is as unvitrescible as itself, both will melt together into glass. To illustrate this, Dr. Watson relates the following experiment. "Mix well together equal weights of powdered chalk or other calcareous body, and powdered pipe-clay; put the mixture into a crucible. Any where towards the middle of the crucible put two solid pieces; one of pure chalk, the other of pure clay, so that they may not be contiguous to each

other, but be every where severally surrounded with the mixture of chalk and clay. Then by exposing the whole to a strong degree of heat for a sufficient length of time, it will be found that the mixture has been converted into glass; and upon breaking the vitrified mass, we shall discover the two solid pieces of chalk and clay unvitrescified and unaltered in their figure, tho' every where surrounded with glass.

It is remarkable, that some kinds of calcareous earth, after being deprived of all their fixed air by calcination, will regain, upon being exposed to the atmosphere, the very same quantity that they lost, while others will not. Dr. Watson informs us, that having calcined into lime 204 grains of dove marble, the lime weighed whilst hot 116 grains. This was done on the 6th of March; and on the 5th of November following it weighed 203½ grains. As it had been frequently weighed during that interval, it is very probable that the half grain had been lost by repeating this operation. A second experiment torned out, as accurately as could be expected, the same. Some dry chalk, weighing 120 grains, was reduced by calcination to 68. This quantity of lime increased only to 104 grains; so that 16 parts in 120, or between one seventh and one eighth of its weight, were never regained. The Doctor gives a reason for this defect of increase in the following manner. "The chalk or clunch (says he) of this country, is not a pure calcareous earth, but contains a portion of sand: and hence, when a definite weight of this chalk-lime is exposed to the air, it cannot acquire as much increase of weight as the same quantity of purer lime would do; for the sand which is mixed with the lime is of a very different nature from it, and does not attract any thing from the air." It is difficult, however, on this supposition, to see why the sand should lose any thing by calcination; for as it can regain no air, so it can lose none in the fire. The following is a table of the weight regained by lime made from different materials, according to Dr. Watson's experiments. He observes, however, that there is great reason to believe, that the quantity of matter which

Batter.
||
Calcareous.

† Travels in
America.

the same sort of lime can attract from the air, depends very much on the degree of heat with which the lime has been burned. There is a certain definite degree of heat requisite to make the lime attract the greatest possible quantity from the air. When the heat is not sufficient to convert the whole of the substance into lime, then that part which is not converted into lime will not contribute any thing to the increase of the lime when exposed to the air, inasmuch as it possesses no quality of attracting any thing from the air. Our author observes also, that the same effect takes place when the heat has been more than sufficient to convert the whole of the substance into lime; for then a partial vitrification takes place. The following substances were changed into lime by being exposed to a very fierce fire for 24 hours. The experiment was made in November 1779; and in three months they had all acquired the greatest increase of weight. The first column of the table expresses the increase of weight which a ton of the same substances gained; and the second expresses that which they would have gained, had they been exposed to the fire only for four hours.

	C.	q.	lb.	C.	q.	lb.
Sunna marble,	8	1	15	15	0	12
Rhomboidal spar,	8	1	5	14	0	16
Statuary marble,	8	0	0	14	2	0
Chalk,	7	1	13	10	2	9
Clithero limestone,	6	2	9	12	1	15
Crystallized spar,	6	0	0	13	1	25

CALCINATION, (Encycl.) In confirmation of the opinion that the increase of weight in metallic calces is owing to the adhesion of elastic fluids, it may be observed, that various metallic calces are in great measure soluble in water; which shows that they have something of a saline nature. Perhaps the elastic, or that matter, whatever it is, which generates the elastic fluids obtained from these calces, renders them so.

CALX ANTIMONII, is the earthy part of the regulus of antimony when deprived of its phlogiston. See **PHARMACY**, no 791. By the mere action of fire, however, the whole of its phlogiston cannot be dissipated; though it may be done by the addition of nitre, and the calx become perfectly white; but in this case it cannot be melted into glass, except in the focus of a burning mirror. The calx of antimony, perfectly deprived of its phlogiston, has been used in medicine chiefly under the name of *diaphoretic antimony*; but little regard is now paid to it.

CAMPHORA. In marginal note, for no 198. read *The Table*.

CAMPVEER. See **VEER**, (Encycl.)

Lighting a CANDLE by a small spark of electricity. This method, which is an invention of Dr Ingenhouz, is recorded in the Phil. Trans. vol. 68. It is done by a small vial, having eight or ten inches of metallic coating, or even less, charged with electricity, which may be done at any time of the night by a person who has an electric machine in his room. "When I have occasion to light a candle," says he, "I charge a small-coated phial, whose knob is bent outwards, so as to hang a little over the body of the phial; then I wrap some loose cotton over the extremity of a long brass pin or a wire, so as to stick moderately fast to

its substance. I next roll this extremity of the pin wrapped up with cotton in some fine powder of resin, (which I always keep in readiness upon the table for this purpose, either in a wide-mouthed phial or in a loose paper); this being done, I apply the extremity of the pin or wire to the external coating of the charged phial, and bring, as quickly as possible, the other extremity wrapped round with cotton to the knob: the powder of resin takes fire, and communicates its flame to the cotton, and both together burn long enough to light a candle. As I do not want more than half a minute to light my candle in this way, I find it a readier method than kindling it by flint and steel, or calling a servant.

"I have found, that powder of white or yellow resin lights easier than that of brown.

"The *farina lycopodii* may be used for the same purpose: but it is not so good as the powder of resin, because it does not take fire quite so readily, requiring a stronger spark not to mis; besides, it is soon burnt away.

"By dipping the cotton in oil of turpentine, the same effect may be as readily obtained, if you take a jar somewhat greater in size. This oil will inflame so much the readier if you threw a few fine particles of brags upon it. The pin dust is the best for this purpose; but as this oil is scattered about by the explosion, and when kindled fills the room with much more smoke than the powder of resin, I prefer the last."

CANDLE-BOMBS, a name given to small glass bubbles, having a neck about an inch long, with a very slender bore, by means of which a small quantity of water is introduced into them, and the orifice afterwards closed up. This stalk being put through the wick of a burning candle, the vicinity of the flame soon rarifies the water into steam, by the elasticity of which the glass is broken with a loud crack.

CANELLA ALBA, (Encycl.) Marginal note, for no 201, read *Catalogue of Simple, (Encycl.)* See also **WINTERANIA** in this Appendix.

CANNEL COAL, a species of coal remarkable for being easily kindled, and burning with a bright flame. It receives its name from *canewyll*, which in the old British language signifies "a candle;" the want of which is supplied by the bright flame of this coal. See **COAL**, (Encycl.)

CANTHARIS, (Encycl.) The cantharis poscillus, which is frequently found in pastures and under juniper trees, shines by night. In Italy and North America a species of winged cantharides remain all night on the shrubs and branches of trees, emitting light; but on the approach of any enemy instantly fly off, and the whole tree seems on fire. This wonderful light, which has no connection either with the culinary or electric fire, is placed in the segments of the abdomen of the insect while it remains alive.

CAOUTCHOUC, (Encycl.) A method of dissolving this elastic gum without ether is as follows: Take one pound of the spirit of turpentine, and a pound of the gum cut into very small pieces; pour the turpentine into a long-necked matras, which must be placed in a sand-bath; throw in the gum, not all at once, but by little and little according as it is perceived to dissolve. When it is entirely dissolved, pour into the matras a pint of nut or linseed oil, or oil of pop-

Candle
Caoutchouc

pices,

CARDAMOM pies, rendered delicate in the usual manner with litharge. Then let the whole boil for a quarter of an hour, and the preparation is finished.—This would make an excellent varnish for Air-balloons, were it not so expensive on account of the price of the gum.

CARDAMOM. For n° 210, 211. read *The Catalogue of Simples.*

CARENING. For plate LXXXIV. read plate LXXXIII.

CARICA, (Encycl.) See also **PAPAW, (Encycl.)**

CARIES. For *Index subjoined to Medicine*, read *Surgery*, n° 393.

CARNATION, or the naked parts of painting, (*Encycl.*) See also **MINIATURE-PAINTING, (Encycl.)**

CARRONADE, a short kind of ordnance lately invented, capable of carrying a large ball, and useful in close engagements at sea. It takes its name from Carron, the place where it was invented. See **GUNNERY**, n° 45. (*Encycl.*)

CARUS. For *Index subjoined to Medicine*, read *MEDICINE*, n° 372—374.

CARYOPHYLLUS. For n° 49. read *Catalogue of Simples.*

CASK, in heraldry. For n° 45. read p. 3607.

CASSIA. For n° 223. read *Catalogue of Simples.*

CASTOREUM. For n° 224. read *Catalogue of Simples.*

CAT. For fig. 4. read fig. 9.

CATECHU, (Encycl.) See also **ARECA, (Encycl.)**

CATHARTICS. For n° 54. &c. read p. 4476.

CATOCHE. For *Index subjoined to Medicine*, read *Medicine*, n° 387.

CAUSTICITY, (Encycl.) Par. 2d, line 10. after *inflammable matter*, add *and all their fixed air.*

CEMENT, (Encycl.) See also **STUCCO, (Encycl.)**

CENTRONIA, in natural history, a name by which the echini marini have been lately distinguished. Dr Hill makes them a distinct class of animals living under the defence of shelly coverings formed of one piece, and furnished with a vast number of spines moveable at the creature's pleasure.

CERATE. For the references at the end, read *Pharmacy*, n° 1019—1021.

CERUSSE OF ANTIMONY, the same with **CALX of Antimony.**

CHAIN-WALES, (Encycl.) See Plate LXXXII. fig. 13.

CHANCE. For *Sortes*, read *Sortilege.*

CHANCELLOR'S COURT, in the universities of Oxford and Cambridge. See *UNIVERSITY COURTS, (Encycl.)*

CHAPEAU. For n° 27. read p. 3607.

CHARLOCKS, (Encycl.) These are the pests of our corn-fields, and are said to give a most unwholesome quality to bread when the seeds abound in grain.

CHARTA MAGNA. For **LAW**, n° 31. read **MAGNA Charta.**

CHAVARIA, in ornithology. See the article **PARRA** in this *Appendix.*

CHEMISTRY. N° 101. par ult. for "See **ESSAYING, GLASS, and SMELTING,**" read "See **FURNACE and GLASS.**"

CHESELDEN, (William), an eminent anatomist and surgeon, was born at Burrow on the Hill, in the

county of Leicester, descended from an ancient family in the county of Rutland, whose arms and pedigree are in Wright's "History of Rutland." He received the rudiments of his professional skill at Leicester; and married Deborah Knight, a citizen's daughter, by whom he had one daughter, Williamina Deborah. In 1713 he published his *Anatomy of the Human Body*, 1 vol. 8vo; and in 1723, *A Treatise on the high Operation for the Stone*. He was one of the earliest of his profession who contributed by his writings to raise it to its present eminence. The following verses were addressed to him in 1733, "on his many dextrous and successful operations:"

Oh wondrous Artift! (surely given,
By the peculiar grace of Heaven,
As a new Saviour to mankind,
The lame to cure, relieve the blind,
And, by the ever happy knife,
To ease, and lengthen human life!
How dost thou grace that noble art,
Which owes to you its noblest part!
How well deserve the general praise
Your universal fame does raise!
How just your merit, for the place
Confer'd on you by royal grace!
Well might the care alone be thine,
To tend on gracious Caroline,
Since all allow your skill divine.
No more let France her artifts boast,
To you but finishers at most.
Their Charité, or Hôtel Dieu,
Ne'er saw such cures as done by you;
Aware of this, with utmost speed,
Their New ACADEMY decreed
You all their honours, and, to grace
Their list, therein give you a place:
From such a member they receive
A greater honour than they give.
Long may you live, and bless the land
With your unerring skill and hand,
May this ne'er fail, that never warp;
And may they both defend to Sharn!

In the beginning of 1736, he was thus honourably mentioned by Mr Pope: "As soon as I had sent my last letter, I received a most kind one from you, expressing great pain for my late illness at Mr Cheseelden's. I conclude you was eased of that friendly apprehension in a few days after you had dispatched yours, for mine must have reached you then. I wondered a little at your quære, who Cheseelden was. It shews that the truest merit does not travel so far any way as on the wings of poetry: he is the most noted and most deserving man in the whole profession of chirurgery; and has saved the lives of thousands by his manner of cutting for the stone." He appears to have been on terms of the most intimate friendship with Mr Pope, who, frequently, in his Letters to Mr Richardson, talks of dining with Mr Cheseelden, who then lived in or near Queen Square. In February 1737, Mr Cheseelden was appointed surgeon to Chelsea Hospital. As a governor of the Foundling Hospital, he sent a benefaction of 50l. to that charity, May 7. 1751. inclosed in a paper with the following lines:

'Tis what the happy to the unhappy owe;
For what man gives, the gods by him bestow.

POPE.
He died at Bath, April 11. 1752, of a disorder arising from drinking ale after eating hot buns. Finding himself uneasy, he sent for a physician, who advised vomiting immediately; and if the advice had been taken,

taken, it was thought his life might have been saved. By his direction, he was buried at Chelief.

CHEVERON. For n° 23, 24. read p. 3592.

CHINA, (*Encycl.*) The immense population of China, recorded under that article, n° 55. falls very far short of that recorded by some late authors. In the Memoirs of the History, &c. of the Chinese by the missionaries at Pekin, published at Paris in 1780, we find a controversy on this subject between M. Pau and the ex-jesuit M. Amiot. The former had published a book, intitled "Philosophical Inquiries concerning the Egyptians and Chinese," in which he rates the population of China much below 82 millions. Amiot is so far from being of this opinion, that he estimates their number at 200 millions. To confirm this estimate, he produces a list made in 1743, of all that paid taxes in the respective provinces, that is, of all the heads of families; and, on summing up their numbers. he finds 28,516,428 families; in which enumeration, says he, women, children, and domestics, are not reckoned. The Chinese reckon, at an average, six to a family; M. Amiot reduces this computation to five, and on this supposition makes the inhabitants of China amount to 142,582,400 souls. But in this number the Missionary comprehends neither the grand mandarins, the inferior ones, nor the literati, nor the military, which amount, according to his calculations, to upwards of seven millions; which added to the enumeration abovementioned, make 149,663,000 souls. Fifty millions are nevertheless still wanting to make up the 200 millions at which our Missionary estimates the inhabitants of China. These he finds in the inhabitants of Pekin, which he reckons at two millions, the Mantcheou Tartars, who live among the Chinese, the tradesmen, the persons employed in the silk manufactures, and the populace of the cities, which are not registered. But the computations of M. Amiot are liable to great difficulties, and are certainly arbitrary and uncertain in several respects. He comprehends in his enumeration districts and provinces that belong to Tartary, and not to China; and he calculates often from registers of the same districts, that are discordant and contradictory. When it is considered, that the enumerations of the inhabitants of China have been different under different dynasties, as all the emperors did not possess the same extent of territory,—that the wars with the Tartars often obliging the Chinese to withdraw in great numbers towards the south, rendered certain provinces more populous at one period than they were at another,—that the numbers of the poor, the straggling labourers, and of those that ply on the rivers, cannot be easily computed,—and that many of the registers are evidently arbitrary; we find ourselves disposed to suspend our determination of the controversy between M. Amiot and M. Pau relative to the object now under consideration. If population had gone on increasing in China, from the third century before the Christian era (which was the period of their rising power), the Chinese might have sent into Tartary numerous colonies, which would have peopled that country and civilized its inhabitants. But this has not been the case; and notwithstanding all the pious relations of the Missionaries, it is certain, that a bad administration,—the extortions and oppressive conduct of civil and military officers,—the revolutions occa-

sioned by the establishment of different dynasties,—famine,—epidemics,—inundations,—wars,—massacres—and the fall of great ministers, involving their friends and families in ruin, keep population within certain bounds, and hinder it from rising to a pitch that would produce new and fatal revolutions.

CHITAU. For *Lignum-aloes*, read *Xylo-aloes*.

CHIVALRY, (*Encycl.*) See also KNIGHT, (*Encycl.*)

CHOCOLATE, (*Encycl.*) This, according to Linnæus, is more salutary than either tea or coffee. There are three methods of preparing it, as practised by the Indians, the Spaniards, and others. The Indians, to one pound of the roasted nuts put half a pound of sugar dissolved in rose-water, and half a pound of flour of maize or Indian corn. The Spaniards, to six pounds of the nut add three and an half of sugar, seven pods of vanillas, one pound and an half of Indian corn, half a pound of cinnamon, six cloves; one drachm of capsicum, and whatsoever is thought requisite of the roucou nut to improve the colour, together with ambergrise or mullk to give an agreeable scent. In the other and more common way, to seventeen pounds of nuts are added ten pounds of sugar, twenty-eight pods of vanillas, one drachm of ambergrise, and six ounces of cinnamon.

CICINDELA, (*Encycl.*) See also Glow-Worm, (*Encycl.*)

CIMICIFUGA, in botany, a genus of the polyandria order, belonging to the diocia class of plants. Melsersheimius, in the *lisse Siberica*, gives it the following character and name: *Cimicifuga fistida* with the leaves of the herb Christopher, bearing a thyrsus of yellow male flowers with a red villous seed, the seed-vessel in form of a horn. This whole plant to resembles the *actæa racemosa*, that it is difficult to distinguish them when not in flower; but in the fructification it greatly differs from it, the *cimicifuga* having four pistills, the *actæa* but one. Jacquin says, that it is a native of the Carpathian mountains. It has obtained the name of *cimicifuga*, or *bugbane*, both in Siberia and Tartary, from its property of driving away those insects; and the botanists of those parts of Europe which are infested by them, have long desired to naturalise it in their several countries.

CIVIL LIST. See LIST, (*Encycl.*)

Civil Society. For LAW, Part I. read Part II.

CLAVARIA. Par. 2. line 1. For Mr Miller, read Mr Muller.

CLEPSYDRA, (*Encycl.*) See also HYDROSTATICS, n° 42. (*Encycl.*)

CLYDESDALE. See LANERKSHIRE, (*Encycl.*)

COAL, (*Encycl.*) See also PITCH and TAR, (*Encycl.*)

CAPE COAST, the name of the chief British settlement on the coast of Guinea in Africa. The name is thought to be a corruption of *Cabo Corç*, the ancient Portuguese appellation. This cape is formed by an angular point, washed on the south and east by the sea, on which stands the English fort. Here the Portuguese settled in 1610, and built the citadel of Cape Coast upon a large rock that projects into the sea. A few years afterwards they were dislodged by the Dutch, to whom this place is principally indebted for its strength. In 1664 it was demolished by Admiral Holmes,

Cobalt
||
Coccus.

Holmes, and in 1665 the famous Dutch admiral De Ruyter was ordered by the states to revenge the insults of the English. With a squadron of 13 men of war he attacked all the English settlements along the coast, ruined the factories, took, burnt, and sunk all the shipping of the English Company: however, after all his efforts, he was baffled in his attempts on Cape Coast. By the treaty of Breda it was confirmed to the English, and the king granted a new charter in 1672; on which the Company applied all their attention to the fortifying and rendering it commodious.

COBALT. At the end, for *Zaffre*, read *Regulus*.

COCCINELLA, (*Encycl.*) Dele the whole article, and read as follows:

COCCINELLA, a genus of insects of the order of coleoptera; the characters of which are these: The antennæ are subelavated; the palpi are longer than the antennæ, the last articulation heart-shaped; the body is hemispheric; the thorax and elytra are margined; the abdomen is flat. This genus is divided into sections, from the colour of the elytra, and of the spots with which they are adorned. The females, impregnated by the males, deposit their eggs, which turn to small larvæ, flow in their progress, and enemies to the plant-louse. Those larvæ are frequently found upon leaves of trees covered with plant-lice. On the point of being metamorphosed, they settle on a leaf by the hinder part of their body, then bend and swell themselves, forming a kind of hook. The skin extends, grows hard; and in a fortnight's time the chrysalis opens along the back. The insect in its perfect state receives the impressions of the air, that gives its elytra a greater degree of consistence. It seldom flies, and cannot keep long on the wing. Of all the different larvæ of the coccinella, the most curious is the white hedgehog, a name given it by M. de Reaumur on account of the singularity of its figure, and the tufts of hair which render it remarkable. It seeks its food on the leaves of trees. After a fortnight, it settles on one spot, and, without parting with its fur, turns to a chrysalis; three weeks after which, it becomes a coccinella. The slough appears nowise impaired by its transformation. M. de Reaumur has observed it on a plum-tree. It is likewise found upon the rose-tree.

When the coccinellæ first arrive at the state of perfection, the colours of their elytra are very pale, nearly bordering upon white or cream colour; and the elytra are very soft and tender, but soon grow hard, and change to very lively brilliant colours. Their eggs are of an oblong form, and of the colour of amber.

The cochineal-insect, described by mistake under this title in the *Encyclopædia*, belongs to a different genus. See *Coccus*, below.

COCCUS, the COCHINEAL, was by mistake confounded with the COCCINELLA, (*Encycl.*) which is a genus belonging to a different order. See COCCINELLA, above.

After "frequent," line 6th of the article *Coccus*, in *Encycl.* supply as follows.

The most remarkable species are:

1. The *coccus hesperidum*, or green-house bug, is oval, oblong, of a brown colour, covered with a kind of varnish: It has six legs; with a notch and four bristles at the tail. It infests orange-trees, and other similar plants in green-houses. When young, it runs

upon the trees; but afterwards fixes on some leaf, where it hatches an infinity of eggs, and dies. The male is a very small fly.

2. The *coccus phalaridis*. The male of this cochineal is small. Its antennæ are long for its size. The feet and body are of a reddish colour, nearly pink, and sprinkled with a little white powder. Its two wings, and the four threads of its tail, are snow white, and of those threads two are longer than the rest. It is to be found upon the species of gramin which Linnæus calls *phalaris*. The female contrives, along the stalks of that dog-grass, little nests, of a white cottony substance, in which she deposits her eggs. The small threads of her tail are scarce perceptible.

3. The *coccus casti*, or famous Mexican cochineal, (see COCHINEAL, below), a native of the warm parts of America. In Mexico this species is nursed with great care. It naturally fixes upon the leaves of various kinds of plants. The Indians gather them, put 10 or 12 into little beds made of moss or of the flue of coco; after which they hang them upon the thorns of the plant known under the various names of *racket*, *cardassia*, *Indian fig-tree*, *opuntia*, *nopal*. There grow great quantities of that plant round their habitations. The gall-insects give birth to myriads of young ones. They disperse, feed on the juice of the plant, and there produce a fresh generation. There are three gatherings of them every year. The first is performed by taking off the nests brought and placed upon the plants; the second, by loosening the cochineal from off the leaves with pincers; and the third, at the approach of winter, by cutting off the leaves that are yet loaded with the insects. Those plants remaining green for a considerable time, afford them sustenance. When they have attained their full size, they are taken off by scraping the leaf. This last cochineal is not of so fine a quality, because a little of the epiderm of the leaf is blended with it. The Spaniards call it *granilla*. As soon as the insects are brought together, they are destroyed. The method taken to effect this has great influence upon the colour. It then goes by various names. That which they kill by the gentle heat of ovens, is of an ash-grey or mottled, and is named *jafpeada*. If the insects are deprived of life by plunging them with baskets into hot water, it then goes by the appellation of *renegrida*, which is not covered over with a white powder. Lastly, it bears the name of *negra*, if destroyed upon the hot plates that have been used for roasting of maize. By this last process it sometimes receives too great a degree of heat, from which it turns somewhat black. Three pounds of fresh-gathered cochineals weigh but one when dried. The cochineal thus nursed upon cultivated plants, yields a more beautiful colour, and in greater quantity, than does the wild. Dried cochineals will preserve their colouring particles for ages, as no other insect fixes on them; neither do they ever decay. This valuable insect is used for dyeing, where it produces a red colour of an excellent tincture, in variety of shades. It is made into scarlet and crimson. The English mix it with gum-lac to dye their cloths. This dye is more expeditious, as good, and cheaper. The cochineal furnishes painters with the most lively colours and most beautiful shades; and the same substance, ground and prepared, produces carmine, which, skilfully laid on over

Coccus.

Plate
COCXIII.

Plate
COCXIII.

the ladies cheeks, emulates nature. At Constantinople they sell a crape or very fine lawn dyed in cochineal; and the same is imitated at Straburgh. This lawn, dipped in water, may be used equally with the macarato-wool of Portugal to the same purposes as cochineal, one of which is to give a colour to liquors. It is computed that there are imported yearly into Europe, in the course of trade, 880,000 pounds of cochineals.

The female cochineal had been long known, and well described, by several naturalists; but the male having been seldom seen, the history of this valuable insect has hitherto been very defective. Mr Ellis, being informed that this insect bred in great abundance on the cactus opuntia of Linnaeus, in South Carolina and Georgia, as well as on the cactus coccinifer in Mexico and Jamaica, obtained from Dr Garden some branches of the former, with the insects upon them. In examining several of these specimens, he at last discovered three or four minute dead flies with white wings; and having moistened them in spirit of wine, and observing them with a microscope, found that they were of a bright red colour, which convinced him that these were the true male insects. Dr Garden, to whom this discovery was communicated, made several observations on the male species. This is very rarely found; so that he imagines there may be 150 or 200 females for one male. The male is much less than the female, more active, and better made; and the body of it is of a lighter red than that of the other.

4. The coccus ilicis, or that forming the kermes grains, inhabits the quercus coccifera of the southern parts of Europe. Mr Hellot of the French Academy of Sciences, in his Art of Dyeing, chap. 12. says it is found in the woods of Vauvert, Vendeman, and Narbonne; but more abundantly in Spain, towards Alicante and Valencia. It not only abounds in Valencia, but also in Murcia, Jaen, Cordova, Seville, Estremadura, la Mancha, Serranias de Cuenca, and other places.

In Xixona and Tierra de Rellu, there is a district called *De la Grana*, where the people of Valencia first began to gather it, whose example was followed all over Spain. It has some years produced 30,000 dollars (5000 l.) to the inhabitants of Xixona.

Both ancients and moderns seem to have had very confused notions concerning the origin and nature of the kermes; some considering it as a fruit, without a just knowledge of the tree which produced it; others taking it for an excrescence formed by the puncture of a particular fly, the same as the common gall observed upon oaks. Tournefort was of this number. Count Marfigli, and Dr Nisole a physician of Montpellier, made experiments and observations, with a view of further discoveries; but did not perfectly succeed. Two other physicians at Aix in Provence, Dr Emeric and Dr Garidel, applied themselves about the same time, and with greater success; having finally discovered that the kermes is in reality nothing else but the body of an insect transformed into a grain, berry, or husk, according to the course of nature.

The progress of this transformation must be considered at three different seasons. In the first stage, at the beginning of March, an animalcule, no larger than a grain of millet, scarce able to crawl, is perceived sticking to the branches of the tree, where it fixes itself, and soon becomes immoveable; at this period it

grows the most, appears to swell and thrive with the sustenance it draws in by degrees. This state of rest seems to have deceived the curious observer, it then resembling an excrescence of the bark; during this period of its growth, it appears to be covered with a down, extending over its whole frame like a net, and adhering to the bark: its figure is convex, not unlike a small floe; in such parts as are not quite hidden by this soft garment, many bright specks are perceived of a gold colour, as well as stripes running across the body from one space to another.

At the second stage, in April, its growth is completed, its shape is then round, and about the size of a pea: it has then acquired more strength, and its down is changed into dust, and seems to be nothing but a husk or a capsule, full of a reddish juice not unlike discoloured blood.

Its third state is towards the end of May, a little sooner or later, according to the warmth of the climate. The husk appears replete with small eggs, less than the seed of a poppy. These are properly ranged under the belly of the insect, progressively placed in the nest of down that covers its body, which it withdraws in proportion to the number of eggs: after this work is performed, it soon dies, though it still adheres to its position, rendering a further service to its progeny, and shielding them from the inclemency of the weather, or the hostile attacks of an enemy. In a good season they multiply exceedingly, having from 1800 to 2000 eggs, which produce the same number of animalcules. When observed with the microscope in July or August, we find, that what appeared as dust, are so many eggs or open capsules, as white as snow, out of each of which issues a gold-coloured animalcule, of the shape of a cockroach, with two horns, six feet, and a forked tail.

In Languedoc and Provence the poor are employed to gather the kermes, the women letting their nails grow for that purpose, in order to pick them off with greater facility.

The custom of lopping off the boughs is very injudicious, as by this means they destroy the next year's harvest. Some women will gather two or three pounds a-day; the great point being to know the places where they are most likely to be found in any quantity, and to gather them early with the morning-dew, as the leaves are more pliable and tender at that time, than after they have been dried and parched by the rays of the sun: strong dews will occasionally make them fall from the trees sooner than usual: when the proper season passes, they fall off of themselves, and become food for birds, particularly doves. Sometimes there will be a second production, which is commonly of a less size with a fainter tinge. The first is generally found adhering to the bark, as well as on the branches and stalks; the second is principally on the leaves, as the worms choose that part where the nutritious juice preserves itself the longest, is most abundant, and can be most easily devoured in the short time that remains of their existence, the bark being then drier and harder than the leaves.

Those who buy the kermes to send to foreign parts spread it on linen, taking care to sprinkle it with vinegar, to kill the worms that are within, which produces a red dust, which in Spain is separated from the husk.

Coccus
Cockburne.

hulk. Then they let it dry, passing it through a sieve, and make it up into bags. In the middle of each, its proportion of red dust, put in a little leather bag, also belongs to the buyer; and then it is ready for exportation, being always in demand on the African coast.

The people of Hanojos, Bonares, Villalba, and other parts of the kingdom of Seville, dry it on mats in the sun, stirring it about, and separating the red dust, which is the finest part, and being mixed with vinegar goes by the name of *pasell*. The same is done with the busses; but these have but half the value of the dust.

The kermes of Spain is preferred on the coast of Barbary, on account of its goodness. The people of Tunis mix it with that of Tetuan, for dyeing those scarlet caps so much used in the Levant. The Tunisians export every year above 150,000 dozen of these caps, which yields to the Dey a revenue of 150,000 hard dollars (33,750 l.) *per annum* for duties; so that, exclusive of the uses and advantages of kermes in medicine, it appears to be a very valuable branch of commerce in Spain.

5. The coccus polonicus. See *Coccus Polonicus*, (Enceyl.)

COCHINEAL, or COCHENEEL, a drug used by the dyers, &c. for giving red colours, especially crimsons and scarlets, and for making carmine; and likewise in medicine as a cardiac, cordial, sudorific, alexipharmic, and febrifuge.

The cochineal, in the state in which it is brought to us, is in small bodies of an irregular figure, usually convex, and ridged and furrowed on one side, and concave on the other. The colour of the best is a purplish grey, powdered over with a sort of white dust. All that the world knew of it for a long time was, that it was gathered from certain plants in Mexico; and therefore it was naturally supposed to be a seed, till in the year 1692 Father Plumier gave Pomot an account of its being an animal. And this, though then disregarded, has been confirmed by subsequent observations. Indeed, to determine the point, we have now the means in our own hands, even in this part of the world. —We need only moisten and soak in water, or in vinegar, a number of cochineals till they are swelled and distended, to know that every one is the more or less perfect body of an insect; the most imperfect and mutilated specimens always show the rings of the body; and from observing others, it will be easy to find the number and disposition of the legs; parts, or even whole ones, being left on several, and often complete pairs. In this way the legs, antennæ, and proboscis, may be discovered. See *Coccus* above.

COCKBURN (Mrs Catharine), a most accomplished lady and celebrated writer, was the daughter of captain David Trotter, a native of Scotland, and a sea-commander in the reign of king Charles II. She was born in London, Aug. 16. 1679, and baptized in the Protestant church, according to which she was bred up in her infancy a Protestant; but being a sprightly, ingenious, and beautiful child, she was particularly caressed by some considerable families among the Papists. This favour naturally wrought a good opinion of such friends; and entering into an intimacy with them as she grew up, she became an easy conquest to

their faith, in which she continued many years. In the mean time her genius ripened apace, and shot forth proofs of her talents for poetry, even before she had passed her childhood. In her 17th year she produced a tragedy called *Agnes de Castro*, which was acted in 1695. This performance, and some verses addressed to Mr Congreve upon his *Mourning Bride* in 1697, brought her into the acquaintance of that gentleman. Thus encouraged in her first attempt, her Muse brought upon the stage three plays more, before the death of Mr Dryden in 1701, to whose memory she joined with several other ladies in paying a tribute of verse. However, poetry and dramatic writing was not the most distinguished of Mr's Trotter's talents; she had a remarkable philosophic turn, and capacity equal to such researches. Mr Locke's Essay on Human Understanding came out during this interval: that famous philosopher had dressed out logic and metaphysics in such a new mode as was very agreeable to the taste of the sex in general, and particularly engaged the attention and admiration of our young authoress. She had begun to project a defence of the essay against some remarks of Dr Burnet of the Charter-house, which was finished so early as the beginning of December 1701. She had but lately passed the 22d year of her age; and the mastery with in which the piece was drawn must needs have given singular pleasure to her great champion, who accordingly expressed his satisfaction by a present of books to his fair defendress. Philosophy sojourns in the neighbourhood of religion; these philosophic reveries would naturally lead a thoughtful mind to that subject; and taking into her consideration the tenets of her present faith, she began to discover their indefensible grounds: she therefore resolved to renounce it, and published a vindication of her change in 1707; and returning to the established church of Scotland, she changed her condition likewise the next year, 1708, and was married to Mr Cockburne, a learned divine of that church. The duties of a wife and mother called Mrs Cockburne from her books and pen many years; and domestic cares engaging her attention, we hear nothing of her as a writer till 1726, when her zeal for Mr Locke's opinions drew her again into public light. She exercised her pen afterwards as occasion offered; and in 1739 she entered into the controversy concerning the foundation of moral duty and obligation. In that controversy she wrote two treatises, the first of which she transmitted in manuscript to Mr afterwards Dr Warburton, the late bishop of Gloucester, who published it, with a preface of his own, in 1747. Mrs Cockburne survived this publication two years only. She died in 1749, and was interred at Long Horsley, near her husband, who died the year before her, with this short sentence upon the tomb, "Let their works praise them in the gates." Prov. xxx. 31. Her works were collected and published in 1751, in two volumes 8vo, with an account of her life prefixed. —This collection is an incontestible proof of the author's genius. But her abilities as a writer will not be seen without attending to the peculiar circumstances in which her writings were produced: her early youth, for instance, when she wrote some; her very advanced age, and ill state of health, when she drew up others; the uneasy situation of her fortune during

during the whole course of her life; and an interval of near 20 years, in the vigour of it, spent in the cares of a family, without the least leisure for reading or contemplation; after which, with a mind so long diverted and encumbered, resuming her studies, she instantly recovered its entire powers; and, in the hours of relaxation from domestic employments, pursued to the utmost limits some of the deepest researches the human understanding is capable of. Her character is that of a most uncommon lady, no less celebrated for her beauty in her younger years, than for her genius and accomplishments. She was small of stature, but had a remarkable liveliness in her eyes, and a delicacy of complexion which continued to her death.

COCKROACH. See BLATTA. (*En cycl.*)

COINING. For Plate LXXXIV. read Plate LXXXII.

COINS, (*En cycl.*) p. 2061, middle of col. 2. The harper there mentioned has been diffused for a century past. See MONEY-Table.—For ninepence, read 11 $\frac{1}{2}$ d.; and for “ $\frac{1}{2}$ of ours, or 15s.” read 18s. 5 $\frac{1}{2}$ d.

COLLINSON (Peter), an eminent naturalist and antiquarian, descended of an ancient family, was born on the paternal estate called *Hugal-Hall*, or *Height of Hugal*, near Windermere lake, in the parish of Stavelay, about ten miles from Kendal in Westmoreland. Whilst a youth he discovered his attachment to natural history. He began early to make a collection of dried specimens of plants, and had access to the best gardens at that time in the neighbourhood of London. He became early acquainted with the most eminent naturalists of his time; the Drs Dérham, Woodward, Dale, Lloyd, and Sloane, were amongst his friends. Among the great variety of articles which form that superb collection, now (by the wife disposition of Sir Hans and the munificence of parliament) the British Museum, small was the number of those with whose history Mr Collinson was not well acquainted; he being one of those few who visited Sir Hans at all times familiarly; their inclinations and pursuits in respect to natural history being the same, a firm friendship had nearly been established between them. Peter Collinson was elected a fellow of the Royal Society on the 12th of December, 1728; and perhaps was one of the most diligent and useful members, not only in supplying them with many curious observations himself, but in promoting and preserving a most extensive correspondence with learned and ingenious foreigners, in all countries, and on every useful subject. Besides his attention to natural history, he minutely every striking hint that occurred either in reading or conversation; and from this source he derived much information, as there were very few men of learning and ingenuity who were not of his acquaintance at home; and most foreigners of eminence in natural history, or in arts and sciences, were recommended to his notice and friendship. His diligence and economy of time was such, that though he never appeared to be in a hurry, he maintained an extensive correspondence with great punctuality; acquainting the learned and ingenious in distant parts of the globe, with the discoveries and improvements in natural history in this country, and receiving the like information from the most eminent persons in almost every other. His correspondence

with the ingenious Cadwallader Colden, Esq; of New York, and the justly celebrated Dr Franklin of Philadelphia, furnish instances of the benefit resulting from his attention to all improvements. The latter of these gentlemen communicated his first essays on electricity to Mr Collinson, in a series of letters, which were then published, and have been reprinted in a late edition of the Doctor's ingenious discoveries and improvements. Perhaps, in some future period, the account procured of the management of sheep in Spain, published in the Gentleman's Magazine for May and June 1764, may not be considered among the least of the benefits accruing from his extensive and inquisitive correspondence. His conversation, cheerful and usefully entertaining, rendered his acquaintance much desired by those who had a relish for natural history, or were studious in cultivating rural improvements; and secured him the intimate friendship of some of the most eminent personages in this kingdom, as distinguished by their taste in planting and horticulture, as by their rank and dignity. He was the first who introduced the great variety of seeds and shrubs, which are now the principal ornaments of every garden; and it was owing to his indefatigable industry, that so many persons of the first distinction are now enabled to behold groves transplanted from the Western continent flourishing so luxuriantly in their several domains, as if they were already become indigenous to Britain. He had some correspondents in almost every nation in Europe, some in Asia, and even at Pekin; who all transmitted to him the most valuable seeds they could collect, in return for the treasures of America. The great Linnæus, during his residence in England, contracted an intimate friendship with Mr Collinson, which was reciprocally increased by a multitude of good offices, and continued to the last. Besides his attachment to natural history, he was very conversant in the antiquities of our own country, having been elected a member of the Society of Antiquaries April 7th, 1737; and he supplied them often with many curious articles of intelligence and observations, respecting both our own and other countries. He died in 1768, leaving behind him many materials for the improvement of natural history.

COLUBER NAJA, or *Cobra de Capello*, a very deadly kind of serpent in the East Indies. The root of the lignum colubrium (*ophiorrhiza*) is said to have been pointed out to the Indians as an antidote against the bite of this serpent by the viverra ichneumon, a creature which fights with this serpent, and cures itself by eating of this plant when wounded. The Indians, when bit, instantly chew it, swallow the juice, and apply the masticated root to the puncture.

COMPASS. For NAVIGATION, *Señ.* i. 15. read p. 5359, par. 15.

COMPASSES, PROPORTIONAL, are those whose joint lies between the points terminating each leg: Plate they are either *simple* or *compound*. In the former sort CCCXIII. the centre is fixed, so that one pair of these serves only for one proportion.

Compound proportional COMPASSES consist of two branches, each pointed at either end with steel: the length of the branches is cut through, for a cursor to slide up and down; in the middle of which cursor is a screw,

Collinson
Compasses.

Compasses. screw, serving to join the branches, and to fix them at any point required. On the one leg are divisions, serving to divide lines into any number of equal parts, for reducing of figures, &c. On the other are numbers, for inscribing any regular polygon in a circle proposed.

The use of the first is easy. Suppose, *v. gr.* a right line required to be divided into three equal parts; push the cursor till the screw be just on the figure 3; where fixing it, take the length of the given line between the longest part of the legs: the distance between the two shortest will be one-third of the given line. In the same manner may the line be divided into any other number of parts.

For the use of the line of polygons. Suppose, *v. gr.* a pentagon required to be inscribed in a circle; push the cursor till the middle of the screw be against 5, the number of sides in a pentagon; between the shortest parts of the legs take the diameter of the circle: the legs thus opened, the distance between the points of the longest parts will be the side of the pentagon to be inscribed in the circle. And thus for a figure of any other number of sides.

Proportional COMPASSES with the sector lines. The structure of these is so like that of the common proportional compasses, only a little nicer, that it needs no particular description.

The lines on the first face are the line of lines, marked *lines*; it is divided into 100 equal parts, every tenth numbered; and the line of chords, which goes to 60°, is marked *chords*.

On the other face are a line of lines to 90°, and a line of tangents to 45°. On the other side are the tangents from 45° to 71° 34'; on the other, secants from 0° to 70° 30'.

For the use of these compasses. 1. To divide a line into any number of equal parts less than 100: Divide 100 by the number of parts required; slip the cursor till the line on the sliding dovetail be against the quotient on the line of lines; then, the whole line being taken between the points of the compasses most remote from the centre, the aperture of the other will show the division required. 2. A right line given, supposed to be divided into 100 parts, to take any number of those parts: slip the line on the sliding dovetail to the number of parts required; the whole line being taken between the points farthest from the centre, the aperture of the other two will include the number of divisions required. 3. The radius being given, to find the chord of any arch under 60°: slip the line on the sliding dovetail to the degrees required on the line of chords; the radius being taken between the points farthest from the centre of the cursor, the aperture of the other line will be the chord required, provided the number of degrees be greater than 29; if it be less, the aperture taken from the radius will leave the chord required. 4. If the chord of an arch under 60° be given, and the radius required; slip the line on the dovetail to the degrees given on the line of chords; the given chord being taken between the two points next the cursor, the aperture of the other will be the radius required. 5. The radius being given, to find the sine of any number of degrees: slip the line on the dovetail to the degree on the line of sines whose sine is required; the radius taken between the points fur-

thest from the cursor, the aperture of the other will give the sine of the angle required: but if the sine sought be less than 30°, the difference of the apertures of the opposite points will be the sine required. 6. The radius being given, to find the tangent of any number of degrees under 71: if the tangent required be under 26° 30', then slip the line on the dovetail to the degree proposed on the tangent line; the radius taken between the points farthest from the cursor, the aperture of the others will be the tangent of the degrees required: if the tangent required be above 26° 30', but under 45°, the line on the cursor must be slipped to the degrees given on the tangent line; then the radius being taken between the points furthest from the cursor, the aperture of the others will be the tangent. If the tangent required be greater than 45°, but less than 56° 20', slip the notch on the tangent side of the turned cheek to the degree 0 in the tangent line on the side of the compass; the radius taken between the points farthest from the cursor, the difference between the aperture of the other and these added together, will be the tangent required. Thus, for the tangents of other degrees under 71. After the like manner may the secant of any number of degrees under 71 be found.

Mr Heath, a mathematical-instrument maker in London, constructed a pair of proportional compasses in 1746, with a curious and useful contrivance for preventing the shorter legs from changing their position when these compasses were used. It consisted of a small beam foldered to a screw, and running parallel to the leg of the compasses, nearly of the length of the groove: in this beam a slit was made, which admitted of a sliding-nut, the other end of which fell into a hole in the bottom of the screw belonging to the great nut of the compasses. The screw-pin of the beam passed through an adjuster, by means of which the mark on the slider might be brought exactly to any division. But the *proportional compasses* have been much out of use since the invention of the sector.

COMPOSITION, (Encycl.) See also the articles **DIALOGUE, EPISTLE, and HISTORY, (Encycl.)**

COMUS, in mythology, the god of jollity or festivity. There is great reason to believe he was the Chamos of the Miabites; Beel-Phegor, Baal Peor, Priapus, and Bacchus. He is represented under the appearance of a young man, with an inflamed red countenance, his head inclined, and crowned with flowers; his air drowsy; leaning on a huntsman's spear in his left hand, and holding an inverted torch in his right. His statue was placed at the chamber doors of new married persons; his pedestal crowned with flowers.

CONCEPTION, in medicine, denotes the first formation of the embryo, or foetus, in the womb.

Conception is no other than such a concourse and commixture of the prolific seed of the male with that of the female, in the cavity of the uterus, as immediately produces an embryo.

The symptoms of conception or pregnancy are, when, in a few days after the conjugal act, a small pain is perceived about the navel, and is attended with some gentle commotions in the bottom of the abdomen; and within one, two, three, or even four, months, the menses cease to flow, or prove in less quantity than usual. Upon the first failure of this kind,

Compass
Conception

kind, the woman begins to count the series of her weeks, without taking any notice of the time before elapsed; after this, or between the second or third months, but generally about the third, the motions of the embryo become perceivable to the mother; who hereupon becomes troubled with a nausea, vomiting, loathing, longing, &c. About this time the breasts begin to swell, grow hard and painful, and contain a little milk; the nipples also become larger, firmer, and darker coloured, a livid circle appearing round them: the eyes seem sunk and hollow. During the two first months of pregnancy, the woman grows thinner and slenderer; the abdomen being also depressed; though it afterwards distends, and grows gradually larger.

The manner wherein conception is effected is thus laid down by the modern writers. In the superficies of the ovaries of women, there are found little pellucid spherules, consisting of two concentric membranes filled with a lymphatic humour, and connected to the surface of the ovaria, underneath the tegument, by a thick calix, contiguous to the extremities of the minute ramifications of the Fallopian tubes.

These spherules, by the use of venery, grow, swell, raise and dilate the membrane of the ovary into the form of papillæ; till, the head propending from the stalk, it is at length separated from it; leaving behind it a hollow cicatrix in the broken membrane of the ovary; which, however, soon grows up again.

Now, in these spherules, while still adhering to the ovary, fetuses have been frequently found; whence it appears, that these are a kind of ova, or eggs, deriving their structure from the vessels of the ovary, and their liquor from the humours prepared therein.

Hence also it appears, that the Fallopian tubes being swelled and stiffened by the act of venery, with their muscular fibrillæ, like fingers, may embrace the ovaries, compress them, and by that compression expand their own mouths: and thus the eggs, now mature, and detached as before, may be forced into their cavities, and thence conveyed into the cavity of the uterus; where they may either be cherished and retained, as when they meet with the male seed; or, if they want that, again expelled.

Hence the phenomena of false conceptions, abortions, fetuses found in the cavity of the abdomen, the Fallopian tubes, &c. For in coition, the male-seed, abounding with living animalcules, agitated with a great force, a brisk heat, and probably with a great quantity of animal-spirits, is violently impelled through the mouth of the uterus, which on this occasion is opener, and through the valves of the neck of the uterus, which on this occasion are laxer than ordinary, into the uterus itself; which now, in like manner, becomes more active, turgid, hot, inflamed, and moistened with the flux of its lymph and spirits, by means of the titillation excited in the nervous papillæ by the attrition against the rugæ of the vagina.

The semen thus disposed in the uterus, is retained, heated, and agitated, by the convulsive constriction of the uterus itself; till meeting with the ova, the finest and most animated part enters through the dilated pores of the membranula of the ovum, now become glandulous; is there retained, nourished, dilated; grows to its umbilicus, or navel; stifles the other less lively animalcules; and thus is conception effected.

Hence it appears, that conception may happen in any part where the semen meets with an ovum: thus, whether it be carried through the Fallopian tube to the ovary, and there cast upon the ovum; or whether it meet with it in some recess of the tube itself; or, lastly, whether it join it in the cavity of the uterus, it may still have the same effect, as it appears from observation actually to have done. But it is probable, that conception is then most perfect when the two, viz. the semen and ovum, are carried at the same time into the uterus, and there mixed, &c.

Other anatomists choose to suppose the male-seed taken up, before it arrives in the uterus, by the veins which open into the vagina, &c. and thus mixed with the blood; by which, in the course of circulation, it is carried, duly prepared, into the ovary, to impregnate the eggs.

It has been advanced by several writers, that women may possibly conceive in their sleep, and be with child without any knowledge of the occasion of it. As ridiculous and absurd as this doctrine may appear to the generality of the world, no less an author than Gea-fili has thought it worthy a particular dissertation.

COOK (Captain James), a late celebrated navigator, was born at Marton, a village about four miles from Great Ayton, in the county of York, and christened there, as appears from the parish register, November 3. 1728. His father formerly used to be employed as a fisherman, and sometimes as a day-labourer; and his son divided his early life between the lowest duties in husbandry and the little school-learning which could be afforded him. He afterwards lived with a grocer in that country: but not liking his situation, he bound himself an apprentice to the master of a collier trading from Newcastle to London; with whom he might have continued, had not the want of seamen in the royal navy occasioned his removal into the service of his sovereign before the expiration of his indentures.

The time which intervened between this and his being raised to be a commission-officer, was not passed in such a manner as to render it worthy of any detail. He soon acquired all the requisites which belonged to his profession; and deported himself so much to the satisfaction of his superiors, that he received a commission as lieutenant on the first day of April 1760; and soon after gave a specimen of those abilities which recommended him to the commands which he executed so highly to his credit.

In the year 1765 he was with Sir William Burnaby on the Jamaica station; and that officer having occasion to lend dispatches to the governor of Jucatan, relative to the logwood cutters in the Bay of Honduras, lieutenant Cook was selected for that employment; and he performed it in a manner which intitled him to the approbation of the admiral. A relation of this voyage and journey was published in the year 1769, under the title of "Remarks on a Passage from the River Balise, in the Bay of Honduras, to Merida, the capital of the province of Jucatan in the Spanish West Indies, by Lieutenant Cook," in an 8vo pamphlet.

To a perfect knowledge of all the duties belonging to a sea-life, Mr Cook had added a great skill in astronomy. In the year 1767, the Royal Society resolved, that it would be proper to send persons into some part

of the South Seas, to observe the transit of the planet Venus over the sun's disk; and by a memorial delivered to his majesty, they recommended the islands of Marquesas de Mendoza, or those of Rotterdam or Amsterdam, as the properest place then known for making such observation. To this memorial a favourable answer was returned; and the Endeavour, a ship built for the coal-trade, was put in commission, and the command of her given to lieutenant Cook. But before the vessel was ready to sail, captain Wallis returned from his voyage, and pointed out Otaheite as a place more proper for the purpose of the expedition than either of those mentioned by the Royal Society. This alteration was approved of; and our navigator was appointed by that learned body, with Mr Charles Green, to observe the transit. On this occasion lieutenant Cook was promoted to be captain, and his commission bore date the 25th of May 1768. He immediately hoisted the pennant, and took command of the ship; in which he sailed down the river on the 30th of July. In this voyage he was accompanied by Joseph Banks, Esq; and Dr Solander; and on 12th June 1771 returned to England, after having been absent almost three years. The narrative of this expedition was written by Dr Hawkesworth.

Soon after captain Cook's return to England, it was resolved to equip two ships to complete the discovery of the southern hemisphere. It had long been a prevailing idea, that the unexplored part contained another continent. To ascertain the fact was the principal object of this expedition; and that nothing might be omitted that could tend to facilitate the enterprise, two ships were provided, furnished with every necessary which could promote the success of the undertaking. The first of these ships was called the Resolution, under the command of captain Cook; the other the Adventure, commanded by captain Furneaux. Both of them sailed from Deptford on the 9th of April 1772, and arrived at the Cape of Good Hope on the 30th of October. They departed from thence on the 22d of November; and from that time until the 17th of January 1773, continued endeavouring to discover the continent, when they were obliged to relinquish the design, observing the whole sea covered with ice from the direction of S. E. round by the south to west. They then proceeded into the South Seas, and made many other discoveries, and returned to the Cape of Good Hope on the 21st of March 1774, and from thence to England on the 14th of July; having, during three years and eighteen days (in which time the voyage was performed), lost but one man by sickness in captain Cook's ship; although he had navigated throughout all the climates from 52° north to 71° south, with a company of 118 men.

The relation of this voyage was given to the public by captain Cook himself, and by Mr George Forster, son of Dr Forster, who had been appointed by government to accompany him for the purpose of making observations on such natural productions as might be found in the course of the navigation. That published by captain Cook has generally been ascribed to a gentleman of great eminence in the literary world; but if the testimony of one who was on board the ship, and who made an extract from the journal in its rude

uncorrected state, may be relied on, there seems no reason to ascribe the merit of the work to any other person than him whose name it goes under.

The want of success which attended captain Cook's attempt to discover a southern continent, did not discourage another plan being resolved on, which had been recommended some time before. This was no other than the finding out a north-west passage, which some had conceived to be a practicable scheme. The dangers which our navigator had twice braved, would have exempted him from being solicited a third time to venture his person in unknown countries, amongst desert islands, inhospitable climates, and in the midst of savages; but, on his opinion being asked concerning the person who would be most proper to execute this design, he once more relinquished the quiet and comforts of domestic life, to engage in scenes of turbulence and confusion, of difficulty and danger. His intrepid spirit and inquisitive mind induced him again to offer his services; and they were accepted without hesitation. The manner in which he had deported himself on former occasions, left no room to suppose that a fitter man could be selected. He prepared for his departure with the utmost alacrity, and actually sailed in the month of July 1776.

A few months after his departure from England, notwithstanding he was then absent, the Royal Society voted him Sir Godfrey Copley's gold-medal, as a reward for the account which he had transmitted to that body, of the method taken to preserve the health of the crew of his ship; and Sir John Pringle, in his oration of 30th November, pronounced an high eulogium upon him.

This honourable testimony to the merit of our gallant commander, never came to his knowledge.—While his friends were waiting with the most earnest solicitude for tidings concerning him, and the whole nation expressed an anxious impatience to be informed of his success, advice was received from captain Clerke, in a letter dated at Kamtschatka, the 8th day of June 1779; from which, and from other accounts, we learn, "That captain Cook, after he had passed the Cape of Good Hope, had continued his course along Van Diemen's Land and New Zealand. He arrived happily in August 1777 at the island of Otaheite, where he landed Omiah, a native of the island, in perfect health: That since the last voyage of captain Cook to that island, the Spaniards had been there twice, and staid some months, and their ships had left all sorts of birds and domestic animals, but only of the male species; so that they received the cows and the she-goats that captain Cook brought with great pleasure. He left that island in the month of December following; and after having made several new discoveries in the South Sea, he arrived in the month of March 1778 on the coasts of America, situated in the south of Kamtschatka. A leak being discovered in captain Cook's ship the Resolution, and finding a very stormy sea, he was obliged to anchor in a bay in that part of the coast. After having repaired his own ship, they both put to sea; and sailing along the coast, they at last luckily discovered the strait between Asia and America. The two parts of the world presented only, at that height of latitude, a low barren land without any shelter, and a sea of a

very

very middling depth. They continued their route till they perceived distinctly the American coast extending to the north-east. He then thought himself arrived near to the bounds of his wives; but when he came to 70° 45' Lat. and 198° of Long. (probably reckoning from Greenwich), he met with impenetrable mountains of ice, which obliged him to turn towards the south. He cast anchor near the island Unalafcha, whence his letter is dated. He fixes that island in 53, 55 Lat. and 192, 30 Long. consequently giving that island a more western and southern position than is in the new general chart of Russia.

"As he then found himself to the east of Sandwich Island, which he had passed in his voyage, he reasonably thought he must meet with other islands; he therefore sailed again, in order to pass the autumn and the winter in a more temperate climate. He actually discovered divers other islands, which appeared to him extremely fertile, and where the inhabitants had raised stone-walls upon the heights for their defence. He cast anchor at one of these islands, named *O-nay-be*, in the gulph of Caracah-Coffa, and treated very amicably with the natives, who paid him almost divine honours. After he had refreshed his people, one of whom only had died in the voyage, and two others had fallen sick, he was already got under sail, when a furious storm hurt his mizen-mast, which obliged him to return to the gulph to repair it. The islanders became every day more bold, and most clearly demonstrated their inclination for theft; which went so far as to steal one of his boats. Captain Cook, willing to seek justice for this robbery, went on shore with his lieutenant, and ten or twelve of his crew. He advanced towards a large body of the inhabitants, who always paid him great respect, and accosted their chief. Whilst the negotiation was carrying on, the insolence of one of the islanders, who was in the throng, obliged him to fire on him with his musket, loaded only with small-shot, which did not even penetrate the mat with which he was covered. The Indians began then to be enraged; and when the lieutenant had at length fired and killed his man, the whole troop fell on the body: and as soon as the sailors had discharged their pieces, they did not give them time to load again, but killed captain Cook and four of his people, forcing the others, partly wounded, to make their escape under the favour of the fire of their pinnace.

"This fatal event happened on the 14th February 1779. A council was then called of the officers, to determine whether their commander's death should not be revenged in an exemplary manner; but it was thought most advisable to keep on the defensive until the mast was repaired. In the mean time captain Clerke made friends with the savages, and quitted the island to return to Kamtschatka, where he wintered in Port Awatscha, from the 1st of January that year till the month of June, and then failed to discover (as he writes word) more exactly the islands between Kamtschatka and America."

Captain Cook was a married man, and left several children behind him. On each of these his majesty has settled a pension of 25 l. a-year, and 200 l. a-year on his widow. It is remarkable, if true as reported, that captain Cook was godfather to his wife; and at the very time she was christened, declared that he had

determined on the union which afterwards took place between them.

Few men have been more regretted than captain Cook. He possessed all the qualities which could insure the esteem of mankind. To the most undaunted courage he added a most persevering resolution. He acquired the love of his seamen, as well by the soft as by stern virtues; being equally gentle and humane as he was commanding and intrepid. Without being possessed of much literature, or cultivating letters, he acquitted himself with credit even where the talents of writing were required. No man seemed so well formed for enterprises such as he was engaged in. He was fond of the pursuit, and sacrificed every consideration to them. He owed his rise entirely to his merit; and retained the modesty of his early state after he had risen beyond the expectations of his friends, and equal to his own.

COPPERPLATE. See ENGRAVING, (*Encycl.*)

COPYHOLD, (*Encycl.*) See TENURE and VILLENAGE, (*Encycl.*)

CORAL, (*Encycl.*) The nature and origin of coral has long been a subject of much dispute. Some have supposed that it is a stone; others a plant; and it has been almost universally believed that it was soft while in the sea, but grew hard on being taken out of it. But Boccone examined coral in the water, before it was taken up into the air, and invariably found it hard, except at its extremities, whence, by pressing it, flowed a small quantity of milky fluid, already taken notice of. We may therefore infer, that there is more of imagination than of truth in the name *gorgonium*, which the ancients gave to coral, and designed to show that Medusa's head did not convert objects into stone, more surely than coral became petrified as soon as it appeared in the air.

M. de Peyssonnel of Marseilles, has, in consequence of a series of experiments and observations from about the year 1720 to 1750, introduced a new system with respect to the nature and production of coral, and similar marine substances. Those bodies, which the count de Marigli imagined to be flowers, this ingenious naturalist discovered to be insects inhabiting the coral; for upon taking branches of it out of the water, the flowers, which proceeded from a number of white points answering to the holes that pierced the bark, and the radiation of which resembled the flower of the olive-tree, entered into the bark and disappeared; but upon being again restored to the water, they were some hours after perceptible. These flowers spread on white paper lost their transparency, and became red as they dried. The holes in the bark correspond to small cavities upon the substance of the coral; and when the bark is removed, there may be seen an infinite quantity of little tubes connecting the bark with the inner substance, besides a great number of small glands adhering to them; and from these tubes and glands the milky juice of coral issues forth: the holes in the bark are the openings through which the insects that form these substances for their habitation come forth; and those cavities which are partly in the bark and partly in the substance, are the cells which they inhabit. The organs of the animal are contained in the tubes, and the glandules are the extremities of his feet, and the milky liquor is the blood and juice of

Copper-plate
||
Coral.

Coral.

of the animal, which are more or less abundant in proportion to its health and vigour. When the insects are dead, they corrupt, and communicate to the water the smell of putrid fish. This juice or liquor runs along the furrows perceived upon the proper substance or body of coral, and stopping by little and little becomes fixed and hard, and is changed into stone; and being stopped in the bark, causes the coral to increase proportionally and in every direction. In forming coral, and other marine productions of this class, the animal labours like those of the stercoraceous kind, each according to his species; and their productions vary according to their several forms, magnitudes, and colours.

The coral insect, or polype, M. Peyssonnel observes, expands itself in water, and contracts itself in air, or when it is touched with the hand in water, or acid liquors are poured upon it: and he actually saw these insects move their claws or legs, and expand themselves; when the sea-water containing coral was placed near the fire, and keep them in their expanded state when separated from the coral in boiling water. Broken branches of coral have been observed to fasten themselves to other branches, and have continued to grow; and this is the case, when they are connected with detached pieces of rock and other substances, from which no nourishment could be derived. The coral insects in their cells, not having been injured, continue their operations; and as they draw no nourishment from the stone of the coral, they are able to increase in a detached and separate state. Coral was found to be equally red in the sea as out of it; and it was more shining when just taken out of the water, than even when it is polished; and the bark by being dried becomes somewhat pale. M. Peyssonnel found that it grows in different directions, sometimes perpendicularly downwards, sometimes horizontally, and sometimes upwards; and in the caverns of the sea, open to every exposure.

This system was little regarded, though first communicated to the Academy of Sciences at Paris in 1727, till Mr Trembley's discovery of the fresh-water polype; but since that time, it has been confirmed by the observations of M. Bernard de Jussieu on the sea-coasts of Normandy, and those of M. de Reaumur near Rochelle. M. Donati of Turin has also adopted the same hypothesis, viz. that coral is a mass of animals of the polype kind; and instead of representing the polype beds and cells which they contain as the work of polypes, he thinks it more just to say, that coral and other coralline bodies have the same relation to the polypes united to them, that there is between the shell of a snail and the snail itself, or the bones of an animal and the animal itself.

The same system has also been excellently illustrated and established by Mr Ellis, in answer to the objections of Dr Baister of Zealand, and Dr Pallas of Berlin, who still refer corallines to the vegetable kingdom.

There are properly but three kinds of coral; red, white, and black: the black is the rarest, and most esteemed; but the red was formerly used in medicine. It must be chosen thick, smooth, and shining, and of a beautiful red, not covered with any tartareous matter. However, this substance is now scarce ever prescribed by any intelligent practitioner.

CORALLINES, in natural history, were formerly reckoned a genus of plants, and Mr Tournefort enumerates 36 species of them; but in the Linnæan system they belong to the class of zoophytes, and are defined by modern naturalists to be submarine plant-like bodies, that consist of many slender finely divided and jointed branches, resembling some species of moss; or animals growing in the form of plants, having their stems fixed to other bodies: these stems are composed of capillary tubes, whose extremities pass through a calcareous crust, and open into pores on the surface. The branches are often jointed, and always subdivided into smaller branches, which are either loose and unconnected, or joined as if they were glued together. They are distinguished from plants by their texture and hardness: they also yield in distillation a considerable quantity of volatile salt; and their smell, in burning, resembles that of burnt horns and other animal substances. Many of the corallines seem to consist of a single tube, containing a single parent animal. Every branch emitted contains an offspring of this parent dependent upon it, and yet capable of producing its like in the emission of a new branch. Others consist of many such tubes united, rising up together, and encircling the deserted tubes of their progenitors, whose exuvie become the substratum of a rising generation. Mr Ellis distributes corallines into the *vesiculated*, *tubular*, *celliferous*, and *articulated* kinds.

Vesiculated corallines are distinguished by their horny hollow ramifications: most of them are furnished with little denticles on their branches, like leaves on mosses; and at certain seasons of the year they are furnished with small bodies like bladders, proceeding from their stems and branches, and differing in form according to the different species. Their colour, when dry, is of a yellowish or pale brown, and their nature is elastic. They are found adhering to rocks, shells, and fucuses, by small root-like tubes: they recover their form in water, after having been dried; and when put into vinegar, they cause no effervescence. See Plate CCCXV. fig. 1. *a* which represents the sea-tamarisk in its natural size, and *A* in which the denticles are magnified. Fig. 2. *b*, *B*, is the sea-cypress; fig. 3. *c*, *d*, *CD*, the small climbing coralline with well shaped cups.

Tubular corallines are composed of a number of simple tubes, growing up nearly together; or of such branched ones as have neither denticles nor vesicles. These are horny and elastic like the former, and recover their original form in water. Some of them appear wrinkled like the wind-pipe, and others like the intestines of small animals. See fig. 4. *E*.

Celliferous corallines are those which appear, when magnified, to be fine thin cells, the habitations of small animals connected together, and disposed in a variety of elegant forms like branches. These effervesce with acids. See fig. 5. *f* and *F*.

Articulated corallines consist of short pieces of a stony or stercoraceous brittle matter, whose surface is covered with pores or cells, which are joined by a tough, membranous, flexible substance, composed of many small tubes of the like nature compacted together. The stony part is soluble in vinegar, and the other part remains entire. See Plate CCCXVI. fig. 1.

See the description and drawings of a great variety of

Corallines

of species belonging to each class, in Ellis's Nat. Hist. above cited. *a*, *A*, (fig. 6.) is the coralline of the shops. It is fixed to rocks and shells by stony joints, which, as they rise, are united to others by extremely fine and slender tubes: These may be discovered by a good eye, or a common magnifier. As the stems extend themselves, they become pennated by side-branches, which come out opposite to each other, and are jointed in the same manner; the joints of this species are like the upper part of an inverted cone, but a little compressed: The whole surface is covered over with very minute circular-shaped cells like pores; see *B*, and *B* 1, where they are higher magnified. *B* 2, shows the cross section highly magnified. If a branch of this coralline is put into vinegar, these cells are dissolved with the whole cretaceous surface; instead of which there appear rows of minute ramifications, which seem to have communicated with each of these cells. Upon some specimens of this coralline, we may observe little small figures like seed-vessels, with which the branches frequently terminate: They are also found on the sides, as may be seen at *A*, where they are magnified.—When a branch is rendered soft by being steeped in vinegar, there may be squeezed out from the little knobs at the ends and sides, small twisted figures, like those at *A* 1, which are magnified higher at *A* 2.—We frequently find this coralline of different colours, as red, green, ash, and white; but all of it, by being exposed to the sun and air on the shore, becomes white.

The ancients have said great things of the virtues of the common coralline. Dioscorides prescribes it for mitigating the pain of the gout, and for preventing stagnations of the humours in any part; he says nothing of its virtues against worms, which are what we alone esteem it for. We give it in powder from 10 grains to a scruple or half a dram twice a day in these cases, and that with a considerable good effect.

Besides the above, Mr Ellis enumerates other genera of marine productions; as the keratophyta, eschara, sponges, and alcyonium; all which are the nests or matrices of sea-animals. See POLYPE. The last class of marine bodies is formed like funguses of various figures, and with different sorts of covering: some having a gritty, and some a callous skin, with a spongy substance in the inside: other species are of a fleshy substance.

CORRALLOIDES (FRUITICES.) See ESCHARA and KERATOPHYTA, in this APPENDIX.

CORNS, in surgery, hard excrescences, consisting of indurations of the skin arising on the toes, and sometimes on the sides of the feet, where they are much exposed to the pressure of the shoes. By degrees they press themselves farther down between the muscular fibres on these parts, and by their irritation occasion extreme pain. Many cures have been prescribed, but the total removal of them is always found to be attended with great difficulty. It has been recommended to soften them with plasters and then to pull them up by the roots, to apply caustic, &c. A piece of raw beef laid on by way of plaster, and frequently shifted, is also said to be effectual; but the best cure is to bathe them frequently in warm water, and pare away as much as possible of the indurated skin without drawing blood.

CORRODY, in law. See REVENUE, (Encycl.)
CORYLUS, (Encycl.) See also HAZEL, (Encycl.)
CORYPHA, MOUNTAIN-Palm, or Cabbage-Tree, in botany; a genus of the order of palmæ, belonging to the monœcia class of plants. There is only one species, the umbracula, a native of the West Indies, where it is said to rise to the height of 150 and 200 feet. It is by some authors called the *palmetto royal*; and well, says Hughes in his Natural History of Barbadoes, may it be called *royal*, since neither the tall cedars of Lebanon, nor any of the trees of the forest, are equal to it in height, beauty, or proportion. It is generally as straight as an arrow: near the earth it is about seven feet in circumference, but tapers as it ascends. The bark is of an ash-colour, till within 25 or 30 feet of the extremity of the tree; when it alters at once to a deep sea-green, which continues to the top. Upon removing the large leaves, or branches, which surround the top of the trunk a little way above the beginning of the green bark just mentioned, what is called the *cabbage* is discovered lying in many thin, snow-white, brittle flakes, in taste resembling an almond, but sweeter. This substance, which cannot be procured without destroying the tree, is boiled, and eaten with mutton by the inhabitants of the West Indies, in the same manner as turnips and cabbage are with us; it is likewise pickled, and sent to Europe, where it is esteemed an exquisite delicacy.

In the pith of the trunk of the cabbage-palms, when felled, there breeds a kind of worms, or grubs, which are eaten and esteemed a great delicacy by the French of Martinico, St Domingo, and the adjoining islands. These worms, says father Labat, are about two inches long, and of the thickness of one's finger; the head is black, and attached to the body without any distinction of neck. Their preparation for the table is as follows: They are strung on wooden skewers before a fire, and as soon as heated, are rubbed over with raspings of crust, salt, pepper, and nutmeg; this powder absorbs all the fat, which during the cookery would otherwise escape; when properly roasted they are served up with orange or citron sauce. These worms being exposed for some time to the sun, are said to yield an oil which is of great efficacy in the piles. The oil in question, says Labat, is never to be heated before its application to the part affected; as repeated experiments have evinced that its spirit is totally dissipated by the fire.

COURTS OF CONSCIENCE. See Courts of REQUESTS, (Encycl.)

COURTS, Ecclesiastical. See ECCLESIASTICAL, (Encycl.)

COURTS, Military. See CHIVALRY, Court of, (Encycl.)

COURTS, Maritime. See ADMIRALTY, (Encycl.)

FOREST COURTS. See FOREST, (Encycl.)

CRADLE, (Encycl.) Add, See Plate LXXXII. fig. 8.

CRANE. For n° 65. read n° 69, 70.

CREST, in heraldry. For n° 49. read p. 3608.

CRICETUS. See MUS, (Encycl.)

CRICKET, (Encycl.) Crickets are thought to be ruminating animals, and certainly are furnished with several different stomachs. In medicine they are believed to be diuretic, and less dangerous than cantha-

Corrody
1
Cricket.

Crimen
||
Culex.

rides; for which intention they are dried and powdered, and given in doses from 12 grains to a scruple. The house cricket only flies from the light, as many other insects do; it feeds almost on every thing. The males only chirp; and their monotony, however disagreeable to some people, is pleasant enough to their own females, for it is the voice of love; and it is continual, night and day, except in very cold weather. They become habituated to bear all kinds of noise; but the field cricket is very timorous, and chirps only in the heat of the finest days of summer.

CRIMEN FALSI. See FALSI Crimen, (Enceyl.)

CRUSADES. See CROISADES, (Enceyl.)

CULEX, the GNAT; a genus of insects belonging to the order of diptera. The mouth is formed by a flexible sheath, inclosing bristles pointed like stings. The antennæ of the males are filiform; those of the females feathered. There are seven species. These insects, too well known by the severe punctures they inflict, and the itchings thence arising, afford a most interesting history. Before they turn to flying insects, they have been in some manner fishes, under two different forms. You may observe in stagnating waters, from the beginning of May till winter, small grubs with their heads downwards, their hinder-parts on the surface of the water; from which part arises sideways a kind of vent-hole, or small hollow tube like a funnel, and this is the organ of respiration. The head is armed with hooks, that serve to seize on insects and bits of grass on which it feeds. On the sides are placed four small fins, by the help of which the insect swims about, and dives to the bottom. These larvæ retain their form during a fortnight or three weeks, after which period they turn to chrysalids. All the parts of the winged insect are distinguishable through the outward robe that shrouds them. The chrysalids are rolled up into spirals. The situation and shape of the windpipe is then altered; it consists of two tubes near the head, which occupy the place of the stigmata, through which the winged insect is one day to breathe. These chrysalids, constantly on the surface of the water in order to draw breath, abstain now from eating; but upon the least motion are seen to unroll themselves, and plunge to the bottom, by means of little paddles situated at their hinder-part. After three or four days strict fasting, they pass to the state of gnats. A moment before, water was its element; but now, become an aerial insect, he can no longer exist in it. He swells his head, and bursts his inclosure. The robe he lately wore turns to a ship, of which the insect is the mast and sail. If at the instant the gnat displays his wings there arises a breeze, it proves to him a dreadful hurricane; the water gets into the ship, and the insect, who is not yet loosened from it, sinks and is lost. But in calm weather, the gnat forsakes his slough, dries himself, flies into the air, seeks to pump the alimentary juice of leaves, or the blood of man and beasts. The sting which our naked eye discovers, is but a tube, containing five or six spicula of exquisite minuteness; some dentated at their extremity like the head of an arrow, others sharp-edged like razors. These spicula introduced into the veins, act as pump-suckers, into which the blood ascends by reason of the smallness of the capillary tubes. The insect injects a small quantity of liquor into the wound, by which the blood be-

comes more fluid, and is seen through the microscope passing through those spicula. The animal swells, grows red, and does not quit its hold till it has gorged itself. The liquor it has injected, causes by its fermenting, that disagreeable itching which we experience; and which may be removed by volatile alkali, or by scratching the part newly stung, and washing it with cold water; for later, the venom ferments, and you would only increase the tumour and the itching. Rubbing one's self at night with fuller's-earth and water, lessens the pain and inflammation. Gnats perform their copulation in the air. The female deposits her eggs on the water; by the help of her moveable hinder part and her legs, placing them one by the side of another in the form of a little boat. This vessel, composed of two or three hundred eggs, swims on the water for two or three days, after which they are hatched. If storm arises, the boats are sunk. Every month there is a fresh progeny of these insects. Were they not devoured by swallows, other birds, and by several carnivorous insects, the air would be darkened by them.

Gnats in this country, however troublesome they may be, do not make us feel them so severely as the musketo-flies (*culex pipiens*) do in foreign parts. In the day-time or at night they come into the houses; and when the people are gone to bed they begin their disagreeable humming, approach always nearer to the bed, and at last suck up so much blood that they can hardly fly away. Their bite causes blisters in people of a delicate complexion. When the weather has been cool for some days, the musketoes disappear; but when it changes again, and especially after a rain, they gather frequently in such quantities about the houses, that their numbers are astonishing. In sultry evenings they accompany the cattle in great swarms, from the woods to the houses or to town; and when they are drove before the houses, the gnats fly in wherever they can. In the greatest heat of summer, they are so numerous in some places, that the air seems to be quite full of them, especially near swamps and stagnant waters, such as the river Morris in New Jersey. The inhabitants therefore make a fire before their houses to expel these disagreeable guests by the smoke.

CULLODEN, a place in Scotland within two miles of Inverness, chiefly remarkable for a complete victory gained over the rebels on the 16th of April 1746. That day the royal army, commanded by the late duke of Cumberland, began their march from Nairn, formed into five lines of three battalions each; headed by major-general Huske on the left, lord Semple on the right, and brigadier Mordaunt in the centre; flanked by the horse under the generals Hawley and Bland, who at the same time covered the cannon on the right and left. In this order they marched about eight miles, when a detachment of Kinglton's horse, and of the Highlanders, having advanced before the rest of the army, discovered the van of the rebels commanded by the young pretender. Both armies immediately formed in the order and numbers, shown in the annexed scheme.

About two in the afternoon the rebels began to cannonade the king's army: but their artillery being ill served, did little execution; while the fire from their enemies was severely felt, and occasioned great disorder.

Plate
CCCXIII.

Barbus's
Genera of
Insects.

Culex
Culloden

Collaborative
Counseling

THE REBEL ARMY.

Duke of PERTH.	Lord JOHN DRUMMOND.	Lord GEO. MURRAY.
<div style="float: left; width: 10%;"> </div> <div style="float: right; width: 90%; text-align: right;">Keppoch 300 Glenary 600</div>	<div style="float: left; width: 10%;"> </div> <div style="float: right; width: 90%; text-align: right;">Marioneth 300 Mardal 100 Merchan 100 Farghartoun 400 Macintosh 500 Larret 300 Cluny 200</div>	<div style="float: left; width: 10%;"> </div> <div style="float: right; width: 90%; text-align: right;">Athol 300 Lochiel 600 Appin 200 Piquets, by Stapleton. </div>
Left Bank 400. Lord John Drummond.	The young pretender.	Fitzjames's horse.
Tull column 800. Those of the above, who have only guns, and Kilmarnock's guards.	Second column 800. Lt. Lewis Gordon's and Glenbocket's, to be ready to succour, when needful.	Third column 800. Colonel Roy Stuart's, and those of the above who have only guns.

The D. of Perth's reg. and Lt. Ogilvie's,
not to fire without positive order; and to keep close, as a fresh corps de reserve 800.—In all 8350.

most coleopterous insects. They bear a resemblance to oblong foot worms. They are provided anteriorly with six scaly legs, and their head is likewise scaly. But the places where those larvae dwell, and their transformations, afford some singularities. Some species of them, that are dreaded for the mischief they do in granaries, find means to introduce themselves, while yet small, into grains of corn, and there make their abode. It is very difficult to discover them, as they lie concealed within the grain. There they grow at leisure, enlarging their dwelling-place as they grow, at the

Curculio

||

Dæmon.

Barren on
Insects.

expende of the interior meal of the grain on which they feed. Corn-lofts are often laid waste by these insects, whose numbers are sometimes so great as to devour and destroy all the corn. When the insect, after having eat up the meal, is come to its full size, it remains within the grain, hidden under the empty husk, which subsists alone; and there transformed, it becomes a chrysalis, nor does it leave it till a perfect insect, making its way through the husk of the grain. It is no easy matter to discover by the eye the grains of corn thus attacked and hollowed out by these insects, as they outwardly appear large and full: but the condition the curculio has reduced them to, renders them much lighter; and if you throw corn infested by these insects into water, all the tainted grains will swim, and the rest sink to the bottom. Other larvæ of curculiones are not so fond of corn, but fix in the same manner on several other seeds. Beans, pease, and lentils, that are preserved dry, are liable to be spoiled by these little animals, which prey upon the inward part of the grain, where they have taken up their habitation, and do not come forth till they have completed their transformation, by breaking through the outward husk of the grain: this is discoverable by casting those grains into water; those that swim are generally perforated by the curculiones. Other species are lodged in the inside of plants. The heads of artichokes and thistles are often bored through and eaten away by the larvæ of large curculiones. Another species smaller, but singular, pierces and inwardly consumes the leaves of elms. It frequently happens that almost all the leaves of an elm appear yellow, and as it were dead towards one of their edges, while the whole remainder of the leaf is green. Upon inspecting those leaves, the dead part appears to form a kind of bag or small bladder. The two lamina or outward pellicles of the leaf, as well above as below, are en-

tire, but distant and separated from each other, whilst the parenchyma that lies between them has been consumed by several small larvæ of the curculio, that have made themselves that dwelling, in which they may be met with. After their transformation they come forth, by piercing the kind of bladder, and give being to a curculio that is brown, small, and hard to catch, by reason of the nimbleness with which it leaps. The property of leaping, allotted to this single species, depends on the shape and length of its hinder legs.

CUSTOM and HABIT. Delete the References to *EMOTIONS and Passions.*

CYMBAL, (Encycl.) Cassiodorus and Isidore call this instrument *acetabulum*, the name of a cup or cavity of a bone wherein another is articulated; and Xenophon compares it to a horse's hoof; whence it must have been hollow: which appears, too, from the figure of several other things denominated from it; as a basin, caldron, goblet, cask; and even a shoe, such as those of Empedocles, which were of brass.

In reality, the ancient cymbals appear to have been very different from our kettle-drums, and their use of another kind: to their exterior cavity was fastened a handle; whence Pliny compares them to the upper part of the thigh, and Rabanus to phials.

They were struck against one another, in cadence, and made a very acute sound. Their invention was attributed to Cybele; whence their use in feasts and sacrifices: setting aside this occasion, they were seldom used but by dissolute and effeminate people. M. Lampe, who has written expressly on the subject, attributes the invention to the Curetes, or inhabitants of mount Ida in Crete: it is certain these, as well as the Corybantes, or guards of the kings of Crete, and those of Rhodes and Samothracia, were reputed to excel in the music of the cymbal.

D.

DÆMON, (Encycl.) This word is by some derived from the Greek *δαίμων*, "knowing, or intelligent;" by some from *δαιμοναίς*, "to distribute." Either of these derivations agrees with the office ascribed to dæmons by the ancient heathens, as the spirits intrusted with the inspection and government of mankind. According to the philosophers, dæmons held a middle rank between the celestial gods and men on earth, and carried on all intercourse between them; conveying the addresses of men to the gods, and divine benefits to men. Many were of opinion that the celestial divinities did not concern themselves with human affairs, but left the management of them entirely to these subaltern deities. Hence they became the objects of worship, though those who were more immediately so were the spirits of men who were thought to have become dæmons or deities after departing from their bodies. Hesiod and other poets who have written concerning the ancient history or traditions on which the public faith was founded, assert, that the men of the golden age, who were very good, became dæmons after death, and dispensers of good things to mankind. In this sense, according to some, the word *dæmon* (though constantly translated *devil*) is also frequently taken in Scripture, both in the Old and New

Testament. Besides the two foregoing kinds of dæmons, the fathers as well as philosophers asserted the existence of another, viz. such as spring from the congress of superior beings with women; and in the theology of the fathers, these were the worst of all.

DAMPS, (Encycl.) Among the other uses to which dephlogiticated air might be applied, Mr Cavallo reckons that of securing people from the dangerous effects of damps in mines, and other subterraneous places. "If a large bladder," says he, "into which a solution of lime in water is introduced, be filled with dephlogiticated air, and a small wooden or glass pipe be adapted to its neck, a man may hold that pipe in his mouth, and may breathe the dephlogiticated air; and thus equipped he may enter into these subterranean places, amidst the various elastic fluids contained in them. A large bladder of dephlogiticated air will serve for above a quarter of an hour, which is a length of time sufficient for various purposes; besides, if longer time is required to be spent in these places, a person may have two or more bladders of dephlogiticated air along with him, and may shift as soon as the air of one is contaminated. Without the necessity of any more complicated apparatus, the bladders full of dephlogiticated air may be kept stopped by putting

corks

Custos

||

Damp.

bet, corks into the glafs or wooden pipes that are tied to their necks. This air might alfo be ufed for diving-bells."

DEBT, National. See NATIONAL and FUNDS. (*Encycl.*)

DEFORMITY, (Encycl.) Deformity is either natural or moral. Thefe are both referred by Mr Hutchifon to an internal fenfe; and our perceptions of them, as he fupposes, arife from an original arbitrary ftructure of our own minds, by which certain objects, when obferved, are rendered the occafions of certain fenfations and affections.

That many objects give no pleafure to our fenfe, is obvious. Many are certainly void of beauty; but then, fays this author, there is no form which feems neceffarily difagreeable of itfelf, when we dread no other evil from it, and compare it with nothing better of the kind. Many objects are naturally difpleafing and diftafteful to our external fenfes, as well as others pleafing and agreeable; as fmells, taftes, and fome feperate founds: but with regard to our fenfe of beauty, no compofition of objects which give not unpleafant fimple ideas, feems pofitively unpleafant or painful of itfelf, had we never obferved any thing better of the fame kind.

Had there been a fpecies of the form which we now denominate *ugly* or *deformed*, and had we never feen or expected greater beauty, we fhould have received no difguft from it; though the pleafure would not have been fo great in this form as in thofe we now admire. Our fenfe of beauty feems defigned to give us pofitive pleafure; but not pofitive pain or difguft, any farther than what arifes from difappointment.

There are indeed many faces which, at firft view, are apt to raife diflike. But this is generally not from any pofitive deformity; but either from want of expected beauty, or from the carrying fome natural indications of morally bad difpofitions, which we all acquire a faculty of difcerning in countenances, airs, and geftures. That this is not occafioned by any form pofitively difgufting, appears hence, that if, upon long acquaintance, we are fure of finding fweetnefs of temper, humanity, and cheerfulnefs, though the bodily form continues, it fhall give us no difguft. There are horrors raifed by fome objects, which are only the effect of fear for ourfelves, or compaffion towards others, when either reafon, or fome foolifh afociation of ideas, makes us apprehend danger; and not the effect of any thing in the form itfelf. For we find, that moft of thofe objects which excite horror at firft, when experience or reafon has removed the fear, may become the occafion of pleafure.

The cafual conjunction of ideas gives us difguft, where there is nothing difagreeable in the form itfelf. And this, in effect, is the caufe of moft of our fantastic averfions to the figures of divers animals, &c. Thus ferpents of all kinds, and many infefts, really beautiful enough, are beheld with averfion by many people, who have got fome accidental ideas of mifchief afociated to them. A fimilar reafoning is applied to our perception of moral beauty and deformity. *Inquiry into the original of our Ideas of Beauty and Virtue*, paffim.

But it is more juft to diftinguifh between the fenfiments of delight or difguft, excited in us by beautiful

or deformed objects, which are effects of fome caufes, and the natural and real qualities of the perceived objects by which they are produced. There are objects,

fays an excellent writer, which have a natural aptitude to pleafe or offend, or between which and the contemplating mind there is a neceffary congruity or incongruity; and though the actual perception of the underftanding, and confequent feeling of the heart, in contemplating the actions and affections of moral agents, may exift in very different degrees, on account of the incidental obftructions arifing from bodily indifpofition, mental prejudices and biaffes, and the afociation of ideas; yet, to every rational mind properly difpofed, morally good actions muft for ever be acceptable, and can never of themfelves offend; and morally evil actions muft for ever be difagreeable, and can never of themfelves pleafe. What is right in actions and characters is beautiful and amiable, and gives pleafure; what is wrong is deformed and odious, and excites difguft: right and pleafure, wrong and pain, are as diftinct as caufe and effect. It is no lefs abfurd to maintain, that the perception of virtue is nothing diftinct from the reception of the pleafure refulting from it, than to infer, with fome metaphyficians, that folidity, extension, and figure, are only particular modes of infatiation, becaufe attended, whenever they are perceived, with fome fenfations of fight or touch. Thus does this author fhew, that moral beauty and deformity are real qualities of certain actions; in which confifts their aptitude to pleafe or difguft. With refpect to natural beauty, he obferves, that uniformity amidft variety pleafes, becaufe of the natures of variety and uniformity, which are fuch, that, whenever united, they are adapted to pleafe every free unbiaffed mind that difcerns them. He accounts for the pleafure they afford, without referring them to an arbitrary internal fenfe, by the following circumftances that attend them. They are more eafily comprehended by the mind: order and fymmetry give things their ftability and ftrengh, and fubfervency to any valuable purpofe; regularity and order evidence art and defign. Diforder and confufion, whence deformity arifes, denote only the negation of regularity and order; or any arrangement and difpofition of things, which are not according to a law, rule, or plan, and prove not defign. Thefe are not pofitively difpleafing; except where we previously expected order, or where impotence or want of fkill appear, and the contriver has either failed of his defign or executed it ill. See on this fubj & Dr Price's Review of the principal Queftions and Difficulties in Morals, ch. ii. paffim. See an admirable Eflay on bodily Deformity, by Mr Hay, in the *Fugitive Piece*, vol. i. p. 93. &c.

DEMESNE LANDS, (Encycl.) See REVENUE, n° 5. (*Encycl.*)

DIACHYLON. For n° 967. read 975.

DIASCORDIUM. For n° 888. read 899.

DISSERTERS, (Engl.) See alfo NONCONFORMISTS, (*Encycl.*)

DODD (Dr William), an unfortunate diffenting Englifh divine, eldeft fon of the Rev. William Dodd, many years vicar of Bourne in Lincolnfhire, was born May 29. 1729. He was fent, at the age of 16, to the univerfity of Cambridge; and admitted, in the year 1745, a fizar of Clare-Hall. In 1749-50 he took the degree of B. A. with great honour, being upon that

Deformity
Dodd.

occasion

Dodd
Dower.

occasion in the list of wranglers. Leaving the university, he imprudently married a Miss Mary Perkins in 1751, was ordained a deacon the same year, priest in 1753, and soon became a celebrated and popular preacher. His first preferment was the lectureship of West-Ham. In 1754 he was also chosen lecturer of St Olave's, Hart-Street; and in 1757 took the degree of M. A. at Cambridge. On the foundation of the Magdalen Hospital in 1758, he was a strenuous supporter of that charity, and soon after became preacher at the chapel of it. By the patronage of Bishop Squire, he in 1763 obtained a prebend of Brecon, and by the interest of some city-friends procured himself to be appointed one of the king's chaplains; soon after which, he had the education of the present earl of Chesham committed to his care. In 1766, he went to Cambridge, and took the degree of LL.D. At this period, the estimation in which he was held by the world was sufficient to give him expectations of preferment, and hopes of riches and honours; and these he might probably have acquired, had he possessed a common portion of prudence and discretion. But, impatient of his situation, and eager for advancement, he rashly fell upon means, which in the end were the occasion of his ruin. On the living of St George, Hanover-Square, becoming vacant, he wrote an anonymous letter to the chancellor's lady, offering 3000 guineas if by her assistance he was promoted to it. This being traced to him, complaint was immediately made to the king, and Dr Dodd was dismissed with disgrace from his office of chaplain. From this period he lived neglected, if not despised; and his extravagance still continuing, he became involved in difficulties, which tempted him to forge a bond from his late pupil lord Chesham, Feb. 4. 1777, for 4200l. which he actually received: but being detected, he was tried at the Old Bailey, found guilty, and received sentence of death; and, in spite of every application for mercy, was executed at Tyburn, June 27. 1777. Dr Dodd was a voluminous writer, and possessed considerable abilities, with little judgment and much vanity. An accurate list of his various writings is prefixed to his "Thoughts in Prison," ed. 1781.

DODONIAN, (*Encycl.*) The origin and occasion of this fable we have from Herodotus, who observes it was founded on this, that *palas*, which in the Thessalian language signifies a pigeon, does likewise signify a witch, or prophets. But what is more extraordinary is, another tradition among the poets, as if the very oaks of the forest of Dodona spoke, and delivered oracles. This fable is easily deduced from the former; the pigeons in the oaks being supposed to speak, it was no great slight of poetical fancy, to introduce the trees themselves speaking, &c.

The fountain of Dodona was in the temple of Jupiter. The ancient naturalists assure us, it had a property of rekindling torches, &c. when newly extinguished. This, no doubt, it did, by means of some sulphureous fumes exhaling from it; as we still find a fountain in Dauphiné, called the *burning fountain*, do. It is also said to have extinguished lighted torches; which is no great miracle, since plunging them into a place where the sulphur was too dense, or into the water, must have that effect.

DOWER, (*Dotarium*), is the portion which a wi-

dow hath of the lands of her husband after his decease, for the fullness of herself and education of her children.

DOWN of PLANTS. See **HAIR**, (*Encycl.*)

DRAPERY, (*Encycl.*) See also **MINIATURE-Painting**, (*Encycl.*)

DULSE, *Dulse*, or *Sweet Fucus*. See **FUCUS**, in this **APPENDIX**.

DUNSTAFFNAGE, a castle situated in the island of Skie, fabled to have been founded by Ewin a Pictish monarch, cotemporary with Julius Cæsar, naming it after himself, *Ewinium*. In fact, the founder is unknown; but it is certainly of great antiquity, and the first seat of the Pictish and Scottish princes. In this place was long preserved the famous stone the Palladium of North Britain; brought, says legend, out of Spain, where it was first used as a seat of justice by Gathelus, coeval with Moses. It continued here as the coronation-chair till the reign of Kenneth II. who removed it to Scone, in order to secure his reign; for according to the inscription,

*Ni fallat fortum, Sciti quocunque locatum
Invenient lapidem, regnare teneantur ibidem.*

The castle is square; the inside only 87 feet; partly ruinous, partly habitable. At three of the corners are round towers; one of them projects very little. The entrance is towards the sea at present by a staircase, in old times probably by a draw-bridge, which fell from a little gate-way. The masonry appears very ancient; the tops battlemented. This pile is seated on a rock, whose sides have been pared to render it precipitous, and to make it conform to the shape of the castle.

In 1307, this castle was possessed by Alexander Macdougall lord of Argyll, a friend to the English; but was that year reduced by Robert Bruce, when Macdougall sued for peace with that prince, and was received into favour.

We find, about the year 1455, this to have been a residence of the lords of the isles; for here James last earl of Douglas, after his defeat in Annandale, fled to Donald, the regulus of the time, and prevailed on him to take arms and carry on a plundering war against his monarch James II.

At a small distance from the castle is a ruined chapel, once an elegant building; and at one end an inclosure, a family-cemetery. Opposite to these is a high precipice, ending abrupt and turning suddenly toward the south-east. A person concealed in the recess of the rock, a little beyond the angle, surprises friends stationed at some distance beneath the precipice, with a very remarkable echo of any word, or even sentence, he pronounces; which reaches the last distinct and unbroken. The repetition is single, but remarkably clear.

DYEING, (*Encycl.*) See also **LINEN**, (*Encycl.*)

DYEING Plants. The following is a list of the British plants which are, or possibly might be, useful in dyeing.

YELLOWs.

Bark of buck-thorn,
berry-bearing alder,
berberry,
plum-tree,
apple-tree,

Rhamnus catharticus.
——— *frangula.*
Berberis vulgaris.
Prunus domestica.
Pyrus malus.

Bark

Nicholl's
Anecdotes, of
Bewyer, &c.

Down
Dyeing.

Bark of horn-beam,	<i>Carpinus betulus.</i>
Root of meadow-rue,	<i>Thalictrum flavum.</i>
common nettle,	<i>Urtica dioica.</i>
Herb, faw-wort,	<i>Serratula tinctoria.</i>
bushy hawkweed,	<i>Hieracium umbellatum.</i>
hemp-agrimony,	<i>Bidens tripartita.</i>
gale, or Dutch myrtle,	<i>Myrica gale.</i>
sweet willow,	<i>Salix pentandra.</i>
birch-tree,	<i>Betula alba.</i>
hedge-nettle,	<i>Stachys sylvatica.</i>
spotted armwort,	<i>Polygonum perficaria.</i>
Herb, yellow loosestrife,	<i>Lythynachia vulgaris.</i>
devil's-bit,	<i>Scabiosa succisa.</i>
kidney-vetch,	<i>Anthyllis vulneraria.</i>
common yellow liver-wort,	<i>Lichen parietinus.</i>
Flowers of St John's wort,	<i>Hypericum perforatum.</i>
REDS.	
Roots of ladies bedstraw,	<i>Galium verum.</i>
herb woodroof,	<i>Asperula tinctoria.</i>
forrel,	<i>Rumex acetosa.</i>
tormentil,	<i>Tormentilla erecta.</i>
purple cinquefoil,	<i>Comarum patulifre.</i>
PURPLES.	
Herb, or tops of wild mar-joram,	<i>Origanum sylvestre.</i>
BLUES.	
Bark of the ash,	<i>Fraxinus excelsior.</i>
Flowers of larkspur,	<i>Delphinium consolida.</i>
bell-flower,	<i>Campanula rotundifolia.</i>
Berries of black heath,	<i>Empetrum nigrum.</i>
GREENS.	
Herb of ragwort,	<i>Senecio Jacobaea.</i>
cow-weed,	<i>Cherophyllum sylvestre.</i>
Panicle of brome-grass,	<i>Bromus secalinus.</i>
common reed,	<i>Arundo phragmites.</i>
BLACKS.	
Bark of oak,	<i>Quercus robur.</i>
Water horchound,	<i>Lycopus europæus.</i>

DYTISCUS. (*Encycl.*) The larvæ of the dytisci, water-beetle, or diver, are often met with in water. They are oblong, and have six fealy feet. Their body consists of eleven segments. The head is large, with

four filiform antennæ and a strong pair of jaws. The last segments of their body have rows of hairs on the sides; and the abdomen is terminated by two spines charged with the like hairs, forming a kind of plumes. These larvæ are frequently of a greenish variegated brown: they are lively, active, and extremely voracious: they devour and feed upon other water-insects, and often tear and destroy each other. The perfect insect is little inferior to its larvæ in voraciousness, but it can only exercise its cruelty on the larvæ; the perfect insects, like himself, being sheltered by the kind of scaly cuirass with which they are armed. This creature must be touched cautiously; for besides its power of giving a severe gripe with its jaws, it has moreover, under the thorax, another weapon, a long sharp spine, which it will drive into one's fingers by the effort it makes to move backwards. The eggs of the dytisci are rather large, and are by them inclosed in a kind of silky dusky cod, of a strong and thick texture, in form round, and terminated by a long appendix, or slender tail, of the same substance. These cods are often found in the water, and from them are brought forth the eggs and larvæ of the dytisci. The strength of these cods probably serves the insect to defend their eggs from the voraciousness of several other aquatic insects, and even from that of their fellow-dytisci, who would not spare them.

Many species of the perfect insect are common in stagnated waters, which they quit in the evening to fly about. They swim with incredible agility, making use of their hinder-legs after the fashion of oars. The elytra of the females are in general furrowed, and those of the male plain: when they first arrive at their perfect state, their elytra are almost transparent, and in many species of a beautiful dun colour, mingled with shades of greenish brown. The best method of catching them is with a hand-net or sieve; for they are so nimble, and exercise their defensive weapons so often, and with such painful success, to those who endeavour to catch them, that they are very often obliged to let them escape; the easiest way to kill them, is to let them fall into boiling hot water, which instantly destroys them.

E.

EAR-ACH, in medicine. This disorder affects the concha, and the whole meatus auditorius. It is attended with inflammation, tumours, punctation, erosion, tension, pulsation, and a sense of weight.

Extraneous bodies falling into the meatus auditorius, or whatever excites pain in other parts, may cause it here.

The quality of the wax may be faulty, and be a cause; but the most frequent causes are heat and cold: sometimes an acrid serum is secreted in the glands of the ear.

If the pain is violent, it seldom fails to bring on a fever, which is early attended with great restlessness; and a delirium, fainting, and often convulsions, are the consequence: for the membrane that lines the ear is exquisitely sensible, and fully strewed with nerves; besides, membranes which adhere to bones have a more than ordinary sensibility.

In the beginning, whilst the pain is not very con-

derable, a little warm olive-oil dropped into the ear will often relieve. If cold is the cause, keep the head warm. If there is inflammation and tumour, which will be known by the throbbing pain, a suppuration may be encouraged by cataplasms applied warm on the outer ear; but if the state of suppuration is not manifestly near, endeavour by bleeding, purging, and discutients applied to the ear, to remove the inflammation and pain. If external heat was the cause, bleed, and give daily a moderate dose of Glauber's salt as a purge, until the pain abates, or until there is reason to suspect a suppuration: an opiate may be given at night when the pain is violent. When acrid disfluxions are the cause, inject a warm infusion of poppy-heads in water. When living insects have crept into the ear, blow the smoke of tobacco therein, and then pour in warm oil. If purulent matter discharges itself, inject tepid water, mixed with a little soap or honey of roses. Besides the above-mentioned, blisters behind the ears, bladders.

Motherby's Med. Dict.

Eau
||
Entomology.

bladders of warm water laid on the affected ear, and the pediluvium, are occasionally useful.

EAU DE CARMES. For n° 571. read n° 569.

EAU de Luce. Dele PHARMACY, n° 671.

ECSTASY. See EXTASY, (*Encycl.*)

EDDOES. For ARUM *Pergrinum*, read ARUM *Esculentum*.

EDUCATION, (*Encycl.*) The follies of a too delicate education are well expressed in that device of an ape; which by over caressing and hugging its younges, strangles them; with this motto, *complexando necat*. Octavius Ferrarius has a very good Latin treatise on the subject of education, intitled *Chiron*, the name of the centaur who was Achilles's tutor.

Mr Locke's excellent treatise of education is known to every body. Quintilian employs the second chapter of his first book in inquiring whether a domestic or a college education be preferable, i. e. whether it be better to bring up one's children at home, or send them to the colleges and public schools. After urging all that can be said on either side, he concludes for a college or school education.

The plan of education, whether it be domestic or collegiate, should be suited to the station and views of parents, and to the genius of their children; and it is also right to consult their constitution and inclination. It is of great importance, that those who are destined to occupy superior stations in society, should enjoy the benefits of an enlarged and liberal education; that they should be furnished with every substantial and ornamental accomplishment; and those that are intended for any particular profession or employment, should be principally directed to those studies which are appropriated to their respective views; and in every rank of life, an attention to the morals of youth should be a primary object. Though the municipal laws of most countries have made no provision for constraining a parent to bestow a proper education on his children; yet in the case of religion, they are under peculiar restrictions in our own country. Some of these restrictions, as they affect protestants who dissent from the religion of the state, may be thought both impolitic and injurious, and have, therefore, lately been considerably relaxed; but those which are to prevent the progress of popery, are prudent and necessary. Thus, if any person sends a child under his care beyond the seas, to be instructed in any Popish college,

&c. in the principles of the Popish religion, or shall contribute towards his maintenance, he shall forfeit one hundred pounds, besides the disabilities incurred by the child so sent, (1 Jac. 1. cap. 4. and 3 Jac. 1. cap. 5. 11 and 12 W. III. cap. 4.); and both shall be incapable of suing in law or equity, of being executor or administrator, of enjoying any legacy or deed of gift, or of bearing any office in the realm; and he shall forfeit all his goods and chattels, and likewise all his real estate for life, 3 Car. 1. cap. 2.

EFFLORESCENCE, (*Encycl.*) Besides the common crystallization of salts, all of them have the property of appearing in the form of an efflorescence, or small saline spiculae, when mixed with any thick substance, particularly lime. Whatever salt happens to be made use of, there is little or no difference in the efflorescence. Thus, in butter very much salted, the sea-salt shoots in the form of long spiculae, though the sea-salt itself never shoots but in the form of cubical crystals. In like manner Glauber's salt will appear in the form of an efflorescence, as well as the fossil alkali, &c. nor will the form of the crystals of the efflorescence be perceptibly different from those of sea-salt. The efflorescences which we see very commonly upon walls are in general Glauber's salt. In some cases (but seldom in such efflorescences as we have examined), they are composed of fossil alkali. The reason of these differences is not known. In almost all cases of this kind there seems to be a real growth of salt. On one spot of a plaster wall about two feet square, which we observed particularly, this growth was very evident. The produce was a true Glauber's salt; and by frequently taking off the efflorescence, eight ounces were procured; nor did the prolific virtue of the wall seem to be in the least impaired by the waste.

ELECTRICITY, p. 2673. col. 1. line 8. for *Bismuth*, read *Zinc*.—P. 2701. col. 1. line 4. for *THUNDER*, read *LIGHTNING*.

ELECTUARY. For 883, read 893.

ELEGY. Marginal note, for n° 62, read p. 6311.

ELEM, (*Encycl.*) See also BURSERIA, in this APPENDIX.

EMBALMING, (*Encycl.*) See also SURGERY, § XX. (*Encycl.*)

EMULSION. Marginal note, for 910 read 922.

ENGLAND. P. 2769. marginal note 45. for *Henry II.* read *Henry III.*

E N T O M O L O G Y.

ENTOMOLOGY, the science of insects, or that part of zoology which treats of insects.

Whoever is desirous of attaining a systematic knowledge of insects, ought primarily to be solicitous about acquiring the terms made use of in the science, that so he may be able rightly to denominate every part of an insect. The student is first to know what an insect is, lest he mistake hippocampi, and other amphibious animals, for them, as was formerly done; or confound them with the *vermes*, which Linnaeus first distinguished from insects, and which differ as essentially from them as the class mammalia do from birds. Every insect is furnished with a head, antennæ, and feet, of all which the *vermes* are destitute. All insects have six or more feet; they respire through pores placed on the

sides of their bodies, and which are termed *spiracula*; their skin is externally hard, and serves them instead of bones, of which they have internally none. From this definition, the *acus marina* is evidently no insect. But the antennæ placed on the fore-part of the head, constitute the principal distinction. These are jointed and moveable in every part, in which they differ from the horns of other animals: they are organs conveying some kind of sense; but we have no more idea of what this kind of sense is, than a man has, who, without eyes, attempts to determine the particular action of the rays of light on the retina of the eye, or to explain the changes which from thence take place in the human mind. That they are the organs of some kind of sense, is apparent from their perpetually moving them

Efflorescence.
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them forward; yet the hard crust with which they are invested, and their shortness in flies and other insects, would induce one to believe them not to be the organs of touch: Mr Barbut supposes them to constitute or to contain the organs of hearing. That they are tumular, and filled with air, and some kind of humour, appears from the antennæ of butterflies immersed in water.—To come now to the terms of the art. A knowledge of the external parts of the body is first to be established; which, after the method of anatomists, we divide into head, trunk, abdomen, and extremities.

Sect. I. External parts of the Body.

I. CAPUT, the HEAD. This part in insects without brain. The difference between the brain and spinal marrow consists in the former being a medullary part organized. We do not deny the existence of a medullary thread in the heads of insects, but we never could discover it to be organized: hence the hippocapna, or horse fly, will live, run, nay even copulate, after being deprived of its head; to say nothing of many others which are capable of living a long while in the same situation.

As they are not apparently furnished with ears, they have been apprehended incapable of hearing; as we can no more conceive that sense to exist without ears, than vision without eyes. That they are nevertheless susceptible of any shrill or loud noise, as well as fishes, is indisputable; but it has been supposed to be in a manner different from that of hearing. Mr Barbut, however, supposes them to possess this sense in a very distinct manner. Many insects, he observes, are well known to be endowed with the power of uttering sounds, such as large beetles, the bee, wasp, common fly, gnat, &c. The sphinx atropos squeaks, when hurt, nearly as loud as a mouse. Now, if insects are endowed with the power of uttering sounds, it certainly must be for some purpose. As they vary their cry occasionally, it must certainly be designed either to give notice of pleasure or pain, or some affection in the creature who possesses it. "The knowledge of their sounds (says our author) is undoubtedly confined to their tribe, and is a language intelligible to them only; saving when violence obliges the animal to exert the voice of nature in distress, craving compassion; then all animals understand the doleful cry. For instance, attack a bee or wasp near the hive or nest, or a few of them: the consequence of that assault will be, the animal or animals, by a different tone of voice, will express his or their disapprobation or pain; that sound is known to the hive to be plaintive, and that their brother or brethren require their assistance; and the offending party seldom escapes with impunity. Now, if they had not the sense of hearing, they could not have known the danger their brother or brethren were in by the alteration of their tone."

Another proof, which he reckons still more decisive, was taken from an observation made by himself a large spider in St James's park. This creature had made a very large web on a wooden railing; and was, at the time of observation, on one of the rails at a considerable distance from the place where a large fly entangled itself. Nevertheless, the moment the fly was entangled, the spider became sensible of it; though,

from the situation of the rail, he could not possibly have seen it. In this, however, Mr Barbut might possibly be deceived; because the spider was perhaps alarmed by the tremulous motion of the threads, occasioned by the fluttering of the fly; which he might well know how to distinguish from their vibration by the wind. The organ of hearing, in our author's opinion, is situated in the antennæ; both from their situation in the part of the head most favourable to such organs, their inward structure being moveable, the ears of most inferior animals being so. He has never considered the antennæ as either offensive or defensive, but has observed them to be endowed with an exquisite sense of feeling; that the animal appeared to be in agony when its antennæ were pinched; and that it takes care to avoid the touching any hard substance with them roughly. "This tenderness in the organ of hearing (says he) is common to all animals; and insects seem to be particularly tender in these parts by quickly withdrawing them from the touch."

Our author further observes, that the antennæ of all insects are composed of joints varying in size, form, and number. Those who are chiefly confined to live under water have their antennæ in general shorter than those who live on land. Some who roam at large in the air, have them long and slender. They are all hollow, and are rendered flexible by the joints, which are very visible in the horns of the crab and lobster. This hollowess, in our author's opinion, is to receive the sound communicated to the extremities of the antennæ by the repercussion of the air affected by any noise, and convey it, by means of the joints, from one to another, till it arrives in that lessened degree of tone best suited to the timid nature of the animal. In this circumstance there may be many variations in point of perfection in those organs: the strength, utility, and degree of power in receiving sound being proportioned to the necessities of the animals, different in their nature and requisites. In most animals, the entrance to the auricular organ is patulous; but in this case the animal would suffer great inconvenience from such an organisation, as the organ would often be clogged with dirt, &c.

It has also appeared dubious if they have the sense of smell, no organ being found in them adapted to that purpose: and although it was evident they had a perception of agreeable and fetid effluvia, it was thought to be in a manner altogether unknown to us. Mr Barbut is of opinion that the organs of smell reside in the palpi or feelers. Many insects have four and some six, two of which are in general cheliform, in order to assist the insect in conveying its food to its mouth. It may be likewise observed, that the palpi are in continual motion; the animal thrusting them into every kind of putrid or other matter, as a hog would do his nose, smelling and searching after food. Insects which apparently do not possess palpi or spiral tongues, have undoubtedly some organ concealed within the mouth analogous to them in function and utility; the fleshy proboscis of the fly is thrust into every substance in which the animal expects to find food; and when it is extended, nearly in the middle are situated, in our author's opinion, two upright palpi, which, no doubt, perform in their turn some office, perhaps that of smell.

Organs of Smell in Insects.

Eyes, Antennæ, &c. of Insects.

Many insects have no tongue, nor make any sound with their mouth; but for this purpose some use their feet, others their wings, and others some elastic instrument with which they are naturally furnished.

EYES. Most insects have two; but the gryinus has four, the scorpion six, the spider eight, and the scolopendra three. They have no eye-brows, but the external tunic of their eyes is hard and transparent like a watch-glass; their eyes have no external motion, unless it be in the crab. They consist for the most part of one lens only; but in those of the butterfly, dipteræ, and many of the beetles, they are more numerous. Pugett discovered 17,325 lenses in the cornea of a butterfly, and Lieuwenhoek 800 in a fly.

ANTENNÆ. Of these there are in general two (unless four are allowed to some kind of crabs), and placed on the fore-part of the head: they are peculiar to insects; and are plainly distinguishable from the tentaculæ of the vermes, in being crustaceous; and from the palpi of insects, which are more numerous, placed near the mouth, and are sometimes wanting. As the antennæ are of great moment in distinguishing the various kinds of insects, we shall enumerate and explain the several different forms of them.

Setacæ, are those which grow gradually taper towards the extremity.

Filiformes, such as are of the same thickness throughout.

Moniliformes, are filiform, like the preceding, but consist of a series of round knobs, like a necklace of beads.

Clavatæ, such as gradually increase in size toward the extremity.

Capitatæ, are *clavatæ*, but have the extremity somewhat round.

Fissiles, are *capitatæ*; but have the capitulum, or knob, divided longitudinally into three or four parts, or laminæ, as in the scarabæi.

Perfoliatæ, are also *capitatæ*; but have the capitulum horizontally divided, as in the dermeistes.

Pectinatæ, so called from their similitude to a comb, tho' they more properly resemble a feather, as in the moths and elateres. This is most obvious in the male.

Aristatæ, such as have a lateral hair, which is either naked or furnished with lesser hairs, as in the fly: *Breviores*, those which are shorter than the body; *longiores*, those which are longer than the body; *mediocres*, those which are of the same length with the body; all three of which varieties are distinguishable in the cerambyces.

PALPI, or *Feelers*, resemble filiform, articulated, moveable antennæ. They are most commonly four in number, sometimes six; they are sufficiently distinguished from antennæ, in being naked, short, and always placed at the mouth.

Os, the *Mouth*, is generally placed in the anterior part of the head, extending somewhat downwards. In some insects, it is placed under the breast, as in the chermes, coccus, cancer (crab), and curculio.

ROSTRUM, or *Proboscis*, is the mouth drawn out to a rigid point: in many of the hemiptera class it is bent downward toward the breast and belly, as in the cicada, nepa, notonesta, cimex (bug), aphid, and remarkably so in some curculiones.

MAXILLÆ, the *Jaws*, are two in number, sometimes

four, and at other times more; they are placed horizontally; the inner edge of them in some insects is serrated, or furnished with little teeth.

LINGUA, the *Tongue*, in some insects is taper and spiral, as in the butterfly; in others it is fleshy, resembling a proboscis, and tubular, as in the fly.

LABIUM *superius*, the *upper Lip*, is situated above the jaws; as in the scarabæus and gryllus.

STEMMATA, or *Crown*, are three smooth hemispheric dots, placed generally on the top of the head; as in most of the hymenoptera, and others.

II. TRUNCUS, the TRUNK, is that part which comprehends the breast or thorax: it is situated between the head and abdomen; and has the legs inserted into it, that its parts may be distinctly determined. It is divided into *thorax*, *scutellum*, and *sternum*.

THORAX, the *Thorax*, is the back part of the breast; and is very various in its shape. It is called *dentatus*, when its sides are armed with points; *spinatus*, when its back is furnished with them, as in the cerambyx; and *marginatus*, when its margin is laterally dilated, as in the silpha and cassida.

SCUTELLUM, or *Escutcheon*, is the posterior part of the thorax: it is frequently triangular; and appears to be divided from the thorax by an intervening suture, as in most of the coleoptera.

STERNUM, the *Sternum*, is situated on the inferior part of the thorax; it is pointed behind in the elateres, and bifid in some of the dytisci.

III. ABDOMEN, the ABDOMEN is in most insects distinct from the thorax; it is the posterior part of the body of the insect; and is composed of a number of annular segments, which serve occasionally to lengthen or shorten it, and to contain the organs of chylicification, &c.

SPIRACULA, are little holes or pores, placed singly on each side of every segment of the abdomen: thro' these the insect breathes; and if oil be applied so as to stop them up, it proves fatal to most of them.

TERGUM, the *Back*, is the superior part of the abdomen.

VENTER, the *Belly*, is the inferior part.

ANUS, is the posterior part of the abdomen, perforated for the evacuation of the excrement. This part also frequently contains the organs of generation.

IV. ARTUS, the LIMBS or EXTREMITIES, are the various instruments of motion.

PEDES, the *Legs*, are generally fix. There is an exception to this, however, in the class Aptera, many of which have eight; as acarî (mites), phalangii, most of the aranei, (spiders) scorpiones, (scorpions) and cancri (crabs). The oniscus has 14, and the Iuli and scolopendri still more.

The first joint of the leg, which is generally thickest, is called *femur*; the second, which is generally of the same size throughout, *tibia*; the third, which is jointed, is distinguished by the name of *tarsus*; and the last, which in most insects is double, by that of *unguis*. The legs of insects, in general, are named from the various motions they produce: *Cursorii*, from that of running, which are the most numerous;

fat-

&c. *saltatorii*, from that of leaping; *natatorii*, from that of swimming, &c.—In the *saltatorii*, the thighs are remarkably large, by which means they are able to leap to a considerable distance, as in the gryllus, (grasshopper), &c. In those of the *Natatorii*, the feet are flat, and edged with hairs, which answer the purpose of oars in assisting them to swim, as in the dytiscus.—*Mutici*, are such feet as have no claws.—*Chelæ*, or claws, are the fore-feet enlarged towards their extremities, each of which is furnished with two lesser claws, which act like a thumb and finger; as in the crab.

Alæ, *Wings*, the instruments which enable them to fly. These are membranous, and undivided, except in the instance of the phalænæ alucitæ, in which they are in part divided. Most insects have four; the diptera-class, and the coccus, however, have two only.

The wing is divided into its superior and inferior surfaces: its anterior part in a butterfly, is that towards the anterior margin, or next to the head; its posterior part, that towards the anus; its exterior part, that towards the outer edge; and the interior, that next the abdomen.

They are called *plicatiles*, when they are folded at the time the insect is at rest, as in the wasp; opposite to these are the *plane*, which are incapable of being folded.

Erectæ, such as have their superior surfaces brought in contact when the insect is at rest; as in the ephemeræ, libellula puella and virgo, and papilionæ (butterflies.)

Patentes, which remain horizontally extended when the insect is at rest; as in the phalænæ geometræ, and most of the libellulæ.

Incumbentes, such as cover horizontally the superior part of the abdomen when the insect is at rest.

Deflexæ, are incumbentes, but not horizontally, the outer edges declining toward the sides.

Reversæ, are deflexæ, with this addition, that the edge of the inferior wings projects from under the anterior part of the superior ones.

Dentatæ, in which the edge is serrated, or scolloped.

Caudatæ, in which one or more projections in the hinder wings are extended into processes.

Reticulatæ, when the vessels of the wings put on the appearance of network, as in the hemerobius perla; the two anterior wings generally become superior, and the posterior ones inferior, in moths, when their wings are closed; but the anterior wings are called *primary*, and the inferior ones *secondary*, in butterflies, as they cannot with propriety be called *inferior* when the wings are erect.

Colores, the colours, these are self-apparent; but according to their several shapes, they take the different names of *punctæ*, dots; *macule*, spots; *fasciæ*, bands, which frequently run across and sometimes surround the edge of the wings; *Strigæ*, streaks, which are very slender fasciæ; and *lineæ*, lines, which are longitudinally extended.

Ocellus, is a round spot, containing a lesser spot of a different colour in its centre.

Stigmata, another term lately introduced by Linnaeus, signifies the spot, or anastomosis, in the middle

of the wing near the anterior margin; it is conspicuous in most of the hymenoptera and neuroptera, and even in the coleoptera. The fingle or double kidney-shaped spot, situated in the same part of the anterior wings, and frequently occurring in the phalænæ paganeæ, is distinguished likewise by the name of *stigma*.

Elytra (in the singular number elytron.) The upper wings, which are of a hard substance, in some degree resembling leather, and which in most insects are of a very hard texture, but in others flexible, are called *elytra*; their superior surface is generally convex, their inferior one concave. When the insect flies, they are extended; and thus when it rests, closing together, and forming a longitudinal suture down the middle of the back, as in the coleoptera.

They are of various shapes. *Abbreviata*, when shorter than the abdomen. *Truncata*, when shorter than the abdomen, and terminating in a transverse line. *Fassiziata*, when of equal or greater length than the abdomen, and terminating in a transverse line. *Serrata*, when the exterior margin towards the apex is notched or serrated, as in some of the buprestes. *Spinosa*, when their surface is covered with sharp points or prickles. *Scabra*, when their surface is so uneven as to grate against the fingers. *Striata*, when marked with slender longitudinal furrows. *Porcata*, when with elevated longitudinal sulci or ridges. *Sulcata*, when these ridges are concave. *Hemelytra*, when the superior wings are of a middle substance betwixt leather and membrane; either totally so, as in the grylli; or partially so, as in the cimices, nepæ, and notonectæ: These are commonly distinguished by the name *hemiptera*.

Halteres, poisers, (a term also introduced by Linnaeus), are little heads placed on a stalk or peduncle, most frequently under a little arched scale. They are found only in the class diptera, and appear to be nothing more than the rudiments of the hinder wings.

CAUDA, the Tail, in most insects is,

Simplex, simple, capable of being extended, and again drawn back at pleasure. In the crab and scorpion, however, it is

Elongata, elongated, or lengthened out.

Setacea, bristle-shaped, or taper; as in the raphidia.

Trifida, consisting of three bristles; as in the ephemeræ.

Furcata, being forked, as in the podura.

Forcipata, resembling a pair of forceps; as in the forficula.

Foliosa, resembling a leaf; as in the blatta, grylli, and some species of cancri.

Teliferæ, such as are armed with a dart or sting; as in the scorpion and panopæa.

Aculeus, an instrument with which they wound, and at the same time infill a poison; with such the bee, wasp, scorpion, &c. are furnished.

EXPLANATION of PLATE CCCXVIII. upper Compartment.

Fig. I. ANTENNÆ PECTINATÆ, or feather'd; as in the phalænæ, moths.

2. ——— PERFOLIATÆ, or perfoliated; as in the dermestes and dytiscus.

3. ——— FISSILES, or fissile, divided into laminae

- minæ at the extremity, as in the *scarabæi*, beetles.
4. ANTENNÆ CLAVATÆ, or club-shaped, as in the *papilio*, butterfly.
 5. ——— MONILIFORMES, like a necklace of beads; as in the *chrysoloma*.
 6. ——— SETACÆ, setaceous, or bristle-shaped; as in many of the *phalænæ*.
 7. ——— ARISTATÆ, furnished with a lateral hair, as in the *ffy*.
 - 8 9. *a* Caput, the head.
b Palpi, or feelers.
c Antennæ, or horns.
d Oculi, the eyes.
e Thorax.
f Scutellum, or escutcheon.
g Pectus, or breast.
h Sternum, or breast-bone.
i Abdomen, and its segments.
k Anus.
l Elytra, or shells.
m Membranous wings.
n Pedes, or feet, which are natatorii.
 10. *o* Femur, or thigh.
p Tibia, or leg.
q Tarsus, or foot.
r Unguis, or claw.
 11. *a* The anterior part of the wing.
b The posterior part.
c The exterior part.
d The interior part.
e The margin.
f The disk, or middle.
g Oculus, or eye.
 - 12, 13, 14, 15. Represent the insect in its egg, caterpillar, pupa, and perfect state.

SECT. II. Of the SEXES of INSECTS.

THE same difference of sex exists in insects as in other animals, and they even appear more disposed to increase their species than other animals; many of them, when become perfect, seeming to be created for no other purpose but to propagate their species. Thus the silk-worm, when it arrives at its perfect or moth-state, is incapable of eating, and can hardly fly: it endeavours only to propagate its species; after which the male immediately dies, and the female as soon as she has deposited her eggs.

In many insects, the male and female are with difficulty distinguished; and in some they differ so widely, that an unskilful person might easily take the male and female of the same insect for different species; as for instance, in the *phalæna humuli*, *pinaria*, *russula*; each sex of which differs in colour. This unlikeness is still more apparent in some insects, in which the male has wings and the female none; as in the *coccus*, *lampyræ*, *phalæna antiqua*, *brumata*, *lichenella*. And as most insects remain a long while in copulation, as we may see in the tipula and silk-worm, the winged males fly with the wingless females, and carry them about from one place to another; as in the *phalæna antiqua*. It is, however, no certain rule, that when one insect of the same species is found to have wings, and the other to be without, the former must necessarily be

the male, and the latter the female. The aphides, for instance, are an exception; and besides these, individuals of both sexes, and of the same species, are found without wings, as the *carabi majores*, *tenebriones*, *meloes*, *cimices*. The *gryllus pedestris* is likewise destitute of wings; and might have passed for a *gryllus* in its pupa state, had it not been seen in copulation; for it is well known that no insect can propagate its species till it arrives at its last or perfect state.

"Pleraque insectorum genitalia sua intra anum habent abscondita, et penes solitarios, sed nonnulla penem habent bifidum: Cancræ autem et Araneæ geminos, quem admodum nonnulla amphibia, et quod mirandum in loco alieno, ut Cancræ, sub basi caudæ. *Araneus* mas palpos habet clavatos, qui penes sunt, juxta utroque unicum, quæ clavæ sexum nec speciem distinguunt; et femina vulvas suas habet in abdomine juxta pectus. Heic vero si unquam vere dixeris, "Res plena timoris amor;" si enim proci in auspicio accesserit, femina ipsum devorat; quod etiam fit, si non statim se retraxerit. Libellula femina genitale suum sub apice gerit caudæ, et mas sub pectore; adeo ut cum mas collum femina forcipè caudæ arripit, illa caudam suam pectori ejus adplicet, sicque peculiari ratione connexæ volunt."

Besides those of the male and female, a third sex exists in some insects which we call *neuter*: As these have not the distinguishing parts of either sex, they may be considered as eunuchs or infertile.

We know of no instance of this kind in any other class of animals, nor in vegetables, except in the class Syngenesiæ, and in the *Opulus*. This kind of sex is only found among those insects which form themselves into societies, as bees, wasps, and ants: and here these kind of eunuchs are real slaves, as on them lies the whole business of the economy; while those of the other sex are idle, only employing themselves in the increase of the family. Each family of *Bees* has one female only (called the *queen*), many males, and an almost innumerable quantity of neuters. Of those, the neuters (whose antennæ have 11 joints) do the working part; they extract and collect honey and wax, build up the cells, keep watch, and do a variety of other things. The males, whose antennæ consist of 15 joints, do no work; they serve the female once, and that at the expense of their lives; they may be considered in the light of a set of parasites, or cecidæi; but as soon as their business of impregnation is over, they are expelled by their servants the neuters, who now shake off the yoke, but yet pay all due respect to their common mother the queen. The same economy nearly takes place in *Wasps*, where the young females, which are impregnated in the autumn, live through the winter, and in the spring propagate their species; but the queen, together with all the males, perish in the winter. Among *Ants*, the neuters form a hill in the shape of a cone, that the water may run off it, and place those which are in the pupa state on that side of it which is least exposed to the heat of the sun. At a considerable distance from these are found the habitations of the males and females, to whom the most ready obedience is yielded by the neuters, till a new offspring succeeds, and then they oblige them to quit their habitations. But those ants which live entirely under ground,

ground, provide better for themselves in this respect : for a little before their nuptials, they quit their habitation of their own accord, and after swarming in the manner of bees, they copulate in the air ; and each retiring to some new habitation, founds a new family.

No *hermaphrodites* have as yet been discovered among insects. There is something very singular, however, in the propagation of the aphides. A female aphid once impregnated, can produce young, which will continue to produce others without any fresh impregnation, even to the fifth progeny ; afterwards a new impregnation must take place. See *APHIS*, (*Encycl.*)

The male insects, like male hawks, are always smaller than the females.

In the propagation of their species they are remarkably careful ; so that it is with the greatest difficulty that flies are kept from depositing their eggs on fresh meat, the cabbage butterfly from laying them on cabbage, and other insects from depositing them in the several places peculiar to each. The scarabæus pilularius and carnisæx, are deserving of our attention, as they afford a mutual assistance to each other : for when the female has laid her eggs in a little ball of dung, the males, with their feet, which are axiform, assist the female to roll it to some suitable place ; as Aristotle and Pliny formerly, and Loeffing has lately observed.

It is very wonderful to observe, that in the coccus and oniscus, the female has no sooner brought forth her young, than she is devoured by it ; and that the sphex should be able so readily to kill the caterpillar of a moth, then bury it in the earth, and there deposited her eggs in it. Nor can we without admiration behold the same species of aphid, which was viviparous in the summer, become oviparous in the autumn.

Almost innumerable examples might be brought of the singularities in the eggs of insects ; we shall, however, only mention those of the hemerobius, which are deposited on a footstalk ; those of the phalæna neutria, which are placed regularly in a ring round the branch of some tree ; and the compound eggs of the blatta.

SECT. III. *Metamorphoses of Insects.*

THERE are no insects, except those of the aptera class, but what are continually undergoing some transformation. Insects change first from the (ovum) egg, into the (larva) caterpillar or maggot ; then into the (pupa) chrysalis ; and lastly into the (imago) fly or perfect state. During each of those changes, their appearance differs as much as night and day.

The insect, as soon as it came out of the egg, was by former entomologists called *eruca* ; but as this is synonymous with the botanic name *gysymbrium*, it was changed by Linnæus for the term *larva*, a name expressive of the insect's being, in this state, as it were masked, having its true appearance concealed. Under this mask or skin the entire insect, such as it afterwards appears when perfect, lies concealed, enveloped only in its tender wings, and putting on a soft and pulpy appearance ; inasmuch that Swammerdam was able to demonstrate the butterfly with its wings to exist in a caterpillar, though it bore but a faint resemblance to its future perfection. The insect, therefore, in this state, undergoes no other alteration but the change of its skin.

The larvæ are, for the most part, larger than the insect when perfect, and are very voracious. The caterpillar of the cabbage-butterfly eats double what it would seem to require from its size ; but its growth is not adequate to its voracity.

Pupa. The insect in this state was formerly called *chrysalis*, or *aurelia* : but as the appearance of gilding is confined to a few butterflies only, the term of *pupa* has been adopted in its stead ; because the lepidoptera, especially, resemble an infant in swaddling clothes ; and in this state all, except those of the hemiptera class, take no nourishment.

Imago, is the third state. This name is given by Linnæus to this third change, in which the insect appears in its proper shape and colours ; and as it undergoes no more transformations, it is called *perfect*. In this state it flies, is capable of propagating its species, and receives true antennæ ; which before, in most insects, were scarce apparent.

As the shape of the Pupa is different, in different classes of insects, it assumes different names ; thus it is called

Coarctata, when it is round, and as it were turned, without the least resemblance of the structure of the insect ; as in the diptera.

Obtecta, when it consists as it were of two parts, one of which surrounds the head and thorax, and the other the abdomen.

Incompleta, when they have wings and feet, but are not capable of moving them ; as in most of the hymenoptera.

Semicompleta, in which they walk or run, but have only the rudiments of wings.

Completa, in which they immediately obtain the perfect form of the insect, without undergoing any more change ; as in those of the aptera class, except only the flea. The bed bug also belongs to this class.

The spider undergoes frequent transformations, though only in the colour of its skin. The crustaceous insects, as crabs, lobsters, &c. yearly cast their shells, as their growth would otherwise be impeded.

The scolopendri, when young, have fewer feet than when they are full grown.

All insects, as soon as they undergo the third change, are arrived at their full growth ; nor do we find any difference in the size of the same species of insect in the same countries, unless, during its caterpillar state, it has not had a sufficiency of proper food.

SECT. IV. *Classification of Insects.*

As insects are endowed with the various powers of creeping, flying, and swimming, there is scarce any place, however remote and obscure, in which they are not to be found. The great confusion which appeared to the ancients to arise from their number, made them never dream of reducing them to any system. Swammerdam, that indefatigable inquirer into nature, observed that their metamorphoses were divided by nature into several states or orders. Their external appearance also carried with it some mark of distinction ; so that entomologists called all those of the coleoptera class, *Scarabæi* (beetles) ; those of the lepidoptera, *Papilionæ* ; and those of the gymnoptera class that had two wings only, *Muscæ* (flies) ; those of the same class that had four wings, were called *Apæ* (bees). No far-

farther progress was made in the systematic part of this science till the time of Linnæus. He was the first that undertook to determine the genera, and assign them their proper characters, in the *Systema Nature*; and thus reduced this science to a systematic form. This system, in subsequent editions, was considerably enriched and amended by him, inasmuch that the science of insects now shines forth in its full lustre. He it was who first instituted natural orders, and reduced them into genera by expressive names; determined an infinite number of species in the *Fauna Suecica*, and *Musæum Regiæ*; collected with incredible pains the synonymous names of the various authors who had written on them; and lastly, added their descriptions, and the places in which they were to be found. So that the system of this illustrious author will lead any person, without the assistance of a master, for the most part, easily to ascertain the name of any insect he may meet with. Before his time scarce any more than 200 insects were known; whereas, in the last edition of his system, he has determined the names of nearly 3000 distinct species.

CLASSES. The Linnæan classes of insects are seven; as enumerated in Zoology, and under the article **INSECTS**, (*Encycl.*) which see.

ORDERS. These classes are again subdivided into different orders: for which see the articles **ZOOLOGY** and **INSECT**, (*Encycl.*) and Plate CLIV.

GENERA. To insert here the characters of all the different genera which may be found in Linnæus's *Syst. Nat.* would be unnecessary. It will be sufficient to enumerate some new genera mentioned by the most modern systematic writers, that, by being acquainted with the subtle distinctions on which they are built, the student may avoid running into confusion. It is among the moderns only that genera of this kind are to be met with, and new names given them. To remove this difficulty, we shall first enumerate the names of those authors which are synonymous with those of Linnæus.

New Genera of authors synonymous with those of Linnæus.

<i>Linnæus's Names.</i>	<i>Names of other Authors.</i>
Lucanus	<i>Platyceros</i>
Hister	<i>Attelabus</i>
Byrrhus	<i>Anthrenus Cistela</i>
Mylabris	<i>Laria Scop.</i>
Attelabus	<i>Clerus</i>
Silpha	<i>Peltis</i>
Bruchus	<i>Mylabris</i>
Pinus	<i>Byrrhus</i>
Chrysomela	<i>Galericula</i>
Hispæ	<i>Crispæris</i>
Cantharis	<i>Cicindela</i>
Buprestis	<i>Cucujus</i>
Carabus	<i>Buprestis</i>
Myrmelcon	<i>Formicaleo</i>
Sirex	<i>Urocero</i>

New genera of authors.

<i>Copris.</i>	<i>Scarabæus absque scutello</i>
<i>Bostriculus.</i>	<i>Dermestes capecinus</i>
<i>Cistela.</i>	<i>Byrrhus Pilula</i>
<i>Rhinomancer.</i>	<i>Attelabus rostro producto sere Curculionis</i>
<i>Anthribus.</i>	<i>Silpha</i>

<i>Bruchus.</i>	<i>Pinus Fur ob spinas thoracis</i>
<i>Melontha.</i>	<i>Chrysomela cylindrica</i>
<i>Altica.</i>	<i>_____ saltatoria</i>
<i>Diaperis.</i>	<i>_____ fungorum</i>
<i>Pyrochora.</i>	<i>Cantharis</i>
<i>Telephorus.</i>	<i>Cantharis</i>
<i>Cantharis.</i>	<i>Meloë Alata</i>
<i>Cerocoma.</i>	<i>Meloë Shafferi</i>
<i>Notaxis.</i>	<i>Meloë Monoceros</i>
<i>Prionus.</i>	<i>Cerambyx thoracis margine denticulato</i>
<i>Stenocoris.</i>	<i>Leptura thoracis spinosa</i>
<i>Hydrophilus.</i>	<i>Dytiscus antennis clavatis</i>
<i>Mylabris.</i>	<i>Necydalis minor</i>
<i>Acridium.</i>	<i>Gryllus Muticus</i>
<i>Locusta.</i>	<i>_____ Tettigonia</i>
<i>Tettigonia.</i>	<i>Cicada</i>
<i>Corixa.</i>	<i>Notonecta</i>
<i>Nauocoris.</i>	<i>Nepa</i>
<i>Perla.</i>	<i>Hemerobius cauda bifida</i>
<i>Libelluloides.</i>	<i>Myrmelcon antennis capitatis</i>
<i>Crabro.</i>	<i>Tenthredo antennis clavatis</i>
<i>Pterophorus.</i>	<i>Phalæna Alucita</i>
<i>Bibio.</i>	<i>Tipula thoracis spinosa</i>
<i>Stomoxoides.</i>	<i>Aphis buccæ inflata</i>
<i>Stratiomymus.</i>	<i>Musca</i>
<i>Nemotelus.</i>	<i>Musca</i>
<i>Velucella.</i>	<i>Musca.</i>

These genera appear to be in a great measure like those which were introduced into botany by the followers of Rivinus. Paying too little regard to nature, they dissipated natural genera, on account of the most trifling distinctions. This made their continuance in the science of very short duration; our business here is not to suppose, but to examine, what nature will allow of, and what she will not. Knowledge of this kind, built on opinion only, will not stand. We are therefore to look into the science with great accuracy; and the larva of the insect, its manner of changing, and other things of moment, are to be known, before we presume to form a new genus.

Coining of new names, and changing of one old one for another, has been the source of the greatest confusion. Thus, in order to reduce the cicindela and carabus to the same genus, *buprestis* has been adopted for the generic name; but as that genus had long ago received a very different application, it was changed for that of *cucujus*.

Again, that the official cantharides might be ranged among the cerambyces, the cantharides have been removed from the genus of *meloë* (to which they naturally belong), and referred to the genus of *cicindela*, obtaining thus a new name. And so of many others.

Thus also, to mention no more, how needless and rash was it to separate the acridium and locusta from the genus of *gryllus*, the crabro from the tenthredines, and the mylabris from the necydalis!

TRIVIAL NAMES. The trivial names placed under their respective genera will occasion little or no controversy; they are current like money, and of the same utility as the proper names of men, Peter or Paul, &c. Insects living on vegetables should receive their names from the particular plants on which they mostly feed, as they are preferable to all others. Thus the names of the *phalæna mori*, &c. are excellent; and when we are able to give such to insects, the old ones are to be dis-

discarded. But we are to be cautious of not being too hasty in our judgment in this respect; as insects, when they cannot get their favourite food, will often eat other plants. Thus the silk-worm, for want of mulberry leaves, will eat those of lettuce, though it will not thrive so well on them.

Many other instances of the invention of trivial names will be met with in the *Systema Naturæ*, particularly among the butterflies and moths. To prevent confusion from the great number of species which constitute the genus of *phalæna*, they are distributed into sections, and distinguished by the terms of *bombyces*, *noctuæ*, *geometræ*, *tortrices*, *pyralides*, *tineæ*, and *alucitæ*. The *bombyces* and *noctuæ*, which are so much alike, that the females of the *bombyces* are with great difficulty distinguished from the *noctuæ*, are named promiscuously.

All those of the *geometræ* have their names terminating in *aria* and *ata*, according as their antennæ are setaceous or pectinated. The *tortrices*, in *aria*; the *pyralides*, in *alis*; the *tineæ*, in *ella*; and the *alucitæ*, in *dactyla*: so that it is evident from the termination itself to what section the insect is to be referred.

It were to be wished that similar institutions could be formed throughout the whole science, as here the name itself serves to distinguish the insect.

Butterflies are divided into sections, by the names of *Equites*, *Heliconii*, *Danai*, *Nymphalei*, and *Plebei*.

In such a multitude of butterflies, the greatest part of which are foreign and extra-european, and to whose food and manner of life we are utter strangers, it was impossible to give significant trivial names. Linæus, therefore, by way of simile, has taken the names of the *Equites* from the Trojan history. These consist, as it were, of two troops or bodies; of which one contains the fable, and as it were mourning nobles, having red or bloody spots at the basis of their wings. These receive names from the Trojan nobles; and as

Priam was king of Troy, the most splendid among these bear his name. The other body, ornamented with a variety of gay colours, are distinguished by the names of the Grecian heroes; and as in both armies there were kings as well as officers of an inferior rank, those elegant butterflies, whose hinder-wings resembled tails, were distinguished by some royal name. Thus when Paris is mentioned, (knowing from history that he was a Trojan, and of royal blood), I find him among those of the first section; that is, those of a fable colour, spotted in the breast with red, and having their hinder-wings resembling tails. When Agamemnon is named, I remember him to be a noble Greek, and find him among those nobles which have variegated and swallow-tailed wings. But when Nereus is spoken of, I readily know him to belong to the last section, with wings having no tails.

The second class, which contains the *Heliconii*, derive their names from the muses, as Urania. The names of the sons and daughters of Danaus are bestowed on the third section. And as these species are subdivided into two other sections, viz. the white and parti-coloured, the metaphor is so conducted, that the white ones preserve the names of the daughters of Danaus, and the parti-coloured ones those of the sons of Egyptus; so that it is evident from the name itself to what section the butterfly is to be referred.

The names of the fourth section, *Nymphalei*, are taken from various nymphs of antiquity; and those of the fifth section, *Plebei*, are selected from different men among the ancients whose names are worthy of remembrance: so that by this means a knowledge of the ancients may be interperfed, and this agreeable science be made doubly pleasing.

Those, therefore, who shall find new lepidoptera, and give them new names, will do well to follow this method, unless it be apparent what food the insect chiefly subsists on.

E P A

EPACTS, in chronology, the excesses of the solar month above the lunar synodical month, and of the solar year above the lunar year of twelve synodical months; or of several solar months above as many synodical months, and several solar years above as many dozen of synodical months.

The epacts, then, are either *annual* or *menstrual*. Menstrual epacts are the excesses of the civil or calendar month above the lunar month. Suppose, *e. gr.* it were new-moon on the 1st day of January; since the lunar month is 29 days 12^h 44' 3", and the month of January contains 31 days, the menstrual epact is 1 day 11^h 15' 57".

Annual epacts are the excesses of the solar year above the lunar. Hence, as the Julian solar year is 365 days 6^h, and the Julian lunar year 354 days 8^h 48' 38", the annual epact will be 10 days 21^h 11' 22"; that is, nearly 11 days. Consequently the epact of 2 years is 22 days; of 3 years, 33 days; or rather 3, since 30 days make an *embolismic* or intercalary month.

Thus the epact of 4 years is 14 days, and so of the rest; and thus, every 19th year, the epact becomes 30 or 0; consequently the 20th year the epact is 11 again; and so the cycle of epacts expires with the golden number, or lunar cycle of 19 years, and begins with the

E P A

fame, as in the following table:

Gold. Num.	Epacts.	Gold. Num.	Epacts.	Gold. Num.	Epacts.
1	XI	7	XVII	13	XXIII
2	XXII	8	XXVIII	14	IV
3	III	9	IX	15	XV
4	XIV	10	XX	16	XXVI
5	XXV	11	I	17	VII
6	VI	12	XII	18	XIX
				19	XXX

Again, as the new moons are the same, that is, as they fall on the same day every 19 years, so the difference between the lunar and solar years is the same every 19 years. And because the said difference is always to be added to the lunar year, in order to adjust or make it equal to the solar year; hence the said difference respectively belonging to each year of the moon's cycle is called the *epact of the said year*, that is, the number to be added to the said year, to make it equal to the solar year; the word being formed from the Greek *επαγειν*, *induco*, *intercolo*.

Upon this mutual respect between the cycle of the moon and the cycle of the epacts, is founded this rule

Ephemeræ. for finding the Julian epact, belonging to any year of the moon's cycle. Multiply the year given of the moon's cycle into 11; and if the product be less than 30, it is the epact sought; if the product be greater than 30, divide it by 30, and the remainder of the dividend is the epact. For instance, I would know the epact for the year 1712, which is the third year of the moon's cycle. Wherefore 3 is the epact for 1712; for $11 \times 3 = 33$, and 33 being divided by 30, there is left 3 of the dividend for the epact. But the difference of the Julian and Gregorian years being equal to the excess of the solar above the lunar year, or 11 days, it happens that the Gregorian epact for one year is the same with the Julian epact for the preceding year.

EPHEMERA, (Encycl.) These flies, who take their name from the shortness of their life, are distinguished into several species. Some live several days, others do not take flight till the setting of the sun, and live not to see the rising of that luminary. Some exist but one hour, others but half that time; in which short period they comply with the call of nature. With respect to those that live several days, there is a peculiarity observed, incident to themselves alone.

Plate
CCCXIII.

Barb's
Insects.

They have to cast off one slough more, an operation which sometimes takes 24 hours to complete. To bring this about, they cling fast to a tree. The ephemeræ, before they flutter in air, have in some manner been fishes. They remain in the states of larva and chrysalis for one, two, or three years. The chrysalis only differs from the larva by there being observable on its back cases for wings. Both have on their sides small fringes of hair, which, when put into motion, serve them as fins. Nothing can be more curious than the plying of those little oars in the water. Their abdomen is terminated, as well as in their state of flies, by three threads. These larvae scoop themselves out dwellings in the banks of rivers; and they are small tubes made like siphons, the one serving for an entrance, the other affording them an outlet. The banks of some rivers are often perforated with them. When the waters decrease, they dig fresh holes lower down, in order to enjoy their element the water. The season and hour when the chrysalids of the different species of the ephemeræ turn into flies, maintain a kind of regularity. The heat, the rise or fall of the waters, accelerate, however, or postpone their final display. The ephemeræ of the Rhine appear in the air two hours before sunset. These flies are hatched almost all at the same instant in such numbers as to darken the air. The most early of those on the Marne and Seine in France do not begin to fly till two hours after the setting of the sun, towards the middle of August. They are seen fluttering and sporting on the brink of their tomb. The glare of light attracts them, round which they perform a thousand circles with amazing regularity. Their coming together for the purpose of generation can only be surmised, the shortness of their life requiring that all its functions should be proportionable in their duration. Some naturalists have been of opinion, that the males impregnated the eggs after the manner of fishes. The females, by the help of the threads of their tail and the flapping of their wings, support themselves on the surface of the water, and in that almost upright situation drop their eggs in clusters. One single female will lay 700

or 800 eggs, which sink to the bottom. The larvæ that escape from the voraciousness of the fishes, set about the construction of habitations to shelter them from every kind of danger. When the flies have propagated, they are seen to die and fall by heaps. The land and water are strewn with them to a considerable thickness. The fishermen consider these multitudes of destroyed insects as manna for the fishes.

EPHORI, (Encycl.) Some authors deny that the ephori were established by Lyncurgus, dating their origin 130 years after the time of that legislator. Thus Plutarch, in his Life of Cleomenes, ascribes their institution to Theopompus king of Sparta; which is also confirmed by the authority of Aristotle.

EPIC. For POETRY, chap. ii. read Part II. chap. i.
EPILOBIUM, (Encycl.) An infusion of the leaves of the angustifolium, or rosbay willow-herb, has an intoxicating quality, as the inhabitants of Kamtschatka have learned. These people also eat the white young shoots which creep under the ground, and have a sort of ale brewed from the dried pith of it. The down of the seeds has been lately manufactured by mixing it with cotton or beaver's hair.

EPITHEM. For 1015, read 1026.

ERYTHRINA, (Encycl.) Of the wood of this tree the inhabitants of Malabar make sheaths for swords and knives. They use the same, together with the bark, in washing a sort of garment which they call *jara-jas*; and make of the flowers, the confection *caryl*. The leaves pulverised and boiled with the mature *nux Indica*, or coccoa-nut, consume venereal buboes, and ease pains in the bones; bruised and applied to the temples, they cure the cephalæ and ulcers; mixed with the sugar called *jagra*, they mitigate pains in the belly, especially in women; and the same effect follows from the use of the bark leavigated with vinegar, or swallowing the kernel stripped of its red pellicle. The juice of the leaves taken with oil fergelim, mitigates venereal pains; drank with an infusion of rice, it stops fluxes; made into a cataplasm with the leaves of beteiera, it destroys worms in old ulcers; and worked with oil, it cures the psoa and itching.

Ray.

ESCHEAT, (Encycl.) Escheat is one of the consequences of tenure in chivalry. See FEODAL System, KNIGHT-Service, and TENURE. It is the determination of the tenure, or dissolution of the mutual bond between the lord and tenant, from the extinction of the blood of the latter by either natural or civil means: if he died without heirs of his blood, or if his blood was corrupted and stained by commission of treason or felony; whereby every inheritable quality was entirely blotted out and abolished. In such cases the land escheated or fell back to the lord of the fee; that is, the tenure was determined by breach of the original condition, expressed or implied in the feudal donation. In the one case, there were no heirs subsisting of the blood of the first feudatory or purchaser, to which heirs alone the grant of the feud extended: in the other, the tenant, by perpetrating an atrocious crime, showed that he was no longer to be trusted as a vassal, having forgotten his duty as a subject; and therefore forfeited his feud, which he held under the implied condition that he should not be a traitor or a felon. The consequence of which in both cases was, that the

Ephori
Escheat.

gift, being determined, resulted back to the lord who gave it.

ESCHARA, in natural history, the name of a species of coralline, &c. the characters of which are these: they are of a stony or coral-like hardness, and resemble a woven cloth in their texture; and the microscope informs us, that they consist of arrangements of very small cells, whose surfaces appear much in that form. Linnaeus makes it a species of millepora, in the class of lithophytes. See Plate CCCXVI. fig. 9. 10.

The narrow-leaved hornwrack, fig. 9. divides as it rises, into narrow leaves made up of regular rows of oblong square-shaped cells placed alternately by each other, and opposite to an equal number on the other side of the leaf, like an honeycomb: from these leaves proceed other still smaller foliaceous ramifications, many of which seem to be connected at the lower part by tubuli; as in the corallines; by which means they can ply to and fro more freely in the water.—*f.* Gives the natural appearance of this coralline. *E* represents two leaves with their tubuli and cells magnified. *E* 1 is a cross section of one of the leaves at *E*, showing the partition and inner form of their cells.

The broad-leaved hornwrack, fig. 10. when fresh taken out of the sea is of a spongy soft texture and smells very fishy; but when it has lain for some time on the shore, it becomes stiff and horny, like some sort of withered leaves. Both surfaces, when examined by glasses, appear to be covered with cells; and, when a piece of it is cut across, one may discover the thin membrane that serves as a base to the cells of each surface. The form of the cells is very remarkable, each one being arched at the top, and contracted a little at the lower part of the sides to make way for the arches of the two next adjoining cells; so that by this particular construction no room is lost. The entrance of the cells is immediately under the arch of each cell, and the walls of the cells seem to be fortified with spines. Jussieu discovered small polytes extending themselves out of these cells, which he has described in the memoirs of the Academy of Sciences 1742.—*f.* Gives the natural appearance of a leafy branch of this coralline. *F* is a part of a leaf magnified to show the superficial figure of the cells, and the manner in which they are disposed. *F* 1 shows a cross section of a leaf, and discovers the several partitions of the cells.

At the entrance of many of the cells a small testaceous body like a bivalve shell is discovered: *F* 2, the

figure of the cell, with the shell in it; it is of a transparent amber colour, so clear that one may see the dead animal through it, represented by the black spot.

ESTRAY, or **STRAY**, signifies any tame beast, as sheep, oxen, swine, and hories, or swans, found within a lordship, and not owned by any man; in which case being cried, according to law, in the church, and two market towns adjoining, if it be not claimed by the owner within a year and a day, it becomes the lord's of the soil where found. If the owner claims it within the year and day, he must pay the charges of finding, keeping, and proclaiming them; and he may seize it, without telling the marks, or proving his property, which may be done at the trial if contested. If the beast stray within the year to another lordship, the first lord cannot retake it. An estray must be fed and kept, uninjured, and without labour, till it is reclaimed, or the limited time expires.

EUPATORIUM, (*Encycl.*) See also *HEMP Agrimony*, (*Encycl.*)

EXERCISE, in military affairs, (*Encycl.*) See also *Words of Command*, (*Encycl.*)

EYE, (*Encycl.*) A new-born child shall be observed, perhaps, never to keep its eyes fixed on any one object, but continually changing from one to another, and if you put your hand before them, the child will not wink. Hence some have thought, that new-born infants have no sight: but this is a mistake; and the true reason why their eyes are in perpetual motion is, that they have not yet acquired the habit of examining one thing at once with their eyes: their not winking at the approach of the hand, arises from their want of experience how easily their eyes may be hurt; but in a few days they get the habit of winking, so that afterwards their eyes do it spontaneously at the approach of danger.—See a description of the eye and its adjacent parts, by J. Warner.

Artificial eyes are made of concave plates of gold, silver, or glass, and are stained so as to resemble the natural eye. They must, when fixed in the orbit, be taken out and cleaned every night, and replaced in the morning. If no more of a diseased eye is removed than what is preternaturally projected, or if enough is left to preserve the muscles unhurt, the artificial eye will have a little motion from the muscles that remain. If the eye does not fit well, it irritates and inflames the other eye; in which case lay it aside, until one can be had that fits better.

F.

FARTHING, a small English copper coin, amounting to one-fourth of a penny. It was anciently called *fourthing*, as being the fourth of the integer or penny.

FARTHING of Gold, a coin used in ancient times, containing in value the fourth part of a noble, or 20d. silver. It is mentioned in the stat. 9 Hen. V. cap. 7. where it is enacted, that there shall be good and just weight of the noble, half-noble, and farthing of gold.

FARTHING of Land seems to differ from *FARDING-deal*. For in a survey-book of the manor of West-Hampton in Devonshire, there is an entry thus: A. B. holds six farthings of land at 126 l. per ann. So that

the farthing of land must have been a considerable quantity, far more than a rood.

FAWKES (Francis), an ingenious poet, had his school-education at Leeds; from whence he was transplanted to Jesus-college, Cambridge, where he took the degrees in arts. Entering early into holy orders, he settled first at Bramham in Yorkshire, near the elegant seat of that name (Mr Lane's), which he celebrated in verse in 1745, in a 4to pamphlet anonymous. His first poetical publications were "Gawen Douglas's Description of May and Winter modernised." Removing afterwards to the curacy of Crocydon in Surry, he recommended himself to the notice of

Feoffment. Archbishop Herring, then resident there on account of his health, to whom besides other pieces he addressed an Ode on his recovery in 1754, printed in Mr Doddley's Collection. In consequence, his Grace collated him in 1755 to the vicarage of Orpington with St Mary Cray, in Kent; and Mr Fawkes lamented his patron's death in 1757 in a pathetic Elegy styled *Aurelius*, first printed with his Grace's "Seven Sermons," in 1763. He married about the same time Miss Purrier of Leeds. In April 1774, by the late Dr Plumtree's favour, he exchanged his vicarage for the rectory of Hayes. He was also one of the chaplains to the Princess Dowager of Wales. He published a volume of Poems by subscription in 8vo, 1761; the "Poetical Calendar, 1763," and "Poetical Magazine 1764," in conjunction with Mr Woty; "Partridge-shooting, an Eclogue, to the Honourable Cha. Yorke, 1797," 4to, and a "Family Bible," with notes, in 4to, a compilation. But his great strength lay in translation, in which, since Pope, few have equalled him. Witness his fragments of Menander (in his Poems); his "Works of Anacreon, Sappho, Bion, Moschus, and Musæus," 12mo, 1760; his "Idylliums of Theocritus," by subscription, 8vo, 1767; and his "Argonautics of Apollonius Rhodius," by subscription also, (a posthumous publication, completed by the Reverend Mr Meen of Emanuel College, Cambridge), 8vo, 1780. He died August 26. 1777.

FEOFFMENT, (*Encycl.*) is a substantive derived from the verb, to enfeoff, *feoffare* or *infeudare*, "to give one a feud;" and therefore feoffment is properly *donatio feudis*. It is the most ancient method of conveyance, the most solemn and public, and therefore the most easily remembered and proved. And it may properly be defined, the gift of any corporeal hereditament to another. He that so gives, or enfeoffs, is called the *feoffor*; and the person enfeoffed is denominated the *feoffee*.

This is plainly derived from, or is indeed itself the very mode of, the ancient feudal donation; for though it may be performed by the word "enfeoff" or "grant," yet the aptest word of feoffment is "*do* or *dedi*." And it is still directed and governed by the same feudal rules; inasmuch that the principal rule relating to the extent and effect of the feudal grant, *tenor est qui legem dat feudo*, is in other words become the maxim of our law with relation to feoffments, *modus legem dat donationi*. And therefore as in pure feudal donations the lord, from whom the feud moved, must expressly limit and declare the continuance or quantity of estate which he meant to confer, *ne quis plus donasse presumatur, quam in donatione expresserit*; so, if one grants by feoffment lands or tenements to another, and limits or expresses no estate, the grantee (due ceremonies of law being performed) hath barely an estate for life. For, as the personal abilities of the feoffee were originally presumed to be the immediate or principal inducements to the feoffment, the feoffee's state ought to be confined to his person and subsist only for his life; unless the feoffor, by express provision in the creation and constitution of the estate, hath given it a longer continuance. These express provisions are indeed generally made: for this was for ages the only conveyance, whereby our ancestors went to create an estate in fee-simple, by giving the land to the

feoffee, to hold to him and his heirs for ever; though it serves equally well to convey any other estate of freehold.

But by the mere words of the deed the feoffment is by no means perfected: there remains a very material ceremony to be performed, called *livery of seisin*; without which the feoffee has but a mere estate at will. See **SEISIN**, (*Encycl.*)

FERETTO, (*Encycl.*) Another way of making feretto is as follows. Make a number of stratifications of plates of copper and white vitriol alternately in a crucible; which place on the floor of the glass furnace near the eye; and let it stand there three days; then take it out, and make a new stratification with more fresh vitriol; calcine again as before. Repeat this operation six times, and a most valuable feretto will be obtained.

FICUS, (*Encycl.*) That part of the history of the fig-tree, which for many ages was so enigmatical, and which nothing but the doctrine of the sexes of plants has completely cleared up, namely, the husbandry or *caprification*, as it is called, is more particularly worthy of attention, not only as a singular phenomenon in itself, but as it has furnished one of the most convincing proofs of the reality of the sexes of plants. Our limits will not allow us to detail this subject; in brief it is this: It is now known, that the flowers of the fig-tree are situated within a pulpy receptacle, which we call the fig, or fruit of this tree; of these receptacles, in the wild fig-tree, some have male flowers only, and others have male and female, both distinct, though placed in the same receptacle. In the garden, or cultivated fig, these are found to contain only female flowers; which are fecundated by means of a kind of gnat bred in the fruit of the wild fig-trees, which pierces that of the cultivated, in order to deposit its eggs within; at the same time diffusing within the receptacle the farina of the male flowers. Without this operation the fruit may ripen, but no effective seeds are produced: hence the garden fig can only be propagated by layers and cuttings, in those countries where the wild fig is not known. The process of thus ripening the fruit, in the oriental countries, is not left to nature, but is managed with great art, and different degrees of dexterity, so as to reward the skilful husbandman with a much larger increase of fruit than would otherwise be produced. A tree of the same size, which, in Provence, where caprification is not practised, may produce about 25 pounds of fruit, will, by that art, in the Grecian islands, bring ten times that quantity.

FIFE, (*Encycl.*) This county, anciently called *Ros*, including the shire of Kinross, is a peninsula lying between the Friths of Forth and Tay. It is bounded on the north by the Frith of Tay; on the south by the Frith of Forth, which divides it from the Lothians; on the west by the Ochil hills; and on the east by the German Ocean.

FINE DRAWING, in the manufactories. See **RENTERING**.

The term is particularly used for a rent or hole happening in the dressing or preparing of a piece of cloth, artfully sewed up or mended with silk.

All fine-drawings are reputed defects or blemishes, and ought to be allowed for in the price of the

the piece.—Hence, M. Savary establishes it as a rule, which is certainly founded on natural equity, that every manufacturer mark the fine drawings of his cloths with a piece of packthread tied to the list; to direct the draper to the spot; and that the draper apprise the taylor or other person to whom he sells it of the same, that he may not come to damage in the cutting; there being instances of drapers condemned to take back their cloth, when cut to pieces, for omitting to mention the fine-drawings and other flaws.

On this occasion M. Savary extols the procedure of an English merchant, who sending a piece of cloth damaged in one spot, to his correspondent at Paris, put a piece of gold in the damaged place, to make up the damage.—But as this example is perhaps the only one of its kind, that author recommends it to the merchant or draper to unfold all the pieces entirely as they come to him; to discover the fine-drawings and other flaws, in order to make the clothier accountable for them.

FINGAL, king of Morven, or ancient Caledonia. He flourished in the third century; and according to the Irish histories died in the year 283, although there is some reason from Ossian's poems for placing his death a few years later. Fingal was descended in all probability from those Celtic tribes who were the first inhabitants of Britain. Tradition, and the poems of Ossian, give him a long line of royal ancestors, such as Combal, Trenmor, Trathal, &c. who had all reigned over the same territory. Whether this territory was bounded by the Caledonian forest, or extended somewhat farther to the south, towards the Roman province, is uncertain; but there is no doubt of its having extended over all the north and west Highlands, comprehending the Hebrides, whose petty chiefs were all subject to the king of Morven. His principal place of residence was Selma, which was probably in the neighbourhood of Glenco, supposed to be the Cona of Ossian; though some imagine it to have been in Strath-Conan in Moray. The truth seems to be, that as Fingal and his people lived by hunting, they often shifted their habitation. Hence, in all parts of the Highlands we find, in the names of places, buildings, &c. such monuments as justify their several claims for the honour of Fingal's residence. Fingal acquired great fame by his prowess in arms. He made many successful incursions into the Roman province, from whence he carried away those spoils which his son so often mentions under the names of *the wine of the stranger*, and *the wax of the stranger*. By sea we find him frequently making voyages to Scandinavia, the Orkneys, and Ireland; called by Ossian *Lochlin*, *Innisfroe*, and *Ullin*. Several of these expeditions were celebrated by his son in epic poems, of which two only remain, Fingal and Temora. In the last of these poems, we find Fingal fighting together with his grandson Oskar. How long he lived afterwards is uncertain. He is said to have died a natural death; and therefore none of his son's poems relate to this event, though it is occasionally mentioned in many of them. "Did thy beauty last, O Ryno? Stood the strength of car-borne Oskar? Fingal himself passed away; and the halls of his fathers have forgot his steps. The blast of the north opens thy gates, O king, and I behold thee sitting on mist, dimly gleaming in all thine

arms. Thy form now is not the terror of the valiant; but like a watery cloud, when we see the stars behind it, with their weeping eyes. Thy shield is like the aged moon; thy sword vapour half kindled with fire. Dim and feeble is the chief who, travelled in brightness before.—But thy steps are on the winds of the desert, and the storms darken in thy hand. Thou takest the sun in thy wrath, and hidest him in thy clouds. The sons of little men are afraid, and a thousand showers descend."—*Barrathon*.

"The character of Fingal is perhaps the most perfect that was ever drawn by a poet, for we may boldly defy all the writers of antiquity to show us any hero equal to Fingal. Throughout the whole of Ossian's works, he is presented to us in all that variety of lights which give the full display of a character. In him concur almost all the qualities that can ennoble human nature; that can either make us admire the hero, or love the man. He is not only unconquerable in war, but he makes his people happy by his wisdom in the days of peace. He is truly the father of his people. He is known by the epithet of "Fingal of the mild look," and distinguished on every occasion by humanity and generosity. He is merciful to his foes, full of affection to his children, full of concern about his friends, and never mentions Agandecca, his first love, without the utmost tenderness. He is the universal protector of the distressed: none ever went sad from Fingal.—"O Oskar! bend the strong in arms, but spare the feeble hand. Be thou a stream of many tides against the foes of thy people; but like the gale that moves the grass to those who ask thine aid: so Trenmor lived; such Trathal was; and such has Fingal been. My arm was the support of the injured; the weak rested behind the lightning of my steel." These were the maxims of true heroism, to which he formed his grandson. His fame is represented as every where spread; the greatest heroes acknowledge his superiority; his enemies tremble at his name; and the highest encomiums that can be bestowed on one whom the poet would most exalt, is to say, That his soul was like the soul of Fingal. Wherever he appears, we behold the hero. The objects he pursues are always great; to bend the proud, to protect the injured, to defend his friends, to overcome his enemies by generosity more than by force.

"Some strokes of human imperfection and frailty are what usually give us the most clear view and the most sensible impression of a character, because they present to us a man such as we have seen; they reveal known features of human nature. When poets go beyond this range, and attempt to describe a faultless hero, they, for the most part, set before us a sort of vague undistinguishable character, such as the imagination cannot lay hold of, or realize to itself as the object of affection. But Fingal, though exhibited without any of the common human failings, is nevertheless a real man; a character which touches and interests every reader." *Dr Blair*.

We may observe, that Fingal appears to have been no less a poet than a warrior; at least in all those passages ascribed to him in the poems of his son, there is a grandeur and loftiness that elevates them above the common style even of Ossian. The following passage from the poem of *Carthon* may be taken as a speci-

Fire.

Fire.

men of Fingal's poetry.—“ Raife, ye bards,” said the mighty Fingal, “ the praise of unhappy Moina. Call her ghost, with your songs, to our hills; that she may rest with the fair of Morven, the sunbeams of other days, and the delight of heroes of old.—I have seen the walls of Balclutha, but they were desolate. The fire had rebounded in the halls: and the voice of the people is heard no more. The stream of Clutha was removed from its place by the fall of the walls. The thistle shook, there, its lonely head: the mofs whistled to the wind. The fox looked out from the windows; the rank gras of the wall waved round his head. Desolate is the dwelling of Moina: silence is in the house of her fathers. Raife the song of mourning, O bards, over the land of strangers. They have but fallen before us; for, one day we must fall.—Why dost thou build the hall, son of the winged days? Thou lookest from thy towers to-day; yet a few years, and the blast of the desert comes; it howls in thy empty court, and whistles round thy half-worn shield.—And let the blast of the desert come! We shall be renowned in our day. The mark of my arm shall be in the battle, and my name in the song of bards. Raife the song; send round the shield: and let joy be heard in my hall. When thou, son of heaven, shalt fail! if thou shalt fail, thou mighty light! if thy brightness is for a season, like Fingal; our fame shall survive thy beams.”

‘ Such was the joy of Fingal in the day of his joy. His thousand bards leaned forward from their seats, to hear the voice of the king. It was like the music of the harp on the gale of the spring. Lovedly were thy thoughts, O Fingal! Why had not Ossian the strength of thy soul? But thou standest alone, my father; and who can equal the king of Morven?’

FIRE, Method of securing BUILDINGS against it.—Dr Hales proposes to check the progress of fires by covering the floors of the adjoining houses with earth. The proposal is founded on an experiment which he made with a fir-board half an inch thick, part of which he covered with an inch depth of damp garden mould, and then lighted a fire on the surface of the mould: though the fire was kept up by blowing, it was two hours before the board was burnt through, and the earth prevented it from flaming. The thicker the earth is laid on the floors, the better: however, Dr Hales apprehends that the depth of an inch will generally be sufficient; and he recommends to lay a deeper covering on the stairs, because the fire commonly ascends by them with the greatest velocity.

Mr Hartley made several trials in the years 1775 and 1776, in order to evince the efficacy of a method which he had invented for restraining the spread of fire in buildings. For this purpose thin iron plates are well nailed to the tops of the joists, &c. the edges of the sides and ends being lapped over, folded together, and hammered close. Partitions, stairs, and floors, may be defended in the same manner; and plates applied to one side have been found sufficient. The plates are so thin as not to prevent the floor from being nailed in the joists, in the same manner as if this preventative were not used; they are kept from rust by being painted or varnished with oil and turpentine. The expense, of this addition, when extended through a whole building, is estimated at about 5 per cent. Mr

Hartley has a patent for this invention, and parliament has voted a sum of money towards defraying the expense of his numerous experiments. The same preventative may also be applied to ships, furniture, &c.

Lord Mahon has also discovered and published a very simple and effectual method of securing every kind of building against all danger of fire. This method he has divided into three parts, viz. under-flooring, extra-lathing, and inter-securing.

The method of underflooring is either single or double: In single underflooring, a common strong lath of oak or fir, about one-fourth of an inch thick, should be nailed against each side of every joist, and of every main timber, supporting the floor which is to be secured. Other similar laths are then to be nailed along the whole length of the joists, with their ends butting against each other. The top of each of these laths or fillets ought to be at 1½ inch below the top of the joists or timbers against which they are nailed; and they will thus form a sort of small ledge on each side of all the joists. These fillets are to be well bedded in a rough plaster hereafter mentioned, when they are nailed on, so that there may be no interval between them and the joists; and the same plaster ought to be spread with a trowel upon the tops of all the fillets, and along the sides of that part of the joists which is between the top of the fillets and the upper edge of the joists. In order to fill up the intervals between the joists that support the floor, short pieces of common laths, whose length is equal to the width of these intervals, should be laid in the contrary direction to the joists, and close together in a row, so as to touch one another: their ends must rest upon the fillets, and they ought to be well bedded in the rough plaster, but are not to be fastened with nails. They must then be covered with one thick coat of the rough plaster, which is to be spread over them to the level of the tops of the joists: and in a day or two this plaster should be trowelled over close to the sides of the joists, without covering the tops of the joists with it.

In the method of double-flooring, the fillets and short pieces of laths are applied in the manner already described; but the coat of rough plaster ought to be little more than half as thick as that in the former method. Whilst this rough plaster is laid on, some more of the short pieces of laths above-mentioned must be laid in the intervals between the joists upon the first coat, and be dipped deep in it. They should be laid as close as possible to each other, and in the same direction with the first layer of short laths. Over this second layer of short laths there must be spread another coat of rough plaster, which should be trowelled level with the tops of the joists without rising above them. The rough plaster may be made of coarse lime and hair; or instead of hair, hay chopped to about three inches in length may be substituted with advantage. One measure of common rough sand, two measures of slacked lime, and three measures of chopped hay, will form in general a very good proportion, when sufficiently beat up together in the manner of common mortar. The hay should be put in after the two other ingredients are well beat up together with water. This plaster should be made stiff; and when the flooring boards are required to be laid down very soon, a fourth or fifth part of quicklime in powder, formed by

by dropping a small quantity of water on the limeſtone a little while before it is uſed, and well mixed with this rough plaſter, will cauſe it to dry very faſt. If any cracks appear in the rough plaſter-work near the joists when it is thoroughly dry, they ought to be cloſed by waſhing them over with a buſh wet with mortar-waſh: this waſh may be prepared by putting two meaſures of quicklime, and one of common ſand, in a pail, and ſtirring the mixture with water till the water becomes of the conſiſtence of a thin jelly.

Before the flooring boards are laid, a ſmall quantity of very dry common ſand ſhould be ſtrewed over the plaſter-work, and ſtruck ſmooth with an hollow rule, moved in the direction of the joists, ſo that it may lie rounding between each pair of joists. The plaſter-work and ſand ſhould be perfectly dry before the boards are laid, for fear of the dry rot. The method of under-flooring may be ſucceſsfully applied to a wooden ſtair-caſe; but no ſand is to be laid upon the rough plaſter-work. The method of extra-lathing may be applied to cieling joists, to ſloping roofs, and to wooden partitions.

The third method, which is that of inter-ſecuring, is very ſimilar to that of under-flowering; but no ſand is afterwards to be laid upon it. Inter-ſecuring is applicable to the ſame parts of a building as the method of extra-lathing, but it is ſeldom neceſſary.

Lord Mahon has made ſeveral experiments in order to demonſtrate the efficacy of theſe methods. In moſt houſes it is only neceſſary to ſecure the floors; and the extra-ſpence of under-flooring, including all materials, is only about nine pence per ſquare yard, and with the uſe of quicklime a little more. The extra-ſpence of extra-lathing is no more than ſix pence per ſquare yard for the timber ſide-walls and partitions; but for the cieling about nine pence per ſquare yard. But in moſt houſes no extra-lathing is neceſſary.

FIRE-EATER. We have a great number of mountebanks who have procured the attention and wonder of the public by eating of fire, walking on fire, waſhing their hands in melted lead, and the like tricks.

The moſt celebrated of theſe was our countryman Richardſon, much talked of abroad. His ſecret, as related in the *Journal des Sçavans*, of the year 1680, conſiſted in a pure ſpirit of ſulphur, wherewith he rubbed his hands, and the parts that were to touch the fire; which burning and cauterizing the epidermis, hardened and enabled the ſkin to reſiſt the fire.

Indeed, this is no new thing: Amb. Paré aſſures us he had tried it on himſelf, that after waſhing the hands in urine, and with unguentum aurcum, one may ſafely waſh them in melted lead.

He adds alſo, that by waſhing his hands in the juice of onions he could bear a hot ſhovel on them while it melted lead.

FLATUS. For INDEX ſubjoined to *Medicine*, read *MEDICINE*, n^o 384.

FLAX-PLANT. (*Phormium tenax*, Forſk.) is a name which we may give to a plant that ſerves the inhabitants of New Zealand inſtead of hemp and flax. Of this plant there are two ſorts; the leaves of both reſemble thoſe of flax, but the flowers are ſmaller, and their cluſters more numerous; in one kind they are yellow, and in the other a deep red. Of the leaves of theſe plants, with very little preparation, they make

all their common apparel, and alſo their ſhirts, lines, and cordage, for every purpoſe; which are ſo much ſtronger than any thing we can make with hemp, that they will not bear a compariſon. From the ſame plant, by another preparation, they draw long ſlender fibres, which ſhine like ſilk, and are as white as ſnow: of theſe, which are very ſtrong, they make their fineſt cloaths; and of the leaves, without any other preparation than ſplitting them into proper breadths, and tying the ſtrips together, they make their fiſhing-nets, ſome of which are of an enormous ſize.

The ſeeds of this valuable plant have been brought over into England; but, upon trial, appeared to have loſt their vegetating power.

The filamentous parts of different vegetables have been employed in different countries for the ſame mechanic uſes as hemp and flax among us. Putrefaction, and in ſome degree alkaline lixivia, deſtroy the pulpy or fleſhy matter, and leave the tough filaments entire. By curiouſly putrefying the leaf of a plant in water, we obtain the fine flexible fibres, which conſtituted the baſis of the ribs and minute veins, and which form as it were a ſkeleton of the leaf. In Madagaſcar, different kinds of cloth are prepared from the filaments of the bark of certain trees boiled in ſtrong ley; and ſome of theſe cloths are very fine, and approach to the ſoftneſs of ſilk, but in durability come ſhort of cotton: others are coarſer and ſtronger, and laſt thrice as long as cotton; and of theſe filaments they make ſails and cordage to their veſſels. The ſtalks of nettles are ſometimes uſed for like purpoſes, even in France; and Sir Hans Sloane relates, in one of his letters to Mr Ray, that he has been informed by ſeveral, that muſlin and callico, and moſt of the Indian linens, are made of nettles. A ſtrong kind of cloth is ſaid to be prepared, in ſome of the provinces of Sweden, of hop-ſtalks; and in the Tranſactions of the Swediſh Academy for 1750, we have an account of an experiment relating to this ſubject: A quantity of the ſtalks was gathered in autumn, which was equal in bulk to a quantity of flax ſufficient to yield a pound after preparation. The ſtalks were put into water, and kept covered with it during the winter. In March they were taken out, dried in a ſtove, and dreſſed as flax. The prepared filaments weighed nearly a pound, and proved fine, ſoft, and white; they were ſpun and wove into fix ells of fine ſtrong cloth. Unleſs the ſtalks are fully rotted, which will take much longer time than flax, the woody part will not ſeparate, and the cloth will prove neither white nor fine.

FLETCHER (Andrew) of Salton, a celebrated Scots patriot and political writer, was deſcended from an ancient family who trace their origin to one of the followers of William the Conqueror. He was the ſon of Sir Robert Fletcher of Salton and Innerpeffer, and born in the year 1650. The tuition of our author was committed by his father, on his deathbed, to Mr (afterwards Biſhop) Burnet, then his pariſh-miſter; by whole care he received a pious, learned, and polite education. Endowed with uncommon genius, and poſſeſſed of virtues and abilities peculiarly ſuited to the times in which he lived, Mr Fletcher quickly ſhone forth the ornament of his country, and the champion of its freedom. Having in the courſe of his clafſical ſtudies

Flax;
Fletcher.

Fletcher.

Studies and historical reading been impressed with an enthusiastic admiration both of ancient and modern republics, he had early contracted an ardent love of liberty, and an aversion to arbitrary rule. Hence his spirit the more readily took alarm at certain measures in the reign of Charles the Second. Being knight of the shire for Lothian to that parliament where the duke of York was commissioner, he openly opposed the designs of that prince, and the bill of accession. He had a share with lord viscount Stair in framing the test-act, by which the duke of York complained that he lost Scotland. On these accounts, he became peculiarly obnoxious to the duke; and was at last obliged to flee to Holland, to avoid the fatal consequences of prosecutions which on various pretences were commenced against him: being cited before the privy-council and judicatory courts, and not appearing, he was declared traitor, and his estate confiscated.

In Holland he and Mr Baillie of Jerviswood were the only persons whom the earl of Argyle consulted concerning the designs which were then in agitation. In 1681 they came over to England, in order to concert matters with their party in that country; and were the only two who were intrusted so far as to be admitted to the secrets of lord Russell's council of six. Mr Fletcher managed his part of the negotiation with so much address, that administration could find no pretext for seizing him: nor could they fix upon him those articles on account of which Mr Baillie was condemned; to whose honour let it be remembered, that although offered a pardon on condition of his accusing his friend, he persisted in rejecting the proposal with indignation.

Mr Fletcher having joined the duke of Monmouth upon his landing, received a principal command under him. But the duke was deprived of his services on the following occasion, as related by Sir John Dalrymple. Being sent upon an expedition, and not esteeming "times of danger to be times of ceremony, he had seized for his own riding the horse of a country gentleman [the mayor of Lynne] which stood ready equipt for its master. The master, hearing this, ran in a passion to Fletcher, gave him opprobrious language, shook his cane, and attempted to strike. Fletcher, though rigid in the duties of morality, yet having been accustomed to foreign services both by sea and land, in which he had acquired high ideas of the honour of a soldier and a gentleman, and of the affront of a cane, pulled out his pistol, and shot him dead on the spot. The action was unpopular in countries where such refinements were not understood. A clamour was raised against it among the people of the country: in a body, they waited upon the duke with their complaints; and he was forced to desire the only soldier, and almost the only man of parts, in his army, to abandon him. With Fletcher all Monmouth's chances of success in war left him." But, in a manuscript memoir belonging to the family, we have the following notice concerning Mr Fletcher's connection with Monmouth, in which his separation from that prince is very differently accounted for: "To lord Marischal Mr Fletcher explained the motives which induced him first to join, and afterwards abandon, the duke of Monmouth. The former he ascribed to the duke's manifesto in Scotland relating to religion, and in England

to liberty. For the latter he accounted by the disgust produced in his own mind and that of his associates, when the duke declared himself king, and broke faith with all who embarked with him on his principles. He complained heavily of the account commonly given of the death of the mayor of Lynne; and mentioned to Lord Marischal, in proof of the contrary, that he did not leave the duke till he came to Taunton, where he was proclaimed king, several weeks after the death of the mayor of Lynne."

Seeing all the efforts of himself and his friends in favour of liberty frustrated at Taunton, he endeavoured to secure his own personal freedom by taking his passage in the first ship bound to a foreign country. It was his misfortune to land in Spain; where he was immediately arrested, cast into prison, and guarded by three different bands of soldiers, till a vessel should be prepared to carry him a victim in chains to the court of London. But on the morning before the ship could fail, whilst he looked pensive through the bars that secured the window of his room, he was hailed by a venerable personage who made signs to speak with him. The prison-doors he found open, and whilst his friendly conductor waved to him to follow him, he passed thro' three different guards of soldiers all fast asleep. Without being permitted to offer his thanks to his deliverer, he found himself obliged to prosecute with all speed the journey, in which he was directed by a person concerning whom he could never collect any information; and in disguise he proceeded in safety through Spain. He felt a peculiar pleasure in relating to his friends instances of the care of Providence which he had experienced during his exile; and entertained them often with narratives of this kind, which he always mingled with religious reflections. Of these, another may be here mentioned. Happening in the evening to pass the skirt of a wood at a few miles distance from a city where he intended to lodge, he came to a place where two roads met. After he had entered upon the road on the right, he was accosted by a female of a respectable figure, who warned him to turn back, and take the road on the left; for that in the other there was danger which he could not escape if he continued to proceed. After which she suddenly retired into the wood, out of which she had issued no less unexpectedly. Having arrived at the city, the inhabitants were soon after alarmed by an account of the robbery and murder of several travellers who that evening had fallen into the hands of a banditti upon the very way in which he had intended to travel. From these and other instances of preservation from dangers, the devotion of his mind, habituated from his infancy to an intercourse with heaven, led him to conclude that he was in a peculiar manner the care of Providence; and that in critical cases his understanding received its direction from a supernatural impulse.

During his exile, he maintained a frequent and extensive correspondence with the friends of liberty at home; and he partly employed himself in making a curious collection of books, which compose the best private library in Scotland. But his genius also prompted him to engage in more active employments. He repaired to Hungary, and served several campaigns as a volunteer under the duke of Lorrain with great reputation. At length, understanding that the great

Fletcher.

*Memoirs of
the family
of Salton,
MS.*

*Memoirs of
Great Britain
and
Ireland,
p. 60, 61.*

design then projecting in Holland, and upon the issue of which he considered the liberties of Britain to be suspended, had attained a considerable degree of maturity, he hastened thither; where his counsels and address were of eminent service. He came over with king William; and in zeal, activity, penetration, and political skill, proved inferior to none of the leaders in the Revolution.

Such, however, was his magnanimity, that from a survey of K. William's papers it appears, that while others laboured to turn this grand event to the emolument of themselves and the aggrandisement of their family, Mr Fletcher asked nothing. His estate had been forfeited, and his house abandoned to military discretion; his fortune was greatly shattered, and his family reduced to circumstances of distress. Nothing was given him in recompence of all his sufferings. On the contrary, he, together with the duke of Hamilton, was distinguished by marks of royal and ministerial dislike. Still, whatever private resentment he might entertain, it appeared that his ruling principle was the good of his country; and that to this grand object of his heart he was willing to sacrifice all private resentments. For when, in 1692, the abdicated king meditated an invasion, Mr Fletcher addressed a letter (preserved in Sir John Dalrymple's Collection) to the duke of Hamilton, in which every argument is employed with skill and energy to engage his Grace to forget his injuries, and in the present crisis to employ the extensive influence and authority he then possessed in the cause of freedom and of his country. This letter produced its full effect; and the duke returned to his duty, from which he had in part declined.

To follow our author through all the mazes of his political life subsequent to the Revolution, is beyond our purpose, and would exceed our limits. One or two circumstances more shall therefore suffice. Being elected a member for the parliament 1683, he showed an uniform zeal for the interest of his country. The thought of England's domineering over Scotland was what his generous soul could not endure. The indignities and oppression which Scotland lay under galled him to the heart; so that in his learned and elaborate discourses, he exposed them with undaunted courage and pathetic eloquence.—In that great event, the Union, he performed essential service. He got the act of security passed, which declared that the two crowns should not pass to the same head till Scotland was secured in her liberties civil and religious. Therefore lord Godolphin was forced into the Union, to avoid a civil war after the queen's demise. Although Mr Fletcher disapproved of some of the articles, and indeed of the whole frame of the Union; as the act of security was his own work, he had all the merit of that important transaction.

We must not omit mentioning, that in the ardour of his political career Mr Fletcher forgot not the interests of the place that gave him birth. He esteemed the education of youth one of the noblest objects of government. On this subject he wrote a treatise, still extant, most characteristic of himself; and he established at Salton a foundation for the same purpose, of great utility while it lasted.

This great man died at London in 1716, aged 66.

His remains were conveyed to Scotland, and deposited in the family vault at Salton.

That Mr Fletcher received neither honours nor emoluments from king William, may perhaps be in part attributed to himself; a circumstance, however, which must add greatly to the lustre of his character. His uncomplaining virtue, and the sternness of his principles, were ill calculated to conciliate courtly favour. He was so zealous an assertor of the liberties of the people, that he was too jealous of the growing power of all princes; in whom he thought ambition so natural, that he was not for trusting the best of kings with the power which ill ones might make use of against their subjects: he was of opinion that all princes were made by, and for the benefit of, the people; and that they should have no power but that of doing good. This, which made him oppose king Charles and invade king James, led him also to oppose the giving so much power to king William, whom he would never serve after his establishment. So we are told by the author of *Short political Characters*, a MS. in the library of the late T. Rawlinson, Esq.—Mr Lockhart, in his *Memoirs*, p. 72. expresses a belief that his aversion to the English and to the Union was so great, that, in revenge to them, he was inclined to side with the abdicated family: "But (adds he) as that was a subject not fit to be entered upon with him, this is only a conjecture from some innuendoes I have heard him make: but so far is certain, he liked, commended, and covered with high-flying Tories, more than any other set of men; acknowledging them to be the best countrymen, and of most honour, integrity, and ingenuity." It seems difficult to reconcile this with Mr Fletcher's avowed principles and the general tenor of his conduct. May we suppose, that chagrin, if not at the neglect or the ill treatment which he had himself received from government since the Revolution, yet at the public measures relating to his native country, might have occasioned him to relent in his sentiments with regard to the exiled family?—In the family-memoirs already quoted, we are informed, that "Lord Marischal held Mr Fletcher's character in high admiration;" and that, "when governor of Neuchâtel, where Rousseau resided about the year 1766, he prevailed with this very extraordinary genius to write the life of a man whose character and actions he wished to have transmitted to posterity with advantage. For this purpose, his lordship applied to an honourable relation of Mr Fletcher's for materials, which by him were transmitted to lord Marischal: but the design failed through Rousseau's desultory and capricious disposition." This anecdote must appear incompatible with the known loyalty and attachments of the Earl Marischal, unless we suppose him to have been privy to some such sentiments of Mr Fletcher, as those alluded to by Mr Lockhart: for how could we suppose him anxious to promote a composition, in which the task would be to celebrate principles diametrically opposite to his own, and to applaud actions subversive of that royal family in whose cause he had ventured his life, and forfeited his fortune, and forgone his country!—But however these circumstances may be reconciled,—as the integrity, disinterestedness, and public spirit of Mr Fletcher, have been universally acknowledged, there is reason to believe, that all his sentiments and actions

were

Fletcher
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Fossils.

were founded in honour, and that he never once pursued a measure further than he judged it to be for the interest of his country.

Mr Fletcher was master of the English, Latin, Greek, French, and Italian languages; and well versed in history, the civil law, and all kinds of learning. In his travels, he had not only acquired considerable knowledge in the art of war, but also became versant in the respective interests of the several princes and states of Europe. In private life, he was affable to his friends, and free from all manner of vice. He had a penetrating, clear, and lively apprehension; but is said to have been too much wedded to opinions, and impatient of contradiction.—He possessed an uncommon elevation of mind, accompanied with a warmth of temper, which would suffer him to brook from no rank among men, nor in any place, an indignity. Of this he exhibited a singular proof in the Scots parliament. The Earl of Stair, secretary of state and minister for Scotland, having in the heat of debate used an improper expression against Mr Fletcher, he seized him by his robe, and insisted upon public and immediate satisfaction. His Lordship was obliged instantly to beg his pardon in presence of parliament.

Mr Fletcher was by far the finest speaker in the parliament of Scotland: the earl of Stair alone rivalled him. The latter was famed for a splendid, the former for a close and nervous eloquence. He formed his style on the models of antiquity; and the small volume of his works, Sir John Dalrymple observes, tho' imperfectly collected, is one of the very few classical compositions in the English language.

FLOS MASCULUS, in botany, a flower which contains the stamen, reckoned by the sexualists the male organ of generation; but not the stigma or female organ. All the plants of the class diœcia of Linnæus have male and female flowers upon different roots: those of the class monœcia bear flowers of different sexes on the same root. The plants, therefore, of the former are only male and female: those of the latter are androgynous; that is, contain a mixture of both male and female flowers.

FOSSILS, (*Encycl.*) The adventitious or extraneous fossils, or those which include the subterraneous exuvie of different sea and land animals, and even vegetables, as shells, teeth, leaves, stalks, &c. which are found buried in great abundance in divers parts of the earth, have employed the curiosity of several of our latest naturalists, who have each their several system to account for the surprising appearances of petrified sea-fishes, in places far more remote from the sea, and on the tops of mountains; shells in the middle of quarries of stone; and of elephants teeth, and bones of divers animals, peculiar to the southern climates, and plants only growing in the east, found fossil in our northern and western parts. See Plate CCCXVII.

Some will have these shells, &c. to be real stones, and stone plants, formed after the usual manner of other figured stones; of which opinion is our learned Dr Lister.

Another opinion is, that these fossil shells, with all other foreign bodies found within the earth, as bones, trees, plants, &c. were buried therein at the time of the universal deluge; and that, having been

penetrated either by the bituminous matter abounding chiefly in watery places, or by the salts of the earth, they have been preserved entire, and sometimes petrified.

Others think, that those shells, found at the tops of the highest mountains, could never have been carried thither by the waters, even of the deluge; inasmuch as most of these aquatic animals, on account of the weight of their shells, always remain at the bottom of the water, and never move but close along the ground.

They imagine, that a year's continuance of the waters of the deluge, intermixed with the salt waters of the sea, upon the surface of the earth, might well give occasion to the production of shells of diverse kinds in different climates; and that the universal saltness of the water was the real cause of their resemblance to the sea-shells, as the lakes formed daily by the retention of rain or spring water produce different kinds.

Others think, that the waters of the sea, and the rivers, with those which fell from heaven, turned the whole surface of the earth upside down; after the same manner as the waters of the Loire, and other rivers, which roll in a sandy bottom, overturn all their sands, and even the earth itself, in their swellings and inundations; and that in this general subversion, the shells came to be interred here, fishes there, trees there, &c.

But nobody has set this system in a better light than Dr Woodward, in his Natural History of the Earth. That author, pursuing and improving the hypothesis of Dr Burnet, maintains the whole mass of earth, with every thing belonging thereto, to have been so broken and dissolved at the time of the deluge, that a new earth was then formed in the bosom of the water, consisting of different strata, or beds of terrestrial matter, ranged over each other usually according to the order of their specific gravities. By this means, plants, animals, and especially fishes and shells, not yet dissolved among the rest, remained mixed and blended among the mineral and fossil matters; which preserved them, or at least assumed and retained their figures and impressions either indentedly, or in relieve.

FOTHERGILL (Dr John), a late eminent physician, was born in 1712, at Wensley-dale in Yorkshire. His father had been bred to the profession of husbandry, and occupied a small estate of his own in that country. The Doctor was the second of five children (four sons and a daughter), and received his education in the seminary belonging to the Quakers; and afterwards served his time to one Mr Bartlett an apothecary at Bradford. From thence he removed to London, and became a pupil of Dr (afterwards Sir Edward) Wilmot, at St Thomas's Hospital. He then went to the university of Edinburgh, where he took his degree in 1736. From Edinburgh he went to Leyden; whence, after a short stay, he returned to London, and began to practise physic about the year 1740, in a house in White-hart Court, Lombard-street, where he resided during the greatest part of his life, and acquired most of his fortune. In 1744 he was admitted a licentiate of the college of physicians in London; and in 1754 a fellow of that of Edinburgh, to which he was a considerable benefactor. He afterwards became a member of the Royal Medical Society at Paris,

Fossils,
Fothergill.

ria, and a member both of the Royal and Antiquarian Societies. He continued his practice with unremitting attention and success, till his illness, during the two last years of his life, obliged him to give up a considerable part of it. The disorder which hastened his death, was a scirrhus of the prostate gland, and an obstruction in the bladder, in which were found two quarts of water after his decease. This had been gradually coming upon him for six years, by reason of his delicacy, which made him unwilling to alight often from his carriage; and when, after his temporary recovery from it the year before he died, he submitted to use relief in his carriage, it was too late. He died in his house in Harpur-street, Dec. 26. 1780.

Dr Fothergill, besides his attention to medicine, had imbibed an early taste for natural history, which was improved by his friend Mr Collinson. He was for many years a valuable contributor to the Gentleman's Magazine; which, in return, considerably assisted his rising fame. His observations on the Weather and Diseases were begun in 1751, and continued monthly for many years. He did not add to the medical art any great or valuable improvements. His pamphlet on the Ulcerous Sore Throat is in every respect the best of his performances, and owes much of its merit to the information of the late Drs Leatherland and Sylvester. It was first printed in 1748, on the re-appearance of that fatal disorder, which, in 1739, had carried off the two sons of Mr Pelham. At the expense of Dr Fothergill also was made and published a new translation of the whole Bible, by Anthony Porver a Quaker, who, by his own industry, acquired a knowledge of the Hebrew, Greek, and Latin languages. This publication is said to have cost the Doctor not less than 2000*l*. It appeared in 1764 in two vols folio; and in 1780 was published an edition of Dean Percy's Key to the New Testament, adapted to the use of a seminary of young Quakers at Ackworth, near Leeds in Yorkshire. This was founded in 1778 by the society, who purchased by subscription, in which Dr Fothergill's name stood foremost, the house and estate of 30 acres possessed by the Foundling Hospital, but which they found inconvenient for their purpose on account of distance. The Doctor first projected this on the plan of a smaller institution of the same kind at Gilderfomes. He also endowed it handsomely by his will. It now contains about 300 children of both sexes, who are fed and instructed.

The fortune acquired by Dr Fothergill was immense; and, taking all things together, the computation cannot be less than 80,000*l*. His business, when in full practice, was valued at 7000*l*. a-year. In the influenza of 1775 and 1776, he is said to have had 60 patients daily on his list, and his profit was estimated at 8000*l*.—When the infirmities of old age obliged him to relax his close attention to business, he quitted his house in the city, and resided in Harpur-street, Red-lion Square. He also furnished himself with a pleasant retreat at Upton, which he used to visit on Saturdays during the winter, and sometimes more frequently in spring and summer. For several years before his death he was accustomed to retire in the month of July to Lea-Hall, a pleasant estate in the neighbourhood of Middlewich, which he rented from Sir John Leicester. He generally resided

at this place till the latter end of September; and while here took no fees, but used to go once a-week to an inn at Middlewich, and prescribe gratis to all who applied to him.

Dr Fothergill's character was excellent. A transaction, indeed, with regard to one Dr Leeds gave occasion to some of his enemies to blame him; but how unjustly, has been abundantly shown by his biographers Dr Elliot and Dr Lettome.

Dr Fothergill wrote a considerable number of Tracts, which are now collected into one vol. 8vo, by Dr Elliott. He sometimes wrote in the newspapers, and is said to have been the author of more than 100 letters in the Gazetteer concerning the New Pavement.

FRAXINELLA, in botany. See DICTAMNUS, (*Encycl.*)—It is remarkable of this odorous plant, that, when in full blossom, the air which surrounds it in a still night, may be inflamed by the approach of a lighted candle. Dr Watson doubts whether this inflammability proceeds from an inflammable air which is exhaled by the plant, or from some of the finer parts of the essential oil of the plant being dissolved in the common atmospheric air. The latter is the most probable supposition; for were it the pure inflammable air, as Mr Cavallo observes, it would, on account of its small specific gravity, leave the plant as soon as it was produced. Common air acquires the property of becoming inflammable, by being transmitted through several essential oils.

FRENUM, in anatomy, the same with the *ligamentum annulare*, or annular ligament.—This name is given to a ligament on each ankle and each wrist, and this more on account of their use than their figure. They bridle the tendons of the muscles which pass through them.

FROST, (*Encycl.*) The great power of frost on vegetables is a thing sufficiently known; but the differences between the frosts of a severe winter, and those which happen in the spring mornings, in their effects on plants and trees, were never perfectly explained, till by M. Du Hamel and Buffon in the Memoirs of the Paris Academy.

The frosts of severe winters are much more terrible than those of the spring, as they bring on a privation of all the products of the tenderer part of the vegetable world; but then they are not frequent, such winters happening perhaps but once in an age; and the frosts of the spring are in reality greater injuries to us than these, as they are every year repeated.

In regard to trees, the great difference is this, that the frosts of severe winters affect even their wood, their trunks and large branches; whereas those of the spring have only power to hurt the buds.

The winter frosts happening at a time when most of the trees in our woods and gardens have neither leaves, flowers, nor fruits upon them, and have their buds so hard as to be proof against slight injuries of weather, especially if the preceding summer has not been too wet; in this state, if there are no unlucky circumstances attending, the generality of trees bear moderate winters very well; but hard frosts, which happen late in the winter, cause very great injuries even to those trees which they do not utterly destroy. These are, 1. Long cracks following the direction of the fibres. 2. Parcels of dead wood inclosed round

Frost.

with wood yet in a living state. And, 3. That diftemperature which the foresters call the *double blea*, which is a perfect circle of blea, or soft white wood, which, when the tree is afterwards felled, is found covered by a circle of hard and solid wood.

The opinions of authors about the expositions of trees to the different quarters, have been very different, and most of them grounded on no rational foundation. Many are of opinion that the effects of frost are most violently felt on those trees which are exposed to the north; and others think the south or the west the most strongly affected by them. There is no doubt but the north exposure is subject to the greatest cold. It does not, however, follow from this, that the injury must be always greatest on the trees exposed to the north in frosts: on the contrary, there are abundant proofs that it is on the south side that trees are generally more injured by frost: and it is plain from repeated experiments, that there are particular accidents, under which a more moderate frost may do more injury to vegetables, than the most severe one which happens to them under more favourable circumstances.

It is plain from the accounts of the injuries trees received by the frosts in 1709, that the greatest of all were owing to repeated felle thaws, succeeded by repeated new frosts. But the frosts of the spring-season furnish abundantly more numerous examples of this truth; and some experiments made by the Count de Buffon, at large in his own woods, prove incontestably, that it is not the severest cold, or most fixed frost, that does the greatest injury to vegetables.

This is an observation directly opposite to the common opinion; yet is not the less true, nor is it any way discordant to reason. We find by a number of experiments, that humidity is the thing that makes frost fatal to vegetables; and therefore every thing that can occasion humidity in them, exposes them to these injuries, and every thing that can prevent or take off an over proportion of humidity in them, every thing that can dry them, though with ever so increased a cold, must prevent or preserve them from those injuries. Numerous experiments and observations tend to prove this. It is well known that vegetables always feel the frost very desperately in low places where there are fogs. The plants which stand by a river side are frequently found destroyed by the spring and autumnal frosts, while those of the same species, which stand in a drier place, suffer little, or perhaps not at all by them; and the low and wet parts of forests are well known to produce worse wood than the high and drier. The coppice wood in wet and low parts of common woods, though it push out more vigorously at first than that of other places, yet never comes to so good a growth; for the frost of the spring killing these early top-shoots, obliges the lower part of the trees to throw out lateral branches: and the same thing happens in a greater or lesser degree to the coppice wood that grows under cover of larger trees in great forests; for here the vapours not being carried off either by the sun or wind, stagnate and freeze, and in the same manner destroy the young shoots, as the fogs of marshy places. It is a general observation also, that the frost is never hurtful to the late shoots of the vine, or to the flower-buds of trees, except when it

follows heavy dews, or a long rainy season, and then it never fails to do great mischief, tho' it be ever so slight.

The frost is always observed to be more mischievous in its consequences on newly cultivated ground than in other places; and this is because the vapours which continually arise from the earth, find an easier passage from those places than from others. Trees also which have been newly cut, suffer more than others by the spring frosts, which is owing to their shooting out more vigorously.

Frosts also do more damage on light and sandy grounds, than on the tougher and firmer soils, supposing both equally dry; and this seems partly owing to their being more early in their productions, and partly to their lax texture suffering a greater quantity of vapours to transpire.

It also has been frequently observed, that the side-shoots of trees are more subject to perish by the spring frosts than those from the top; and M. Buffon, who examined into this with great accuracy, always found the effects of the spring frosts much greater near the ground than elsewhere. The shoots within a foot of the ground quickly perished by them; those which stood at two or three feet high, bore them much better; and those at four feet and upwards frequently remained wholly unhurt, while the lower ones were entirely destroyed.

There are a series of observations, which have proved beyond all doubt, that it is not the hard frosts which so much hurt plants, as those frosts, tho' less severe, which happen when they are full of moisture; and this clearly explains the account of all the great damages done by the severe frosts being on the south side of the trees which are affected by them, tho' that side has been plainly all the while less cold than the north. Great damage is also done to the western sides of trees and plantations, when after a rain with a west wind the wind turns about to the north at sun-set, as is frequently the case in spring, or when an east wind blows upon a thick fog before sun-rising.

FUCUS, in botany, a genus of the order of algae, belonging to the cryptogamia class of plants. The most remarkable species are,

1. The ferratus, ferrated fucus, or sea-wrack. This is frequent at all seasons of the year upon the rocks at low-water mark, but produces its seeds in July and August. It consists of a flat, radical, and dichotomous leaf, about two feet long; the branches half an inch wide, ferrated on the edges with dents of unequal size, and at unequal distances, having a flat-stalk or rib divided like the leaf, and running in the middle of it through all its various ramifications. A small species of coralline, called by Linnæus *Sertularia pumila*, frequently creeps along the leaf. All the species of fucus afford a quantity of impure alkaline salt; but this much less than some others, eight ounces of the ashes yielding only three of fixed salt. The Dutch cover their crabs and lobsters with this fucus to keep them alive and moist; and prefer it to any other, as being destitute of those mucous vessels with which some of the rest abound, and which would sooner ferment and become putrid.

2. The vesiculosus, bladder fucus, common sea-wrack, or sea-ware. It grows in great abundance on the sea-rocks about low-water mark; producing its fructifications in July and August. It has the same habit, colour, and substance

Frost, Fucus.

stance as the foregoing; but differs from it in the following respects: The edges of the leaf have no serratures, but are quite entire. In the disc or surface are immersed hollow, spherical, or oval air-bladders, hairy within, growing generally in pairs, but often single in the angles of the branches, which are most probably air-bladders, destined to buoy up the plant in the water. Lastly, on the summits or extreme segments of the leaves, appear tumid vesicles about three quarters of an inch long, sometimes oval and in pairs, sometimes single and bifid, with a clear viscid mucus interspersed with downy hairs.—This species is an excellent manure for land; for which purpose it is often applied in the maritime parts of Scotland and other countries. In the islands of Jura and Skye it frequently serves as a winter-food for cattle, which regularly come down to the shores at the recess of the tides to seek for it. And sometimes even the flags have been observed, after a storm, to descend from the mountains to the sea-shores to feed upon this plant.

Linnaeus informs us, that the inhabitants of Gothland in Sweden boil this fucus in water, and mixing therewith a little coarse meal or flour feed their hogs with it; for which reason they call the plant *svintang*. And in Scania, he says, the poor people cover their cottages with it, and sometimes use it for fuel.

In Jura, and some other of the Hebrides, the inhabitants dry their cheeses without salt, by covering them with the ashes of this plant; which abounds with such quantity of salts, that from five ounces of the ashes may be procured two ounces and a half of fixed alkaline salts, that is, half of their whole weight.

But the most beneficial use to which the fucus vesiculosus is applied, in the way of economy, is in making pot-ash or kelp, a work much practised in the western isles.

There is great difference in the goodness and price of this commodity, and much care and skill required in properly making it. That is esteemed the best which is hardest, finest grained, and free from sand or earth. The price of kelp in Jura is 3*l.* 10*s.* per ton, and about 40 or 50 tons are exported annually from that island. So great a value is set upon this fucus by the inhabitants of that place, that they have sometimes thought it worth their while to roll fragments of rocks and huge stones into the sea, in order to invite the growth of it.

Its virtues in the medical way have been much celebrated by Dr Ruffel, in his Dissertation concerning the use of Sea-water in the Diseases of the Glands. He found the saponaceous liquor or mucus in the vesicles of this plant to be an excellent resolvent, extremely serviceable in dispersing all scorbutic and serophulous swellings of the glands. He recommends the patient to rub the tumour with these vesicles bruised in his hand, till the mucus has thoroughly penetrated the part, and afterwards to wash with sea-water. Or otherwise, to gather two pounds of the tumid vesicles, in the month of July, when they are full of mucus, and infuse them in a quart of sea-water, in a glass-veffel, for the space of 15 days, when the liquor will have acquired nearly the consistence of honey. Then strain it off through a linen cloth, and rub this liquor with the hand, as before, three or four times a-day upon any hard or serophulous swellings, washing, the

parts afterwards with sea-water, and nothing can be more efficacious to disperse them. Even scirrhoties, he says, in women's breasts, have been dispelled by this treatment.

The same author, by calcining the plant in the open air, made a very black salt powder, which he called *vegetable athrops*; a medicine much in use as a resolvent and deobstruent, and recommended also as an excellent dentrifice, to correct the scorbutic laxity of the gums, and take off the foulness of the teeth.

3. The plicatus, matted, or Indian-grass fucus, grows on the sea-shores in many places both of Scotland and England. It is generally about three or four, but sometimes six inches long. Its colour, after being exposed to the sun and air, yellowish, or auburn. Its substance pellucid, tough, and horny, so as to bear a strong resemblance to what the anglers call *Indian grass*, that is, the tendrils issuing from the ovary of the dog-fish.

4. The palmatus, palmated, or sweet fucus, commonly called *dulse*, or *diffe*. This grows plentifully on the sea-coasts of Scotland, and the adjoining islands. Its substance is membranaceous, thin, and pellucid; the colour red, sometimes green with a little mixture of red; its length generally about five or six inches, but varies from three inches to a foot; its manner of growth fan-shaped, or gradually dilated from the base upwards. Its divisions extremely various. The inhabitants both of Scotland and England take pleasure in eating this plant, without expecting any medical virtues from it. The inhabitants of the Archipelago also are fond of this plant, as we learn from Steller. They sometimes eat it raw, but esteem it most when added to ragouts, ogleis, &c. to which it gives a red colour; and, dissolving, renders them thick and gelatinous. In the Isle of Skye it is sometimes used in fevers to promote a sweat, being boiled in water with the addition of a little butter. In this manner it also frequently purges. The dried leaves, infused in water, exhale the scent of violets.

5. The esculentus, eatable fucus, or bladderlocks, commonly called *langle* in Scotland, is likewise a native of the British shores. It is commonly about four feet long, and seven or eight inches wide, but is sometimes found three yards or more in length, and a foot in width. Small specimens are not above a cubit long, and two inches broad. The substance is thin, membranaceous, and pellucid; the colour green or olive. The root consists of tough, cartilaginous fibres. The stalk is about six inches long, and half an inch wide, nearly square, and pinnated in the middle, between the root and origin of the leaf, with ten or a dozen pair of thick, cartilaginous, oval-obtus, foliaceous ligaments, each about two inches long, and crowded together. The leaf is of an oval-lanceolate, or long elliptic form, simple and undivided, waved on the edges, and widely ribbed in the middle from bottom to top, the stalk running through its whole length, and standing out on both sides of the leaf. This fucus is eaten in the north both by men and cattle. Its proper season is in the month of September, when it is in greatest perfection. The membranous part is rejected, and the stalk only is eaten. It is recommended in the disorder called a *piea*, to strengthen the stomach and restore the appetite.

6. The *faccharinus*, sweet fucus, or sea-belt, is very common on the sea-coast. The substance of this is cartilaginous and leathery; and the leaf is quite ribbed. By these characters it is distinguished from the preceding, to which it is nearly allied. It consists only of one simple, linear, elliptic leaf, of a tawny green colour, about five feet long, and three inches wide, in its full-grown state; but varies so exceedingly as to be found from a foot to four yards in length. The ordinary length of the stalk is two inches, but it varies even to a foot. The root is composed of branched fibres, which adhere to the stones like claws. This plant is often infested with the *tertiaria ciliata*.

The inhabitants of Iceland make a kind of pottage of this fucus; boiling it in milk, and eating it with a spoon. They also soak it in fresh water, dry it in the sun, and then lay it up in wooden vessels, where in a short time it is covered with a white efflorescence of sea-salt, which has a sweet taste like sugar. This they eat with butter; but if taken in too great a quantity, the salt is apt to irritate the bowels and bring on a purging. Their cattle feed and get fat upon this plant, both in its recent and dry state; but their flesh acquires a bad flavour. It is sometimes eaten by the common people on the coast of England, being boiled as a pot-herb.

6. The *ciliatus*, ciliated, or ligulated fucus, is found on the shores of Jona and other places, but is not common. The colour of this is red, the substance membranous and pellucid, without rib or nerve; the ordinary height of the whole plant about four or five inches. It is variable in its appearance, according to the different stages of its growth. This fucus is eaten by the Scotch and Irish promiscuously with the *fucus palmatus* or *dilse*.

7. The *prolifer*, or *proliferous fucus*, is found on the shores of the western coast, adhering to shells and stones. The colour is red; the substance membranaceous, but tough, and somewhat cartilaginous, without rib or nerve, though thicker in the middle than at the edges. The whole length of the plant is about four or five inches, the breadth of each leaf about a quarter of an inch. The growth of this fucus, when examined with attention, appears to be extremely singular and wonderful. It takes its origin either from a simple, entire, narrow, elliptic leaf, about an inch and a half long; or from a dilated forked one, of the same length. Near the extremity of the elliptic leaf, or the points of the forked one, (but out of the surface, and not the edge), arises one or more elliptic or forked leaves, which produce other similar ones, in the same manner, near the summits; and so on continually one or more leaves from near the ends of each other, in a *proliferous* and *dichotomous* order, to the top of the plant; which in the manner of its growth resembles in a good measure the *cactus opuntia*, or flat-leaved Indian fig. Sometimes two or three leaves, or more, grow out of the middle of the disc of another leaf; but this is not the common order of their growth. The fructifications are red, spherical, rough warts, less than the smallest pin's head, scattered without order on the surface of the leaves. These warts, when highly magnified, appear to be the curled rudiments of young leaves; which in due time either drop off and form new plants, or continue on and germinate upon

the parent. This plant is very much infested with the *flustra pilosa*, the *madrepore verrucaria*, and other corallines, which make it appear as if covered with white scabs.

8. The *pinnatifidus*, jagged fucus, or pepper-dilse, is frequent on sea-rocks which are covered by the tides, both on the eastern and western coasts. It is of a yellow olive-colour, often tinged with red. The substance is cartilaginous, but yet tender and transparent; the height about two or three inches. This fucus has a hot taste in the mouth, and is therefore called *pepper-dilse* by the people in Scotland, who frequently eat it as a salad in the same manner they do the *fucus palmatus*.

9. The *plocamium*, or *pectinated fucus*, is frequent on the sea-rocks, and in basins of water left by the recess of the tides. Its natural colour is a most beautiful bright red or purple, but is often variegated with white or yellow. Its substance is cartilaginous, but extremely thin, delicate, and transparent. Its height commonly about three or four inches. The stalk is compressed, about half a line in diameter, erect, but waved in its growth, and divided almost from the base into many widely expanded branches. These primary branches are very long, alternate, exactly like the stalk, and subdivided into alternate secondary branches, which are again frequently compounded in like manner, and these divisions decorated with subulated teeth growing in alternate rows, curiously pectinated or finely toothed on the upper side like a comb, the smallest of these teeth scarcely visible to the naked eye. The fructifications are minute spherical capsules, or smooth dark-red globules, scattered without order on the sides of the branches; generally sessile, but some few of them supported on short peduncles. This fucus, on account of its elegant colours and fine divisions, is the species most admired by the ladies who are fond of pictures and mimic landscapes composed of marine vegetables.

10. The *filum*, *thread-fucus*, or *sea-laces*, is found on the sea-rocks, and waving under the water like long strings, frequent on many parts of the coast. The substance of this is opaque and cartilaginous, but not difficult to be broken. The colour, when recent, a dull olive-green; when dry, fuscous, or nearly black; and when exposed for some time on the shores to the sun and air, it becomes yellow, straw-coloured, or white. It consists only of a simple, unbranched, naked, cylindrical stalk, three or four yards long, more or less, from the size of a large fiddle-string to that of a thick whip-cord; smallest at the base and summit; smooth on the outside, full of mucus within; often twisted, and always intercepted by numerous transverse diaphragms, visible when the plant is held between the eye and the light. The fructifications have not yet been discovered; but from the transverse septa in its structure, it is reasonable to suppose this plant to belong rather to the genus of *conferva* than that of *fucus*. The stalks, skinned when half dry and twisted, acquire so considerable a degree of strength and toughness, that we were informed the Highlanders sometimes used them for the same intentions as Indian grass.

11. The *giganteus*, or *gigantic fucus*, is a native of the Straits Le Maire; and grows on rocky ground, which in those countries is distinguished from sand or

gora
adens.

ooze by the enormous length of the sea-weeds that grow upon it. The leaves are four feet long, and some of the stalks, though not thicker than a man's thumb, are 120. Mr Banks and Dr Solander found over some of them which were 84 feet long; and as they made a very acute angle with the bottom, they were thought to be at least one half longer.

FULGORA, in zoology, a genus of insects belonging to the order of hemiptera; the characters of which are, The front, or fore-part of the head, is drawn extended and empty. The antennæ are seated below the eyes, having two articulations, whereof the exterior is larger, and of a globular form. The rostrum is inflected, or bent inwards under the body. The feet are made for walking. There are nine species, the most remarkable of which is the lanternaria. See **LANTERN-FLY**, (*Encycl.*) and Plate CCCXIII.

FUNGI, (*Encycl.*) The piperatus, or pepper-agaric, though the most acrid and suspicious of the whole tribe, is eaten in great quantities by the Russians. They fill large vessels with them in the autumn, season or pickle them with salt, and eat them in the ensuing Lent. But as the free use of these and others of the genus has frequently been attended with fatal consequences, it may not be amiss in this place, once for all, to admonish the reader of the general nature and dangerous qualities of them; which we cannot do better than in the words of the great and ingenious Haller. "All fungi are crude in their nature, of speedy growth and sudden decay. They spring up, arrive at maturity, and perish in a few days, most of them dissolving away in a black corrupted liquor, of a fetid nauseous smell. They are the food of snails, beetles, flies, maggots, and the nidus where they deposit their young.

"The Russians indeed devour almost every species, even those which other nations esteem the most poisonous, such as the agaricus muscarius, piperatus, &c.; but all of them are a doubtful and suspicious food, and the most innocent have proved sometimes prejudicial.

"By analysis it is found, that seven parts of eight in their composition are watery. They yield by fire a yellow spirit like hartshorn, a yellow empyreumatic oil, and a dry, volatile, crystalline salt; so that their nature is evidently alkaline, extremely prone to corruption.

"Their fibres are tough and very difficult to digest, swelling in the stomach like a sponge; so that there are instances of their remaining undigested for three

days before their bad effects have appeared. The maladies they occasion are, a swelling of the abdomen, restlessness, heartburns, vomitings, colics, difficult breathings, hiccoughs, melancholy, diarrhæas accompanied with a tenesmus, and gangrenes. To which dreadful complaints the acrimonious quality of some fungi bring on, besides, inflammations in the mouth, with bloody lotions and bloody stools. Lastly, it is certain that some species have an intoxicating quality, followed often by deliriums, tremblings, watchings, faintings, apoplexies, cold sweats, and death itself. Some have fancied that skilful cookery would deprive them of their bad effects, and that oils would steal their noxious qualities; but these are fatal deceits, not to be trusted.

"To persons suffering from eating any species of fungi, the most approved and speedy remedy is to use emetics and cathartics."

FURIA, in zoology, a genus of insects belonging to the order of vermes zoophyta. There is but one species, viz. the infernalis. This has a linear smooth body ciliated on each side, with reflexed feelers pressed to its body. In Finland, Bothnia, and the northern provinces of Sweden, it was not infrequently that people were seized with a pungent pain, confined to a point, in the hand or other exposed part of the body, which presently increased to a most excruciating degree, and hath sometimes been suddenly fatal. This disorder was more particularly observed in Finland, especially about boggy and marshy places, and always in autumn. At length it was discovered that this pain instantly succeeded somewhat that dropped out of the air, and in a moment penetrated and buried itself in the flesh. The Finlanders had tried variety of applications to no purpose, until at length a poultice of curds or cheese was found the most effectual in easing the pain: and the event confirmed that the insect was allured by this application to leave the flesh; as, on its removal, this worm, no longer than the sixth of an inch, was found in it, and thus the cause of this painful disease explained. But by what means this creature is raised into the air, is as yet unknown.

FUST, (*Encycl.*) Line 5. for 1460, read 1443; and line 67. for "their types were cut in wood and fixed, not moveable as at present;" read "they used separate wooden types, or cut metal types, of which Guttemberg was the inventor." See *History of PRINTING*, (*Encycl.*)

Furia,
Gardens.

G.

GAELIC LANGUAGE. For See **GAELIC** in *Appendix*, read See **HIGHLANDS**.

GARDENS (**HANGING**), in antiquity, gardens raised on arches by Nebuchadnezzar king of Babylon, in order to gratify his wife Amyctis, daughter of Astyages king of Media. Q. Curtius makes them equal in height to the walls of the city, viz. 50 feet. They contained a square of 400 feet on every side, and were carried up into the air in several terrasses laid above one another, and the ascent from terrass to terrass was by stairs 10 feet wide. The arches sustaining the whole pile were raised above one another, and it was

strengthened by a wall, surrounding it on every side, of 22 feet in thickness. The floors of each of the terrasses were laid in the following manner: on the top of the arches were first laid large flat stones 16 feet long and 4 broad, and over them was a layer of reed mixed with a great quantity of bitumen, over which were two rows of bricks closely cemented together by plaster, and over all were laid thick sheets of lead; and lastly, upon the lead was laid the mould of the garden. The mould or earth was of such a depth as to admit the largest trees to take root and grow; and it was covered with various kinds of trees, plants, and flowers.

Gas,
Gaubius.

flowers. In the upper terrais there was an aqueduct or engine, whereby water was drawn up out of the river for watering the whole garden.

GAS, (*Encycl.*) The composition of aerial vapours or gases, is a subject which has drawn the attention of the curious, though little can be known with precision. What can be known with any degree of probability is drawn entirely from the effects of latent heat upon terrestrial bodies. By means of this element almost all substances become for a time aeriform; and if they do not constantly remain so, it is because of their inability to absorb the heat in a permanent manner. From analogy, however, we must be apt to conclude, that those aerial fluids which continue permanently elastic are formed in like manner by the union of a vast quantity of latent heat with some small portion of terrestrial matter, in such a manner that they cannot afterwards be separated, at least so easily as the latent heat of mere aqueous or other vapours is absorbed. This will be in some measure confirmed by the two following considerations. 1. There is no kind of aerial vapour which does not expand by heat to a very great degree. Terrestrial bodies, whose texture is close and compact, expand but little by heat. These, we know, are formed of a great quantity of inactive matter, together with a very fine invisible fluid with which their pores are filled. The expansion probably takes place by means of an agitation in this fluid excited by heat. Air is exceedingly expandible; whence its terrestrial particles are probably few in number, while the quantity of fluid interposed betwixt them is very great. 2. All kinds of air seem to be produced from some terrestrial matter and heat, at least heat in some way or other seems to be concerned in the formation of all that are yet known. In the first process published by Dr Priestley for making dephlogisticated air, a violent heat was employed. Oil of vitriol poured on red-lead was afterwards found to yield dephlogisticated air also: but the red-lead had been previously subjected to a strong heat; and, even in the very act of producing the air, a great degree of heat is spontaneously generated. In the natural processes for producing dephlogisticated air, the *light* of the sun, and consequently his heat, in some degree is necessary for its formation. Besides, all the different airs or gases we know, fixed air, inflammable, nitrous, marine acid, vitriolic acid, fluor acid, vegetable acid, phlogisticated airs, &c. are every one of them produced from terrestrial materials. In these materials we know that an invisible fluid, the same with elementary heat or fire, is continually acting; whence it is exceedingly probable that all of these vapours are nothing else than combinations of the two.

GAUBIUS (Hieronymus David), a celebrated physician of Holland, studied under the illustrious Boerhaave; and became so much the favourite of his professor, that he resigned the chemical chair in his favour. He taught at Leyden with great applause for 40 years. In the year 1775 he laid down his office, as being no longer able to support the fatigues of it. He was succeeded by John David Hahn, then professor at Utrecht. His reputation was extended all over Europe by several valuable publications, particularly by his *Institutiones Pathologiae Medicinalis*, and his *Adversaria*, which have contributed not a little to the improvement both of the theory and practice of medi-

cine. He died at Leyden 29th November 1780, in General Gentoos

the 76th year of his age.
GENERATION OF INSECTS. The world is now generally convinced, that insects are not bred of corruption, but *ex ovo*; though the contrary was believed by the ancients, because of the vast numbers that were sometimes hatched, as it were at once, and because they could not discern the particular manner of their propagation.

Malpighi, Swammerdam, and Redi, have abundantly disproved the doctrine of equivocal generation, as well as the chimerical transformation of the caterpillar into the butterfly, and other the like metamorphoses; and have shown, that all the members of the butterfly were originally inclosed under the skin or nymph of the caterpillar, as the parts of a plant are in the seed.

Insects take particular care to deposit their eggs or seed in such places where they may have a sufficient incubation, and where the young, when hatched, may have the benefit of proper food till they become able to shift for themselves. Those whose food is in the water, lay their eggs in the water; those to whom flesh is a proper food, in flesh; and those to whom the fruits or leaves of vegetables are food, are accordingly deposited, some in this fruit, some in that tree, and some in one plant, and some in another; but constantly the same kind in the same tree or plant. As for others that require a more constant and greater degree of warmth, they are provided by the parent animal with some place in or about the body of other animals; some in the feathers of birds, some in the hair of beasts; some in the scales of fishes, some in the nose, some in the flesh, nay, some in the bowels and inmost recesses of man and other creatures. And as for others, to whom none of those methods are proper, the parents make them nests by perforation in the earth, in woods, in combs, and the like; carrying in and sealing up provisions that serve both for the production of their young, and for their food, when produced. In flies, butterflies, &c. it is observed, there is a kind of gluten, by which the female fastens her eggs to the bearing buds of trees, &c. so that the rains cannot wash them off. These eggs will not be hurt by the greatest frost.

GENTOOS, in modern history, according to the common acceptance of the term, denote the professors of the religion of the bramins or brachmans, who inhabit the country called *Hindustan*, in the East Indies, from the word *stan*, a "region," and *hind* or *hindoo*; which Ferishteh, as we learn from colonel Dow's translation of his history, supposes to have been a son of Ham the son of Noah. It is observed, however, that Hindoo is not the name by which the inhabitants originally styled themselves; but, according to the idiom of the *schanferit* which they use, *jumbodeep*, from *jumboo*, a "jackall," an animal common in their country; and *deep*, a large portion of land surrounded by the sea; or *berttekhunt*, from *khunt*, i. e. a "continent," and *bherrehut*, the name of one of the first Indian rajahs. It is also to be observed, that they have assumed the name of Hindoos only since the era of the Tartar government, to distinguish themselves from their conquerors the Mussulmen. The term *Gentoo* or *Gent*, in the Shanferit dialect, denotes animal in general, and in its more confined sense mankind, and is never

never appropriated particularly to such as follow the doctrines of Brhima. These are divided into four great tribes, each of which has its own separate appellation; but they have no common or collective term that comprehends the whole nation under the idea affixed by the Europeans to the word *Gentoo*. Mr Halhed, in the preface to his translation of the Code of G-ntoo Laws, conjectures, that the Portuguese, on their first arrival in India, hearing the word frequently in the mouths of the natives, as applied to mankind in general, might adopt it for the domestic appellation of the Indians themselves, or perhaps their bigotry might force from the word *Gentoo* a fanciful allusion to Gentile or Pagan. The Hindoos, or Gentoos, vie with the Chinese as to the antiquity of their nation. They reckon the duration of the world by four jogues, or distinct ages: the first is the Suttie jogue, or age of purity, which is said to have lasted about 3,200,000 years; during which the life of man was 100,000 years, and his stature 21 cubits: the second, the Tirtah jogue, or the age in which one-third of mankind were reprobate; which consisted of 2,400,000 years, when men lived to the age of 10,000 years: the third, the Dwapar jogue, in which half of the human race became depraved; which endured to 600,000 years, when mens lives were reduced to 1000 years: and fourthly, the Collee jogue, in which all mankind were corrupted, or rather diminished, which the word *collee* imports. This is the present æra, which they suppose will subsist for 400,000 years, of which near 5000 are already past; and man's life in this period is limited to 100 years. It is supported by many authors, that most of the *Gentoo shasters*, or scriptures, were composed about the beginning of the *collee jogue*: but an objection occurs against this supposition, viz. that the shasters take no notice of the deluge; to which the bramins reply, that all their scriptures were written before the time of Noah, and the deluge never extended to Hindostan. Nevertheless, it appears from the shasters themselves, that they claim a much higher antiquity than this; instances of which are recited by Mr Halhed.

The doctrine of transmigration is one of the distinguishing tenets of the Gentoos. With regard to this subject, it is their opinion, according to Mr Holwell, that those souls which have attained to a certain degree of purity, either by the innocence of their manners or the severity of their mortifications, are removed to regions of happiness proportioned to their respective merits; but that those who cannot so far surmount the prevalence of bad example, and the powerful degeneracy of the times, as to deserve such a promotion, are condemned to undergo continual punishment in the animation of successive animal-forms, until, at the stated period, another renovation of the four jogues shall commence, upon the dissolution of the present. They imagine six different spheres above this earth; the highest of which, called *suttie*, is the residence of Brhima and his particular favourites. This sphere is also the habitation of those men who never uttered a falsehood, and of those women who have voluntarily burned themselves with their husbands; the propriety of which practice is expressly enjoined in the code of the *Gentoo laws*. This code, printed by the East-India Company in 1776, is a very curious collection

of Hindoo jurisprudence, which was selected by the most experienced pundits or lawyers, from curious originals in the Shanferit language, who were employed for this purpose from May 1773 to February 1775; afterwards translated into the Persian idiom, and then into the English language, by Mr Halhed.

The several institutes contained in this collection are interwoven with the religion of the Gentoos, and revered as of the highest authority. The curious reader will discover an astonishing similarity between the institutes of this code and many of the ordinances of the Jewish law; between the character of the bramins or priests, and the Levites; and between the ceremony of the scape-goat under the Mosaic dispensation, and a *Gentoo* ceremony called the *assumed jug*, in which a horse answers the purpose of the goat. Many obsolete customs and usages alluded to in many parts of the Old Testament, may also receive illustration from the institutes of this code. It appears from the code, that the bramins, who are the priests and legislators of the country, have resigned all the secular and executive power into the hands of another cast or tribe; and no bramin has been properly capable of the magistracy since the time of the *suttie jogue*. The only privilege of importance which they have appropriated to themselves, is an exemption from all capital punishment: they may be degraded, branded, imprisoned for life, or sent into perpetual exile; but it is every where expressly ordained, that a bramin shall not be put to death on any account whatsoever.

We have already observed, that the Hindoos are divided into four great and original tribes, which, according to the *Gentoo* theology, proceeded from the four different members of Brhima, the supposed immediate agent of the creation under the spirit of the Almighty. These tribes are the bramins, which proceeded from his mouth, and whose office is to pray, read, and instruct; the Chesterke, which proceed from his arms, whose office is to draw the bow, to fight, and to govern; the Bice, proceeding from the belly or thighs, who are to provide the necessaries of life by agriculture and traffic; and the Sooder, from the feet, which are ordained to labour, serve, and travel.

Few Christians, says the translator of the *Gentoo* code, have expressed themselves with a more becoming reverence of the grand and impartial designs of Providence in all its works, or with a more extensive charity towards all their fellow-creatures of every profession, than the Gentoos. It is indeed an article of faith among the bramins, that God's all-merciful power would not have permitted such a number of different religions, if he had not found a pleasure in beholding their varieties.

GEOFFRÆA, in botany, a genus of the decandria order, belonging to the diadelphia class of plants. There is only one species, viz. the cabbage-bark tree. The wood of this tree is used in building; but it is chiefly valued for its bark, which is administered in different forms, viz. in decoctions, syrup, powder, and extract, as an anthelmintic medicine. From this medicinal property it is also called the *worm-bark tree*. The decoction made by boiling an ounce of the bark in a quart of water, is mostly used in Jamaica; and it seldom fails to perform every thing that can be expected from an anthelmintic medicine, by destroying

Gentoos,
Geoffræa.

Geography worms in the intestines, and bringing them away in great quantities. This bark is externally of a grey colour, and internally black and furrowed; its taste, when fresh, is mucilaginous and sweet; and its smell, which it retains in the decoction, disagreeable. Dr Wright of Jamaica recommends it as a very valuable remedy.

GEOGRAPHY. At n° 33. dele *Plate CXVI.* fig. 2. on the margin; and at the end of the section add, "See Plate XLVIII. fig. 2. and **ASTRONOMY**, p. 802."

GILLICRANKY. See **GILLICRANKY**, (*Encycl.*) **GLOSSOPETRA.** or **GLOTOPETRA**, in natural history, a kind of extraneous fossil, somewhat in form of a serpent's tongue; frequently found in the island of Malta, and divers other parts. See *Plate CCCXVII.*

The vulgar notion is, that they are the tongues of serpents petrified; and hence their name, which is a compound of γλῶσσα, "tongue," and πέτρα, "stone." Hence also their traditional virtue in curing the bites of serpents. The general opinion of naturalists is, that they are the teeth of fishes, left at land by the waters of the deluge, and since petrified.

The several sizes of the teeth of the same species, and those of the several different species of sharks, afford a vast variety of these fossil substances. Their usual colours are black, bluish, whitish, yellowish, or brown; and in shape they usually approach to a triangular figure. Some of them are simple; others are tricuspidate, having a small point on each side of the large one: many of them are quite straight; but they are frequently found crooked, and bent in all directions; many of them are serrated on their edges, and others have them plain; some are undulated on their edges, and slightly serrated on these undulations. They differ also in size as much as in figure; the larger being four or five inches long, and the smaller less than a quarter of an inch.

They are most usually found with us in the strata of blue clay, though sometimes also in other substances, and are frequent in the clay-pits of Richmond and other places. They are very frequent also in Germany, but nowhere so plentiful as in the island of Malta.

The Germans attribute many virtues to these fossil teeth; they call them cordials, sudorifics, and alexipharmics: and the people of Malta, where they are extremely plentiful, hang them about their childrens necks to promote dentition. They may possibly be of as much service this way as an anodyne necklace; and if suspended in such a manner that the child can get them to its mouth, may, by their hardness and smoothness, be of the same use as a piece of coral.

GNAT. (*Encycl.*) Line 1. for *See Musca*, read "*See CULEX* in the APPENDIX."

GORDON (Alexander), an excellent draughtsman, and a good Grecian, who resided many years in Italy, visited most parts of that country, and had also travelled into France, Germany, &c. was secretary to the Society for Encouragement of Learning; and afterwards to the Egyptian Club, composed of gentlemen who had visited Egypt (viz. Lord Sandwich, Dr Shaw, Dr Pococke, &c.) He succeeded Dr Stukely as secretary to the Antiquarian Society, which office he resigned in 1741 to Mr Joseph Ames. He

went to Carolina with governor Glen, where, besides a grant of land, he had several offices, such as register of the province, &c.; and died a justice of the peace, leaving a handsome estate to his family. He published, 1. "Itinerarium Septentrionale, or a Journey through most parts of the Counties of Scotland, in two parts, with 66 copperplates, Lond. 1726," folio. 2. "Additions and Corrections, by way of Supplement, to the Itinerarium Septentrionale; containing several Dissertations on, and Descriptions of, Roman Antiquities, discovered in Scotland since publishing the said Itinerary. Together with Observations on other ancient Monuments found in the North of England, never before published. Lond. 1732," folio. 3. "The Lives of Pope Alexander VI. and his son Cesar Borgia, comprehending the wars in the reign of Charles VIII. and Lewis XII. kings of France; and the chief Transactions and Revolutions in Italy, from the year 1492 to the year 1516." 4. "A complete History of the ancient Amphitheatres, more particularly regarding the Architecture of these Buildings, and in particular that of Verona, by the marquis Scipio Maffei; translated from the Italian, 1730," 8vo. afterwards enlarged in a second edition. 5. "An Essay towards explaining the hieroglyphical figures on the Coffin of the ancient Mummy belonging to Captain William Lethieuller. Lond. 1737," folio, with cuts. 6. "Twenty-five plates of all the Egyptian Mummies, and other Egyptian Antiquities in England," about 1739, folio.

GORDONIA, **LOBLOLLY-BAY**, a genus of the polyandria order, belonging to the monodelphia class of plants. This is a tall and very straight tree, with a regular pyramidal head. Its leaves are shaped like those of the common bay, but serrated. It begins to blossom in May, and continues bringing forth its flowers the greatest part of the summer. The flowers are fixed to foot-stalks, four or five inches long; are monopetalous, divided into five segments, encompassing a tuft of stamina headed with yellow apices; which flowers, in November, are succeeded by a conic capsula having a divided calix. The capsula, when ripe, opens, and divides into five sections, disclosing many small half-winged seeds. This tree retains its leaves all the year, and grows only in wet places, and usually in water. The wood is somewhat soft; yet Mr Catfish mentions his having seen some beautiful tables made of it. It grows in Carolina, but not in any of the more northern colonies.

GORGONIA, in natural history, a name given by some writers to coral, on occasion of its supposed change from a soft substance to an absolute stone, on being brought out of the water into the air: but this is known now to be a fabulous opinion, coral being as hard while growing to the rocks as when it has been ever so long out of the sea.

The gorgoniae are a genus of zoophytes, which formerly were called *ceratophyton*, and are known in English by the names of *sea fans*, *sea feathers*, and *sea-whips*. Dr Linnæus and Dr Pallas consider them as of a mixed nature in their growth, between animals and vegetables; but Mr Ellis has clearly proved that they are true animals of the polype kind, growing up in a branched form resembling a shrub, and in no part vegetable. They differ from the fresh-water polype

Gordon
Gorge

in many of its qualities, and particularly in producing from its own substance a hard and solid support, serving many of the purposes of the bone in other animals. This is formed by a concreting juice thrown out from a peculiar set of longitudinal parallel tubes, running along the internal surface of the fleshy part: in the coats of these tubes are a number of small orifices, through which the osseous liquor exudes, and, concreting, forms the layers of that part of the hard annular circles which some, judging from the consistence rather than the texture, have erroneously denominated wood. The surface of the gorgonia is composed of a kind of scales, so well adapted to each other as to serve for defence from external injuries: and the flesh, or, as some have called it, the *bark* or *cortex*, consists of proper muscles and tendons for extending the openings of their cells, for sending forth from thence their polype suckers in search of food, and for drawing them in suddenly and contracting the sphincter muscles of these fleshy cells, in order to secure these tender parts from danger; and also of proper secretory ducts, to furnish and deposit the osseous matter that forms the stem and branches as well as the base of the bone. Mr Ellis affirms, that there are ovaries in these animals, and thinks it very probable that many of them are viviparous.

GRASS, (*Encycl.*) By grasses are meant all those plants which have a round, jointed, and hollow stem, surrounded at each joint with a single leaf, long, narrow, and pointed, and whose seeds are contained in chaffy husks. It appears by this definition, which is Ray's, that all the kinds of grain, as wheat, oats, barley, &c. are properly grasses; and that the broad, the white, the hop, &c. clovers are not grasses, though so frequently called by that name.

Culmiferous grasses might be divided into two general classes for the purposes of the farmer, that it might be of use for him to attend to; viz. 1st, Those which, like the common annual kinds of corn, run chiefly to seed-stalks; the leaves gradually decaying as these advance towards perfection, and become totally withered or fall off entirely when the seeds are ripe. Rye-grass belongs to this class in the strictest sense. To it likewise may be assigned the vernal-grass, dogs-tail-grass, and fine bent-grass. 2^{dly}, Those whose leaves continue to advance even after the seed-stalks are formed, and retain their verdure and succulence during the whole season, as is the case with the fescue and poa tribe of grasses, whose leaves are as green and succulent when the seeds are ripe and the flower-stalks fading, as at any other time.

“ It is wonderful, Mr Stillingfleet † remarks, to see how long mankind has neglected to make a proper advantage of plants of such importance, and which, in almost every country, are the chief food of cattle. The farmer, for want of distinguishing and selecting grasses for seed, fills his pastures either with weeds or bad or improper grasses; when, by making a right choice, after some trials, he might be sure of the best grass, and in the greatest abundance that his land admits of. At present, if a farmer wants to lay down his land to grass, what does he do? he either takes his seeds indiscriminately from his own foul hay-rick, or sends to his next neighbour for a supply. By this means, besides a certain mixture of all sorts of rubbish,

which must necessarily happen, if he chances to have a large proportion of good seeds, it is not unlikely but that what he intends for dry land may come from moist, where it grew naturally, and the contrary. This is such a slovenly method of proceeding, as one would think could not possibly prevail universally: yet this is the case as to all grasses except the daniel-grass, and what is known in some few counties by the name of the *Suffolk grass*; and this latter instance is owing, I believe, more to the soil than any care of the husbandman. Now, would the farmer be at the pains of separating once in his life half a pint or a pint of the different kinds of grass-seeds, and take care to sow them separately, in a very little time he would have wherewithal to stock his farm properly, according to the nature of each soil, and might at the same time spread these seeds separately over the nation, by supplying the seed-shops. The number of grasses fit for the farmer is, I believe, small, perhaps half a dozen or half a score are all he need to cultivate; and how small the trouble would be of such a task, and how great the benefit, must be obvious to every one at first sight. Would not any one be looked on as wild who should sow wheat, barley, oats, rye, pease, beans, vetches, buck-wheat, turneps, and weeds of all sorts together? yet how is it much less absurd to do what is equivalent in relation to grasses? Does it not import the farmer to have good hay and grass in plenty? and will cattle thrive equally on all sorts of food? We know the contrary. Horses will scarcely eat hay that will do well enough for oxen and cows. Sheep are particularly fond of one sort of grass, and fatten upon it faster than any other, in Sweden, if we may give credit to Linnaeus. And may they not do the same in Britain? How shall we know till we have tried?”

As the generality of farmers know scarce any of the grasses by name, and as without such knowledge little improvement can be made in this branch of husbandry, we have on Plate CCCXIX. given figures of those sorts which have been recommended as the most profitable, viz.

1. *Hordeum murinum*, RYE-GRASS *vulgè*. [*Rye-grass propriè* is the *secale villosum*. Perennial daniel, *lolium perenne* is also, in some counties of England, improperly called *rye-grass*.]

2. *Festuca rubra*, PURPLE FESCUE-GRASS. See AGRICULTURE, n^o 52.

3. *Festuca ovina*, SHEEPS ditto. See AGRICULTURE, n^o 54.

4. *Holcus lanatus*, CREEPING SOFT-GRASS. See AGRICULTURE, n^o 57.

5. *Aspercurus bulbosus*, BULBOUS FOXTAIL-GRASS, is recommended by Mr Anderson †, as promising on † *Essays on* some occasions to afford a valuable pasture-grass. It Agriculture, &c. seems chiefly, he observes, to delight in a moist soil, and therefore promises to be only fit for a meadow pasture-grass. The quality that first recommended it to his notice, was the unusual firmness that its matted roots gave to the surface of the ground, naturally soft and moist, in which it grew; which seemed to promise that it might be of use upon such soils, chiefly in preventing them from being much poached by the feet of cattle which might pasture upon them. Mossy soils especially are so much hurt by poaching, that any thing that promises to be of use in preventing it deserves to be attended to.

6. *Poa pratensis*, GREAT MEADOW-GRASS, seems to approach in many respects to the nature of the purple-fescue; only that its leaves are broader, and not near so long; being only about a foot or 16 inches at their greatest length. Like it, it produces few seed-stalks and many leaves, and is an abiding plant.

7. *Poa compressa*, CREEPING MEADOW-GRASS, according to Mr Anderson, seems to be the most valuable grass of any of this genus. Its leaves are firm and succulent, of a dark Saxon-green colour; and grow so close upon one another, as to form the richest pile of pasture-grass. The flower-stalks, if suffered to grow, appear in sufficient quantities; but the growth of these does not prevent the growth of the leaves, both advancing together during the whole summer; and when the stalks fade, the leaves continue as green as before. Its leaves are much larger and more abundant than the common meadow-grass, *poa trivialis*; and therefore it better deserves to be cultivated.

8. *Anthoxanthum odoratum*, VERNAL GRASS, grows very commonly on dry hills, and likewise on found rich meadow-land. It is one of the earliest grasses we have; and from its being found on such kinds of pastures as sheep are fond of, and from whence excellent mutton comes, it is most likely to be a good grass for sheep-pastures. It gives a grateful odour to hay. It is very easy to gather, as it sheds its seeds upon the least rubbing.

9. *Cynosurus cristatus*, CRESTED DOG'S-TAIL GRASS. Mr Stillingfleet imagines this grass to be proper for parks, from his having known one, where it abounds, that is famous for excellent venison. He recommends it also, from experience, as good for sheep; the best mutton he ever tasted, next to that which comes from hills where the purple and sheeps fescue, the fine bent, and the silver hair grasses abound, having been from sheep fed with it. He adds that it makes a very fine turf upon dry sandy or chalky soils: but unless swept over with the scythe, its flowering-stems will look brown; which is the case of all grasses which are not fed on by variety of animals. For that some animals will eat the flowering-stems is evident by commons, where scarcely any parts of grasses appear but the radical leaves.

10. *Stipa pennata*, COCK'S-TAIL or FEATHER GRASS.

11. *Agrostis capillaris*, FINE BENT, is recommended by Mr Stillingfleet, from his having always found it in great plenty on the best sheep-pastures, in the different counties of England that are remarkable for good mutton.

12. *Areira flexuosa*, MOUNTAIN HAIR.

13. — *caryophylla*, SILVER HAIR.

The same may be said of these two grasses as of the preceding one.

14. *Festuca siliensis*, FLOTE FESCUE. In a piece published in the *Amœnitates Academicæ*, vol. 3. intitled *Plantæ Esculentæ*, we are informed, that "the seeds of this grass are gathered yearly in Poland, and from thence carried into Germany, and sometimes into Sweden, and sold under the name of *manna seeds*. These are much used at the tables of the great, on account of their nourishing quality and agreeable taste. It is wonderful, (adds the author), that amongst us these seeds have hitherto been neglected, since they are so easily collected and cleaned." There is a clammy-

ness on the ear of the flote-fescue, when the seeds are ripe, that tastes like honey; and for this reason perhaps they are called *manna seeds*.

Linnaeus (*Flor. Suec.* art. 95.) says that the bran of this grass will cure horses troubled with botts, if kept from drinking for some hours.

Concerning this grass we have the following information by Mr Stillingfleet. "Mr Dean, a very sensible farmer at Rusbomb, Berkshire, assured me that a field, always lying under water, of about four acres, that was occupied by his father when he was a boy, was covered with a kind of grass, that maintained five farm-horses in good heart from April to the end of harvest, without giving them any other kind of food, and that it yielded more than they could eat. He, at my desire, brought me some of the grass, which proved to be the flote-fescue with a mixture of the marsh-bent; whether this last contributes much towards furnishing so good pasture for horses, I cannot say. They both throw out roots at the joints of the stalks, and therefore likely to grow to a great length. In the index of dubious plants at the end of Ray's Synopsis, there is mention made of a grass under the name of *gramen caninum supinum longissimum*, growing not far from Salisbury, 24 feet long. This must by its length be a grass with a creeping stalk; and that there is a grass in Wiltshire growing in watery meadows, so valuable, that an acre of it lets from 10 to 12 pounds, I have been informed by several persons. These circumstances incline me to think it must be the flote-fescue; but whatever grass it be, it certainly must deserve to be inquired after."

15. *Alopecurus pratensis*, MEADOW FOXTAIL. Linnaeus says that this is a proper grass to sow on grounds that have been drained.—Mr Stillingfleet was informed, that the best hay which comes to London is from the meadows where this grass abounds. It is scarce in many parts of England, particularly Herefordshire, Berkshire, and Norfolk. It might be gathered at almost any time of the year from hay-ricks, as it does not shed its seeds without rubbing, which is the case of but few grasses. It is amongst the most grateful of all grasses to cattle.

16. *Poa annua*, ANNUAL MEADOW GRASS. "This grass (says Mr Stillingfleet) makes the finest of turfs. It grows every where by way sides, and on rich found commons. It is called in some parts the *Suffolk grass*. I have seen whole fields of it in High Suffolk without any mixture of other grasses; and as some of the best salt-butter we have in London comes from that county, it is most likely to be the best grass for the dairy. I have seen a whole park in Suffolk covered with this grass; and whether it affords good venison, I cannot tell, having never tasted of any from it. I should rather think not, and that the best pasture for sheep is also the best for deer. However, this wants trial. I remarked on Malvern-hill something particular in relation to this grass. A walk that was made there for the convenience of the water-drinkers, in less than a year was covered in many places with it, though I could not find one single plant of it besides in any part of the hill. This was no doubt owing to the frequent treading, which above all things makes this grass flourish; and therefore it is evident that rolling must be very serviceable to it.

"It has been objected, that this grass is not free from
bents,

Harmattan *bents*, by which word is meant the flowering-stems. I answer, that this is most certainly true, and that there is no grass without them. But the flowers and stems do not grow so soon brown as those of other grasses; and being much shorter, they do not cover the radical leaves so much; and therefore this grass affords a more agreeable turf without mowing, than any other whatever that I know of."

GROWTH, (*Encycl.*) See also NUTRITION, (*Encycl.*)

Growth
Herb.

GUIDON, in ancient military history, the name of a sort of standard carried by the king's life-guards; so called from its being broad at one extreme, almost pointed at the other, and slit or divided in two.

GUNNERY. P. 4543. marginal note, n° 15. for Plate CXLIV. read Plate CXLII.

H.

HARMATTAN, a very extraordinary kind of wind and fog on the coast of Guinea, of which an account, taken from Dr Lind's works, is given under the article MEDICINE, p. 4657. col. 2. An account remarkably different, however, from that of the Doctor, may be seen in the Philosophical Transactions, vol. lxxi.

HEAT, (*Encycl.*) See also PHLOGISTON, (*Encycl.*)
HEBRIDES. P. 3556. col. 2. line 2. for MULK read MULL.

HEDGE-NETTLE, the *flachys sylvatica*. Horses abominate this plant. Cows, notwithstanding its fetid smell, will eat it; and Gunner says it undoubtedly increases their milk greatly.

HEDGE-SPARROW, a species of MOTACILLA, omitted under that article. Its head is of a deep brown, mixed with ash-colour; the cheeks marked with oblong spots of dirty white: the back and coverts of the wings are dusky, edged with reddish brown; the quill-feathers and tail dusky: the rump brown, tinged with green: the throat and breast are of a dull ash-colour; the belly of a dirty white: the sides, thighs, and vent-feathers are of a pale tawny brown; the legs of a dull flesh-colour.—This bird frequents low hedges, especially those of gardens. It makes its nest in some small bush, and lays four or five eggs of a fine pale-blue colour; during the breeding season it has a remarkable flirt with its wings. The male has a short but very sweet plaintive note, which it begins with the first frosty mornings, and continues till a little time in the spring. This is the *motacilla modularis* of Linnaeus; the bird which he supposes to be our hedge-sparrow, and describes under the title of *motacilla curruca*, differs in colours of plumage as well as eggs.

HEIR-LOOMS, (*Encycl.*) See HEIR-LOOMS, (*Encycl.*)
HELM. For Plate CXLVIII. read CLVIII.

HEMERIOBIUS, (*Encycl.*) This insect takes the name of *hemerobius* from the shortness of its life, which, however, continues several days. In the state of larva it is a great devourer of plant-lice, for which it has had bestowed upon it the appellation of *lion of the plant-lice*. The *hemerobii*, even after their transformation, preserve their carnivorous inclination. Not satisfied with making war upon the plant-lice, who tamely let themselves be devoured, they do not spare each other. The eggs of this insect are borne upon small pedicles, which are nothing but a gum spun out by the *hemerobius* by raising up the hinder-part of its abdomen, and by that means the egg remains fastened to the upper part of the thread. Those eggs are deposited upon leaves, and set in the form of bunches. They have been taken for parasitic plants. The larva, when hatched, finds there its food in the midst of plant-lice. In 15 or 16 days it has attained

to its full growth. With its spinning-wheel at its tail, it makes itself a small, round, white, silky cod, of a clove texture. In summer, at the end of three weeks, the *hemerobius* issues forth with its wings; but when the cod has not been spun till autumn, the *chrysalis* remains in it the whole winter, and does not undergo its final metamorphose till the ensuing spring. The flight of this insect is heavy: some species have an excrementitious smell. One goes by the name of the *water-hemerobius*, because it lives mostly at the water-side.

HEMSKERCK (Egbert), called the *Old*, a celebrated Flemish painter of drolls and conversations, of whom, though so universally known, we have no information as to the time in which he flourished, or the school in which he was taught. Though the taste of his compositions is but low, yet it ought to be considered that he took his subjects from nature; from persons in the meanest occupations, whose dress, actions, and manners, could not furnish the imagination with any ideas of elegance: and to express their passions and undisguised humours, seems to have been the utmost of his ambition. By frequenting fairs, merry-meetings, gaming-houses, and inns, he acquired a surprising power of connecting humorous circumstances; he designed and drew correctly, and his pictures have a strong effect from his accurate management of the chiaro oscuro. Some of his pictures have suffered from unskilful cleaners, and many things are sold as his which dishonour him; but his genuine works, well preserved, have a clearness and force equal to any of the Flemish artists.

HEMSKERCK (Egbert), called the *Young*, was the disciple of Peter Grebber, but imitated the manner of Brouwer and of the elder Hemskerck. He was born at Haerlem in 1645, but settled at London, where for a long time his works were exceedingly esteemed, tho' they are now much sunk in their value. He had a whimsical imagination, and delighted in composing uncommon and fanciful subjects; such as the temptation of St Anthony, nocturnal intercourses of witches and spectres, enchantments, &c. which he executed with a free pencil and a spirited touch. It was customary with him to introduce his own portrait among the conversations he designed; and for that purpose had a small looking-glass placed near his case. He died in 1704.

HERALDRY. P. 3593. col. 2. for 19 *argent*, read 20 *argent*.

HERB-ROBERT. This plant is in great reputation with some farmers on account of its prevailing virtues against staling of blood, and the bloody-flux in cattle; in which cases it is said to be the best among a great variety of means commonly used on these occasions.

HERIOT, in law, a customary tribute of goods and chattels, payable to the lord of the fee on the decease of the owner of the land. See **TENURE**, (*Encycl.*)

Heriot is of two sorts—viz. 1. *Heriot-custum*, where heriots have been paid time out of mind by custom, after the death of a tenant for life. In some places, there is a customary composition in money, as 10 or 20 shillings in lieu of a heriot, by which the lord and tenant are both bound, if it be an indisputable ancient custom; but a new composition of this sort will not bind the representatives of either party. 2. *Heriot-service*, when a tenant holds by such service to pay heriot at the time of his death; which service is expressed in the deed of feoffment.—For this latter the lord shall distrain; and for the other he shall seize, and not distrain. If the lord purchase part of the tenancy, heriot-service is extinguished; but it is not so of heriot-custum.

HERNANDIA, (*Encycl.*) The sonora is a native of Java, and other parts of the East Indies. It affords a sure antidote against poison, if you either put its small roots on the wounds or eat them; as was discovered to Rumphius by a captive woman in the war between the people of Macassar and the Dutch in the year 1667. The soldiers of the former always carry this root about them, as a remedy against wounds with poisonous arrows. The leaves of this tree are thick and smooth. Another tree like this, which likewise grew here, had not such thick and smooth leaves.

HINDOOS. See **GENTOOS** in this APPENDIX.

HIRUNDO. P. 3647. col. 2. dele l. 4.

HOLOTHURIA, in zoology, a genus belonging to the order of vermes mollusca. There are nine species, all inhabitants of the ocean. The physalis, called by the Dutch *bessantjes*, by Dampier *cutters*, and by the English sailors *man-of-war*, has a half-round body, stands directly upwards, has many long and many short tentacula, is slimy, transparent, somewhat bluish, shines in dark nights, is poisonous, and so light that it will scarce sink in Spanish brandy. Beyond the Cape they are small; in the ocean they are larger and very numerous, especially in March.

HOOKE (Nathaniel), author of an esteemed Roman history and other performances.—Of this learned gentleman the earliest particulars to be met with are furnished by himself, in the following modest but mainly address to the Earl of Oxford, dated Oct. 7. 1722: "My Lord, the first time I had the honour to wait upon your Lordship since your coming to London, your lordship had the goodness to ask me, what way of life I was then engaged in; a certain *mauvais honte* hindered me at that time from giving a direct answer. The truth is, my lord, I cannot be said at present to be in any form of life, but rather to live extempore. The late epidemical distemper seized me, I endeavoured to be rich, imagined for a while that I was, and am in some measure happy to find myself at this instant but just worth nothing. If your Lordship, or any of your numerous friends, have need of a servant, with the bare qualifications of being able to read and write, and to be honest, I shall gladly undertake any employments your Lordship shall not think me unworthy of. I have been taught, my lord, that neither a man's natural pride, nor his self-love, is an equal

judge of what is fit for him; and I shall endeavour to remember, that it is not the short part we act, but the manner of our performance, which gains or loses us the applause of him who is finally to decide of all human actions. My lord, I am just now employed in translating from the French, a History of the Life of the late archbishop of Cambray; and I was thinking to beg the honour of your lordship's name to protect a work which will have so much need of it. The original is not yet published. 'Tis written by the author of the "Discourse upon Epic Poetry," in the new edition of *Telemaque*. As there are some passages in the book of a particular nature, I dare not solicit your lordship to grant me the favour I have mentioned, till you first have perused it. The whole is short, and pretty fairly transcribed. If your lordship could find a spare hour to look it over, I would wait upon your lordship with it, as it may possibly be no unpleasing entertainment. I should humbly ask your lordship's pardon for so long an address in a season of so much business. But when should I be able to find a time in which your lordship's goodness is not employed? I am, with perfect respect and duty, my lord, your lordship's most obliged, most faithful, and most obedient humble servant, NATHANIEL HOOKE." The translation here spoken of was afterwards printed in 12mo, 1723. From this period till his death, Mr Hooke enjoyed the confidence and patronage of men not less distinguished by virtue than by titles. In 17... he published a translation of Ramfay's Travels of Cyrus, in 4to; in 1733 he revised a translation of "The History of the Conquest of Mexico by the Spaniards, by Thomas Townsend, Esq;" printed in 2 vols 8vo; and in the same year he published in 4to, the first volume of "The Roman History, from the building of Rome to the ruin of the Commonwealth; illustrated with maps and other plates." In the dedication to this volume, Mr Hooke took the opportunity of "publicly testifying his just esteem for a worthy friend, to whom he had been long and much obliged," by telling Mr Pope, that the displaying of his name at the head of those sheets was "like the hanging out a splendid sign, to catch the traveller's eye, and entice him to make trial of the entertainment the place affords. But," he proceeds, "when I can write under my sign, that Mr Pope has been here, and was content, who will question the goodness of the house?" The volume is introduced by "Remarks on the History of the Seven Roman Kings, occasioned by Sir Isaac Newton's objections to the supposed 244 years duration of the royal state of Rome." His nervous pen was next employed in digesting "An Account of the conduct of the Dowager-duchess of Marlborough, from her first coming to Court to the Year 1710. In a Letter from herself to Lord ——. 1742." 8vo. His reward on this occasion was considerable; and the reputation he acquired by the performance much greater. The circumstances of this transaction are thus related by Dr Maty, in his *Memoirs of Lord Chesterfield*, vol. i. p. 116. "The relict of the great duke of Marlborough, being desirous of submitting to posterity her political conduct, as well as her lord's, applied to the earl of Chesterfield for a proper person to receive her information, and put the memoirs of her life into a proper dress.

Mr. Hooke
qu. Hops.

drefs. Mr Hooke was recommended by him for that purpose. He accordingly waited upon the duchess, while she was still in bed, oppressed by the infirmities of age. But, knowing who he was, she immediately got herself lifted up, and continued speaking during six hours. She delivered to him, without any notes, her account, in the most lively as well as the most connected manner. As she was not tired herself, she would have continued longer the business of this first sitting, had not she perceived that Mr Hooke was quite exhausted, and wanted refreshment as well as rest. So eager was she for the completion of the work, that she insisted upon Mr Hooke's not leaving her house till he had finished it. This was done in a short time; and her Grace was so well pleased with the performance, that she complimented the author with a present of 5000*l.* a sum which far exceeded his expectations. As soon as he was free, and permitted to quit the house of his benefactors, he hastened to the earl, to thank him for his favour, and communicated to him his good fortune. The perturbation of mind he was under, occasioned by the strong sense of his obligation, plainly appeared in his flammering out his acknowledgments: and he, who had succeeded so well as the interpreter of her Grace's sentiments, could scarcely utter his own." The second volume of his "Roman history" appeared in 1745; when Mr Hooke embraced the fair occasion of congratulating his worthy friend the earl of Marchmont, on "that true glory, the consenting praise of the honest and the wise," which his lordship had so early acquired. To the second volume Mr Hooke added "The Capitoline Marbles, or Consular Calendars, an ancient Monument accidentally discovered at Rome in the year 1545, during the Pontificate of Paul III." In 1758 Mr Hooke published "Observations on, I. The Answer of M. l'Abbe de Vertot to the late earl of Stanhope's Inquiry concerning the Senate of ancient Rome: dated December, 1719. II. A Dissertation upon the Constitution of the Roman Senate, by a Gentleman: published in 1743. III. A Treatise on the Roman Senate, by Dr Conyers Middleton: published in 1747. IV. An Essay on the Roman Senate, by Dr Thomas Chapman: published in 1750;" which he with great propriety inscribed to Mr Speaker Onslow. The third volume of Mr Hooke's "Roman History," to the end of the Gallic war, was printed under his inspection before his last illness; but did not appear till after his death, which happened in 1764. The fourth and last volume was published in 1771. Mr Hooke left two sons; of whom one is a divine of the church of England; the other, a doctor of the Sorbonne, and professor of astronomy in that illustrious seminary.

HOPE, in ethics, is the desire of some good, attended with a belief of the possibility, at least, of obtaining it, and enlivened with joy, greater or less, according to the greater or less probability of our possessing the object of our hope. Alexander, preparing for his Asian expedition, distributed his hereditary dominions among his friends; allotting to some villages, to others boroughs, to others cities; and being asked what he had reserved for himself, replied, Hope.

HOPS. See HUMULUS, (*Encycl.*) The cultivation of hops, which is now so very general, is not in

all places equally successful. Very large hop-grounds will for 20 years successively appear with the most promising verdure, yet produce nothing. When the fructification in an early state contracts a mouldiness, it withers and is destroyed. It is then infested by the aphides, who produce on it what is commonly called an *honey-dew*; but the plant must first be in a sickly state before it is infested with these insects. Into this situation it is reduced by the caterpillar of the phalaena humuli or other moth, which feeds on its roots; a circumstance of which the cultivators of this plant are generally ignorant, though some of them have discovered that a sound hop will be infested by planting a sickly one near it, when they transplant the roots from a hop-ground that is thus attacked to one that is perfectly healthy. The hop grows naturally among stones and fragments of rocks, where it is never damaged by the honey-dew. The reason is, that the caterpillar abovementioned, cannot in such a soil penetrate to its roots; and therefore, those who cultivate this plant ought to cover the ground with stones.

HUMMING-BIRD. See TROCHILUS, (*Encycl.*) We have the following pleasing account of this little animal in professor Kalm's Travels into America. The description applies to the *trochilus colubris* †. "Its † See Plate plumage is most beautifully coloured, most of its feathers being green, some grey, and others forming a shining red ring round its neck; the tail glows with fine feathers, changing from green into a brass colour. These birds come here (Pennsylvania) in spring, about the time when it begins to grow very warm, and make their nests in summer; but towards autumn, they retreat again into the more southern countries of America. They subsist barely upon the nectar, or sweet juice of flowers, contained in that part which botanists call the *nectarium*, and which they suck up with their long bills. Of all the flowers, they like those most which have a long tube; and they are observed to flutter chiefly about the *impatiens noli tangere*, and the *monarda* with crimson flowers. An inhabitant of the country is sure to have a number of these beautiful and agreeable little birds before his windows all the summer long, if he takes care to plant a bed with all sorts of fine flowers under them. The flowers of the above-mentioned monarda grow verticillated, that is, at different distances they surround the stalk, as the flowers of our mint (*mentha*), bastard hemp (*galeopsis*), mother-wort (*leonurus*), and dead nettle (*lamium*). It is therefore diverting to see them putting their bills into every flower in the circle. As soon as they have sucked the juice of one flower, they flutter to the next. One that has not seen them would hardly believe in how short a space of time they have had their tongues in all the flowers of a plant, which when large, and with a long tube, the little bird, by putting its head into them, looks as if it crept with half its body into them.

"During their sucking the juice out of the flowers, they never settle on it, but flutter continually like bees, bend their feet backwards, and move their wings so quick, that they are hardly visible. During this fluttering, they make a humming like bees, or like that which is occasioned by the turning of a little wheel. After they have thus, without resting, fluttered for a while, they fly to a neighbouring tree or post, and resume their vigour again. They then re-

turn:

Humming-
Bird.

Humming, turn to their humming and sucking. When several of
Hunter. them were on the same bed, there was always a violent
combat between them, in meeting each other at the
same flower (for envy was likewise predominant a-
mongst these little creatures), and they attacked with
such impetuosity, that it would seem as if the strongest
would pierce its antagonist through and through with
its long bill. During the fight, they seem to stand in
the air, keeping themselves up by the incredibly swift
motion of their wings. When the windows towards
the garden are open, they pursue each other into the
rooms, fight a little, and flutter away again. Some-
times they come to a flower which is withering, and
has no more juice in it; they then, in a fit of anger,
pluck it off and throw it on the ground, that it may
not mislead them for the future. If a garden contains
a great number of these little birds, they are seen to
pluck off the flowers in such quantities, that the ground
is quite covered with them, and it seems as if this pro-
ceeded from a motion of envy.

“Commonly you hear no other sound than their hum-
ming; but when they fly against each other in the air,
they make a chirping noise like a sparrow or chicken.
They are so small, that one would easily mistake them
for great humble-bees or butterflies; and their flight
resembles that of the former, and is incredibly swift.
They have never been observed to feed on insects or
fruit; the nectar of flowers seems therefore to be their
only food. Several people have caught some hum-
ming-birds, on account of their singular beauty, and
have put them into cages, where they died for want
of a proper food. However, Mr Bartram has kept a
couple of them for several weeks together, by feeding
them with water in which sugar had been dissolved;
and I am of opinion, that it would not be difficult to
keep them all winter in a hot-house.

“The humming-bird always builds its nest in the
middle of a branch of a tree; and it is so small, that it
cannot be seen from the ground, but he who intends
to see it must get up to the branch. For this reason
it is looked upon as a great rarity if a nest is accident-
ally found, especially as the trees in summer have so
thick a foliage. The nest is quite round, and con-
sists in the inside of a brownish and quite soft down,
which seems to have been collected from the leaves of
the great mullein or *verbascum thapsus*, which are of-
ten found covered with a soft wool of this colour, and
the plant is plentiful here: other materials, however,
are often used, as flax, hemp, moss, hair, or such like
soft substances. The outside of the nest has a coating of
green moss, such as is common on old pales, or en-
closures, and on trees; the inner diameter of the nest
is hardly a geometrical inch at the top, and its depth
half an inch; they are said to lay two eggs, each of
the size of a pea.”

HUNTER (Dr William), a celebrated anatomist,
was a native of Kilgerie in the county of Lanerk in
Scotland. Being designed by his father for the church,
he was sent, at a proper age, to the college of Glasgow:
But having spent five years in regular academical at-
tendance there, he began to feel strong objections to
theological studies; and happening to become ac-
quainted with Dr Cullen, who was at that time just
established in practice at Hamilton, he was per-

suaded to apply himself to physic. Dr Cullen's
friendship made it easy to obtain his father's consent.
He was taken into the DoRor's house, where he
spent two of the happiest years of his life. In
Scotland (if we except Edinburgh) there is not that
distinction between the branches of physic that prevails
in England. The physicians generally dispense their
own medicines, and likewise practise surgery. Dr
Cullen, though an enthusiastic cultivator of physic and
chemistry, had always a dislike to the chyrurgical part
of his practice. It was therefore agreed between him
and Mr Hunter, that the latter should go first to the
college at Edinburgh, and then to London, in order
to see the practice of the hospitals, and improve him-
self in anatomy and surgery, and that at his return to
Hamilton a partnership should take place between them.
Mr Hunter brought with him to London a letter of
introduction to his countryman Dr James Douglas, at
that time in high reputation as a physician and man-
midwife, and well known by his “Treatise on the
Muscles,” and other works. Dr Douglas advised him
to attend St George's Hospital, and Dr Nichols's lec-
tures, as a perpetual pupil, for the opportunity of
learning all his arts in making anatomical preparations.
At the end of the season, when he was preparing
to set out on his return to Hamilton, Dr Douglas per-
suaded him to change his proposed plan; to assist him
in his anatomical pursuits; to accompany his son, at
that time a student in physic, to Paris and Holland;
and afterwards to settle in London, and to teach ana-
tomy. Mr Hunter communicated this proposal, and
the arguments which Dr Douglas had used, to Dr
Cullen; who, thinking it a fairer prospect, with his
usual generosity readily gave his consent. After the
death of his patron Dr Douglas, Mr Hunter began
to teach anatomy in London. His easy, agreeable
manner of lecturing, the new and clear points of view
in which he placed the different parts of his subject,
added to the number and elegance of his preparations,
drew to him a great number of pupils. He soon be-
came eminent in his profession, and enriched the art
with many important discoveries. In or about 1747, Mr
Hunter was admitted a member of the Surgeon's com-
pany. His anatomical reputation soon procured him an
extensive practice, particularly in midwifery; and when
he came to be established, the university of Glasgow
complimented him with the degree of M. D. In 1756
he was admitted a member of the College of Physicians;
and soon afterwards was elected F. R. S. having made
himself known by an ingenious paper “on the Structure
of Cartilages,” published in the Phil. Trans. so early as
1743. He since, at different times, communicated several
other valuable papers to the society. When the
present queen became pregnant, Dr Hunter was con-
sulted, and at the same time honoured with the ap-
pointment of physician-extraordinary to her majesty.
When the Royal Academy of Arts was founded, he
was nominated professor of anatomy to that institu-
tion; and lately, upon the death of one of the eight
foreign associates of the Academy of Sciences at Paris,
he was elected to supply the vacancy. To consider
him as a teacher, is to view him in his most amiable
character: perspicuity, unaffected modesty, and a de-
sire of being useful, were his peculiar characteristics;
and,

Hunter.

Hunter
||
page.Hunter
||
Ichneumon.

and, of all others, he was most happy in blending the *utile* with the *dulce*, by introducing apocryphal and pleasing stories to illustrate and enliven the more abstruse and jejune parts of anatomy; thus fixing the attention of the volatile and the giddy, and enriching the minds of all with useful knowledge. Employed as Dr Hunter had been, for a long series of years, by persons of the highest rank in this country, and consulted as an anatomist in difficult cases of surgery by all ranks of people and from every part of the kingdom, his gains must have been immense; and he employed them in a manner of all others the most liberal, the improvement of science. Having never married, and being averse to ostentation and luxury, he always conducted his domestic expences on a plan adapted to his profession; and his accumulated fees were expended in erecting and furnishing a museum, which, considered in every point of view, is certainly not to be equalled in Europe. It is unnecessary to say any thing of the anatomical varieties it contains, because it will be easily conceived, that a person of the Doctor's disposition, who had spent near half a century in the pursuit of a favourite object, must have amassed every thing that is curious and valuable on that subject. But the specimens of human and comparative anatomy form only a small part of the Hunterian Museum. The collection of scarce and valuable books is to be equalled only by royal libraries; and his cabinet of medals, particularly Greek and Roman, is far more valuable than the Imperial collection at Vienna. The expence of building his house and museum in Windmill-street, and furnishing the latter, is said to have approached near to 100,000*l*. His Plates of the Gravid Uterus, and his other publications, sufficiently evince his profound knowledge and unwearied industry; and the description of his Greek coins his boundless munificence. It is much to be feared that the other works he had in hand at the time of his death are left too incomplete for the public eye. His museum, the most comprehensive and select of any individual's in Europe, was left for thirty years to his sister's son, Mr Bailey. If during the above-

mentioned period of 30 years Mr Bailey should die, the property of the museum for the remainder of the period devolves to Mr Cruikshank. At the conclusion of the period of 30 years, the entire museum, without any participation or entail whatever, is bequeathed to the university of Glasgow. The sum of 4000*l*. sterling is left, with the interest from time to time growing on it, for the support and augmentation of the collection. His brother, Mr John Hunter, the surgeon, on account of some difference between them; is not named in the will. The executors are, Dr Pitcairn, Mr Coombe apothecary (the Doctor's learned coadjutor in his literary labours), and Dr Fordyce of Essex-street; to each of whom Dr Hunter has left a legacy of 20*l*. a-year, during the period in which they will be executing the purposes of the will. Making a pecuniary estimate of the museum in question, 70,000*l*. is said to be the sum it is worth. Besides that, the Doctor was possessed of above 20,000*l*. in money; the bulk of which is given to Mr Bailey. We are credibly informed, that the Doctor formerly applied to the ministers of this country to allot him a piece of ground, on which he might build a museum, that he would engage to leave endowed for the public service. His request, however, was not complied with; and he then purchased the premises in Great Windmill-street, where he built his museum and spacious habitation. He died 30th April 1783, of the gout in his stomach.

HYDRA, in zoology, a genus of the order of zoophyta, belonging to the class of vermes. There are seven species, known by the general name of polypes. See POLYPE, in this APPENDIX.

HYDROCEPHALUS INTERNUS; (*Encycl.*) See MEDICINE, n° 370. 438. Besides the use of mercury, there recommended as effectual in this disease, formerly so fatal, a surprising instance of the efficacy of the vapour-bath is given in the 8th volume of the Medical Commentaries. The instance, however, is singular, and the medicine ought to be often repeated with success before much confidence is put in it.

I.

Plate
CCCXXII.

JACEA, in botany. See CENTAUREA, (*Encycl.*)

JAGO (Richard), an ingenious poet, was vicar of Snitterfield in Warwickshire, and rector of Kimcote in Leicestershire. He was the intimate friend and correspondent of Mr Shenstone, contemporary with him at Oxford, and, it is believed, his schoolfellow; was of University College; took the degree of M.A. July 9. 1739; was author of several poems in the 4th and 5th volumes of Doddley's Poems; published a sermon, in 1755, on the Causes of Impenitence considered, preached May 4. 1755, at Harbury in Warwickshire, where he was vicar, on occasion of a conversation said to have passed between one of the inhabitants and an apparition in the church-yard there; wrote "Edge-hill," a poem, for which he obtained a large subscription in 1767; and was also author of "Labour and Genius, 1768," 4to; of "The Blackbirds," a beautiful elegy in the Adventurer; and of many other ingenious performances. He died May 28. 1781.

ICHNEUMON, (*Encycl.*) One distinguishing and

striking character of these species of flies is the almost continual agitation of their antennæ. The name of *ichneumon* has been applied to them from the service they do us by destroying caterpillars, plant-lice, and other insects, as the *ichneumon* or mangouste destroys the crocodiles. The variety to be found in the species of *ichneumons* is prodigious: among the smaller species, there are males who perform their amorous preludes in the most passionate and gallant manner. The posterior part of the females is armed with a whimble, visible in some species, nowise discoverable in others; and that instrument, though so fine, is able to penetrate through mortar and plaster: the structure of it is more easily seen in the long-whimble fly. The food of the family to be produced by this fly is the larva of wasps or mason-bees; for it no sooner espies one of those nests, but it fixes on it with its whimble, and bores through the mortar of which it is built. The whimble itself, of an admirable structure, consists of three pieces: two collateral ones, hollowed out into a gutter, serve as a sheath, and contain a compact, solid,

solid, dentated stem, along which runs a groove that conveys the egg from the animal, who supports the whimble with its hinder legs, lest it should break; and by a variety of movements, which it dexterously performs, it bores through the building, and deposits one or more eggs, according to the size of the ichneumon, though the largest drop but one or two. Some agglutinate their eggs upon caterpillars; others penetrate through the caterpillar's eggs, though very hard, and deposit their own on the inside. When the larva is hatched, its head is so situated, that it pierces the caterpillar, and penetrates to its very entrails. These larvæ pump out the nutritious juices of the caterpillar, without attacking the vitals of the creature; who appears healthy, and even sometimes transforms itself to a chrysalis. It is not uncommon to see those caterpillars fixed upon trees, as if they were sitting upon their eggs, and it is afterwards discovered that the larvæ, which were within their bodies, have spun their threads, with which, as with cords, the caterpillars are fastened down, and so perish miserably. The ichneumons performed special service in the years 1731 and 1732; by multiplying in the same proportion as did the caterpillars, their larvæ destroyed more of them than could be effected by human industry. Those larvæ, when on the point of turning into chrysalids, spin a silky cocoon. Nothing is more surprising and singular, than to see those cods leap, when placed on the table or hand. Plant-lice, the larvæ of the curculiones, spiders' eggs, are also sometimes the cradle of the ichneumon-fly. Carcasses of plant-lice, void of motion, are often found on rose-tree leaves: they are the habitation of a small larva, which, after having eaten up the entrails, destroys the springs and inward economy of the plant-louse, performs its metamorphose under shelter of the pellicle which enfolds it, contrives itself a small circular outlet, and sallies forth into open air. There are ichneumons in the woods, who dare attack spiders, run them through with their sting, tear them to pieces, and thus avenge the whole nation of flies of so formidable a foe: others, destitute of wings, (and those are females) deposit their eggs in spiders' nests. The ichneumon of the bedeguar (or sweet-briar sponge), and that of the rose-tree, perhaps only deposit their eggs in those places, because they find other insects on which they feed. The genus of the ichneumon flies, might with propriety be termed a race of diminutive cannibals.

ICHTHYOLOGY, (Encycl.) The most judicious arrangement of this branch of Zoology seems to be that of Mr Pennant, who distributes fish into three divisions; *Cetaceous, Cartilaginous, and Bony.*

Div. I. CETACEOUS Fish; the characters of which are the following: No gills; an orifice on the top of the head, through which they breathe and eject water; a flat or horizontal tail; exemplified in Plate CCCXVIII. (lower compartment), fig. 1. by the Beaked Whale, borrowed from Dale's Hist. Harw. 411. Tab. xiv.—This division comprehends three genera; the Whale, Cachalot, and Dolphin.

Div. II. CARTILAGINOUS Fish; the characters of which are: Breathing through certain apertures, generally placed on each side the neck; but in some instances beneath, in some above, and from one to seven in number on each part, except in the pipe-fish, which

has only one; the muscles supported by cartilages instead of bones. Example, the Picked Dog-fish, fig. 2. **a.** The lateral apertures.—The genera are, the Lamprey, Skate, Shark, Fishing-frog, Surgeon, Sun-fish, Lump-fish, Pipe-fish.

Div. III. BONY Fish, includes those whose muscles are supported by bones or spines, which breathe thro' gills covered or guarded by thin bony plates, open on the side, and dilatable by means of a certain row of bones on their lower part, each separated by a thin web; which bones are called the *radii branchiifleggi*, or the *gill covering rays*. The tails of all the fish that form this division are placed in a situation perpendicular to the body; and this is an invariable character.

The great sections of the Bony Fish into *Apodal, Thoracic, Jugular, and Abdominal*, he copies from Linnaeus: who founds this system on a comparison of the ventral fins to the feet of land-animals or reptiles; and either from the want of them, or their particular situation in respect to the other fins, establishes his sections.—In order to render them perfectly intelligible, it is necessary to refer to those several organs of movement, and some other parts, in a perfect fish, or one taken out of the three last sections. In fig. 4. (the Haddock), *a*, is the pectoral fins; *b*, ventral fins; *c*, anal fins; *d*, caudal fin, or the tail; *e, e, e*, dorsal fins; *f*, bony plates that cover the gills; *g*, branchiostegous rays and their membranes; *h*, lateral or side line.

SECT. 1. APODAL: The most imperfect, wanting the ventral fins; illustrated by the Conger, fig. 3. This also expresses the union of the dorsal and anal fins with the tail, as is found in some few fish.—Genera: The Eel, Wolf-fish, Lance, Morris, Sword-fish.

SECT. 2. JUGULAR: The ventral fins *b*, placed before the pectoral fins *a*, as in the Haddock, fig. 4.—Genera: The Dragonet, Weaver, Codfish, Blenny.

SECT. 3. THORACIC: The ventral fins *a*, placed beneath the pectoral fins *b*, as in the Father Lasher, fig. 5.—Genera: The Goby, Bull-head, Doree, Flounder, Gilt-head, Wraffe, Perch, Stickleback, Mackerel, Surmullet, Gurnard.

SECT. 4. ABDOMINAL: The ventral fins placed behind the pectoral fins, as in the Minnow, fig. 6.—Genera: The Loche, Salmon, Pike, Argentine, Athérine, Mullet, Flying fish, Herring, Carp.

ICHTHYPERIA, (Encycl.) See Plate CCCXVII. **IDEAS, (Encycl.)** The origin of ideas has been a long time disputed among philosophers. The Peripatetics maintain, that external objects emit species which resemble them all around; and that these species, striking on our senses, are by them transmitted to the understanding; and that, being material and sensible, they are rendered intelligible by the active intellect; and are at length received by the passive. Others are of opinion, that our souls have of themselves the power of producing ideas of things we would think upon; and that they are excited to produce them by the impressions which objects make on the body, tho' these impressions are not images in any respect like the objects that occasioned them. And in this, say they, it is, that man is made after the image of God, and that he partakes of his power; for as God made all things out of nothing, and can reduce them to nothing when he pleases, so man can create as many ideas as he pleases, and annihilate them when he has done.

Others

Others maintain, that the mind has no occasion for any thing beside itself to perceive objects; and that, by considering itself, and its own perfections, it is able to discover all things that are without. Others, with Des Cartes, hold, that our ideas were created and born along with us.

Malebranche, and his followers, assert, that God has in himself the ideas of all the beings he has created; that thus he sees all things, in considering his own perfections, to which they correspond; and that, as he is intimately united to our souls, by his presence, our mind sees and perceives things in him which represent created beings; and that it is thus we come by all our ideas. He adds, that though we see all sensible and material things in God, yet that we have not our sensations in him. When we perceive any sensible object, in our perception is included both a sensation and a pure idea. The sensation is a modification of the soul, and it is God who causes it in us: but for the idea joined with the sensation, it is in God; and it is in him that we see it.

The Cartesians distinguish three kinds of ideas. The first, innate; such, they say, is that we have of God, as of a Being infinitely perfect. The second, adventitious; which the mind receives in proportion as bodily objects present themselves to our senses: such is the idea of body, sound, figure, light, &c. The third, according to these philosophers, are fæctitious; which are those which the mind forms, by uniting and assembling the ideas which it already had; and these are called *complex*. But Mr Locke seems to have put this matter out of dispute; having made it appear, that all our ideas are owing to our senses; and that all innate, created, and fæctitious ideas, are mere chimeras.

Our mind, he shows, has not absolutely any ideas besides those presented to it by the senses, and those which it forms by its own operations on those others which the senses furnish; so that a man, destitute of one of his senses, would never have any idea belonging to that sense; and, supposing him destitute of all the senses, he would never have any idea at all: external objects having no other way of producing ideas in him, but by means of sensation, he would have no idea, not even of reflection; because, in wanting all sensation, he wants that which would excite in him the operations of his mind, which are the objects of his reflection.

It is plain, therefore, there is no innate idea; no general truth, or first principle, inherent in the soul, and created with it; no immediate object of the mind, before it had perceived external objects by means of the senses, and reflected on that perception. Those ideas only seem to be innate, because we find we have them as soon as we come to the use of reason; but they are, in effect, what we formed from the ideas wherewith the mind was insensibly filled by the senses. Thus, when the mind is employed about sensible objects, it comes by the ideas of bitter, sweet, yellow, hard, &c. which we call *sensation*; and, when employed about its own operations, perceiving and reflecting on them, as employed about the ideas before got by sensation, we get the ideas of perception, thinking, doubting, willing, &c. which we call *inward sensation*, or *reflection*; and these two, viz. external material

things as the objects of sensation, and the operations of our own minds as the objects of reflection, are the only originals whence all our ideas have their rise. When we have considered these, and their several modes and combinations, we shall find, that they contain our whole stock of ideas, inasmuch that the understanding does not seem to have the least glimmering of any ideas, that it did not receive from one of those sources.

And thus far the mind appears merely passive, as not having it in its power to choose whether it will have these first beginnings, or materials of knowledge, or not. For the objects of sense will obtrude their ideas upon the mind; and the operations of the mind will not let us be without some (however obscure) notion of them.

The origin of our ideas and notions is a perplexed question, and not at all cleared up by the labours of metaphysicians. As to ideas of sense, some philosophers have pretended, that bodies acting or pressing upon our nerves, or putting the animal-spirits in motion, produce sensations; but as the motion communicated to the nerves or spirits has nothing in common either with the thing or body moving, or with the idea excited in the mind, and that we do not conceive the least relation between the motion of the nerves or spirits and the production of an idea; to say that the motion of, or impression upon, the nerves or animal-spirits is the cause of ideas, is explaining nothing at all.

The species emitted by objects, and the formation of ideas by the soul itself, are not more clear. As to innate ideas, it is true indeed, that the arguments of those who maintain them, have been refuted by Mr Locke; but when he goes farther, and denies innate ideas, his arguments have been thought by some not to be conclusive.

Dr Price, in his Inquiry into the Original of our Ideas, has taken occasion to remark, that the system of Mr Locke, which ascribes all our ideas to sensation and reflection, is materially defective; for, if by sensation we understand the effects arising from the impressions made on our minds by external objects, and by reflection the notice which the mind takes of its own operations, it will be impossible to drive some of the most important of our ideas from them. This excellent reasoner observes, that the power within us that understands, the intuition of the mind, or the faculty in it that discerns truth, that views, compares, and judges of all ideas and things, is a spring of new simple ideas, or original, primary, and uncompounded perceptions of the mind. To this source he refers our ideas of the impenetrability and *vis inertia* of matter, substance, duration, space, infinity, necessity, contingency, possibility, impossibility, power, causation, &c. all our abstract ideas, and also our ideas of moral right and wrong, and of moral obligation. It is, he says, of the essence of these ideas to imply something true or false of an object, and that they by no means denote the manner in which we are affected by it; so that they cannot with any propriety be referred to that part of our constitution, which has been distinguished by the appellation of *sense*. Accordingly, our ideas may be divided, first, into those implying nothing real without the mind, or nothing real and true besides its own affections and passions: to which class we may refer the immediate effects of impressions on the bodily

senses,

Ideas.

senses, without supposing any previous ideas; as all tastes, smells, colours, &c.: and those that arise upon occasion only of other ideas; as the effects in us of considering, order, happiness, the beauties of poetry, painting, &c. Secondly, into those which are images of something distinct from sensation, or which imply real, independent of existence and truth; which may be subdivided into such as denote the real properties of external objects, and the actions and passions of the mind; and those which are derived immediately from intelligence. By the notices conveyed to the mind through the organs of the body, or its observation of the necessary attendants and concomitants of certain sensations and impressions, it perceives the figure, extension, motion, and other primary qualities of material substances; by contemplating itself, it perceives the properties of spiritual substances, volition, consciousness, memory, &c. To all these ideas it is essential that they have real, certain, invariable archetypes, actually existing, to which they are referred, and to which they are conformable. These ideas again become objects or archetypes to the intellectual faculty; from whence arises a new set of ideas, which are the perceptions of this faculty, and represent not the mind's own affections, but necessary truth. Antecedently to these, whatever other ideas we may be furnished with, nothing is understood; whatever seeds or subjects of knowledge may be in the mind, nothing is known.

The system of Mr Locke, with regard to the origin of our ideas, has lately been attacked by Dr Reid and others; and it has been charged as the foundation of universal scepticism. Dr Reid objects to every system which supposes that the mind receives images of things from without by means of the senses, because sensations bear no resemblance to bodies, or any of their qualities. With regard to extension, figure, motion, &c. he says, if they are not ideas of sensation, nor like to any sensation, then the ideal system is a rope of sand, and all the laboured arguments of the sceptical philosophy against a material world, and against the existence of every thing but impressions and ideas, proceed upon a false hypothesis. To this objection it has been replied, that ideas are only in a figurative sense the images of external things; that certain impressions are conveyed to the mind by means of the organs of sense, and their corresponding nerves, between which, and the sensations existing in the mind, there is a real and necessary, though at present an unknown connection; and that the same reasoning would lead him to deny that sounds are produced by bodies striking against one another, because he can perceive no proper resemblance between the cause and the effect.

Dr Reid farther objects to the notion generally received among philosophers, that the images of external objects are conveyed by the organs of sense to the brain, and there perceived by the mind. But from this objection it might be inferred, that the whole system of our senses, nerves, and brain, is of no real use whatever; because it is impossible to say how they act upon the mind, or the mind upon them.

It is also objected, that Mr Locke's division of ideas into those of sensation, and those of reflection, is contrary to all the rules of logic; because the second member of the division includes the first. For can we,

Ideas.

says he, form clear and just notions of our sensations any other way than by reflection? Sensation is an operation of the mind, of which we are conscious, and we get the notion of it by reflecting upon that which we are conscious of. In like manner, doubting and believing are operations of the mind, whereof we are conscious, and we get the notion of them by reflecting upon what we are conscious of. The ideas of sensation, therefore, are ideas of reflection, as much as the ideas of doubting or believing, or any other idea whatsoever. But it has been alleged, that the author confounds the ideas of sensation with the idea of sensation itself, which is, without doubt, of the same class with the ideas of doubting, &c. as Mr Locke would have allowed. But the ideas belonging to the class of sensation do not require any scientific knowledge of that power, or any reflection upon it. If this were the case, brute animals, having no proper ideas of reflection, could have no ideas of sensation; and the case would be the same with the bulk of mankind. In another place, Dr Reid acknowledges, that human beings may have ideas of mere sensation some time before they discover any power of reflection, and that this power may discover itself and come into exercise afterwards.

Dr Beattie, Dr Oswald, and others, have pursued and extended the same kind of reasoning against the principles of Mr Locke; and alleged, that Berkeley's reasoning against the existence of a material world, and Hume's reasoning against the existence both of soul and body, are deduced from Locke's Essay, and the Principia of Des Cartes.

In opposition to this system, Dr Reid, and those who have adopted his theory, have recurred to certain instinctive principles; alleging that our perceptions necessarily imply the belief of the present existence of external objects; and that the real, separate, and independent existence of matter, is believed, not because it can be proved by argument, but because the constitution of our nature is such, and we must believe it; and that we cannot, in our own minds, separate the belief of external objects from our sensations. However, it has been urged by an ingenious writer, that Mr Locke's doctrine is not so favourable to Mr Berkeley's theory as Dr Reid's; and that a system which ascribes our primary mental operations to mere constitution and feeling, is more favourable to scepticism than that in the room of which it is substituted. According to Mr Hume's system, all perceptions are either impressions or ideas, and it is not possible for us so much as to conceive any thing specifically different from ideas and impressions; and since all ideas are copied from impressions, we can, therefore, have no idea or conception of any thing of which we have not received an impression. No man can have any idea of power or energy, because he has never received any impression of it; and for the same reason no man can have any idea of self. What we call a mind is nothing but a bundle or collection of different perceptions, which succeed each other with inconceivable rapidity, and are in a perpetual flux and movement. There is properly, says Mr Hume, no simplicity in the mind at one time, nor identity at different times, whatever natural propensity we may have to imagine that simplicity and identity. They are the successive perceptions only that constitute the mind: so that there

there is nothing in the universe but impressions and ideas; all possible perceptions being comprehended in those two classes. Consequently, this philosophy, excluding body and mind, admits of no existence whatsoever, not even of a percipient being to be the subject of these perceptions. To the same purpose Dr Reid observes, that, according to Mr Locke's system, ideas being the only objects of thought, and having no existence but when we are conscious of them, it necessarily follows, that there is no object of our thought which can have a continued and permanent existence. Body and spirit, cause and effect, time and space, to which we were wont to ascribe an existence independent of our thought, are all turned out of existence by this short dilemma. Either these things are ideas of sensation or reflection, or they are not: if they are ideas of sensation or reflection, they can have no existence but when we are conscious of them: if they are not ideas of sensation or reflection, they are words without any meaning. To which we shall only reply, that we have the same reason to believe, that mind exists as that body exists; since it is only by that name that we distinguish the subject of certain powers or properties, of which we are conscious, as perception, memory, will, &c. and we have just the same reason to believe the identity of an idea as that of any external body, or that of our own minds.

Those who wish to be farther acquainted with the controverted relating to the nature and origin of our ideas, must be referred to Hume's Treatise of Human Nature, vol. i. p. 123, &c. 282, &c. 434, &c. Reid's Inquiry into the Human Mind, passim. Beattie's Essay on Truth, part ii. chap. 2. Priestley's Examination of Reid, Beattie, &c. passim.

INEBRIANTS, are defined to be such things as affect the nerves in a particular and agreeable manner, and through them alter and disturb the functions of the mind. They are properly divided into native and artificial; the former chiefly in use among the oriental and other nations, the latter principally throughout Europe.

Natural Inebriants are, 1. Opium; in use all over the east, and of which the Turks, through custom, swallow a drachm. 2. Peganum harmala, Syrian rue. The seeds are sold in Turkey for this purpose; and with these, as Bellonius relates, the Turkish emperor Solymán kept himself intoxicated. 3. Mastic of the Turks, or bangle of the Persians; prepared from the dust of the male-flower of hemp, or from the leaves. 4. Bangle of the Indians, from the leaves of the hibiscus sabdariffa. 5. Seeds of various species of the datura, or thorny apple. 6. Pinang, or betel of the Indians. 7. Roots of black henbane. 8. The hyoscyamus physaloides. 9. Berries of the deadly nightshade. 10. Leaves of millfoil, are used by the Dalekarlians to render their beer intoxicating. 11. Tobacco, and several others less material are mentioned; such as clary, saffron, and dandel.

Artificial Inebriants, are fermented liquors from farinaceous feeds; wines, and spirits drawn by distillation. With these is ranked the nectar of the gods, and the anodyne medicine of Homer, commonly called *nepenthe*; and the spells by which Medea and Circe produced their incantations.

INFORMATION. Line penult, for *made*, read *mode*.

INJECTION, or INJECTING, in surgery, the throwing in some liquor or medicine into a vein opened by incision. This practice, and that of transfusion, or the conveying the arterial blood of one man, or other animal, into another, were once greatly practised, but are now laid aside.

The method of injecting is this: A vein is to be opened in the arm with a lancet as in bleeding, and the small pipe of a syringe being introduced at the orifice, the liquor intended to be mixed with the blood; and contained for that purpose in the body of the syringe, is to be forcibly injected, or thrown into the vein upwards, or toward the heart; which done, the orifice is to be secured with compresses and bandage, as in bleeding.

The bold experiment of injecting medicated liquors into the human veins was first made in the hospital at Dantzick. One of the patients was a lusty robust soldier dangerously infected with the venereal disease, so that he had exostoses on the bones of his arms. While the liquor, (two drachms of a laxative medicine,) was passing into the vein of his arms, he complained of great pain in his elbows, and the valves of the vein swelled so visibly, that it was necessary to stroke them up with a finger towards the patient's shoulders. In four hours after, it began to operate by stool, and continued to do so till next day; so that the patient had in all five stools from it. The disease disappeared without any other remedy.

A married woman of 35 years of age, and a young woman of 20, had both been so grievously afflicted with epileptic fits from their infancy, that little or no hope could be entertained of their cure. Both of them underwent this singular treatment: into their veins were injected a laxative rosin dissolved in an antiepileptical spirit; but what the rosin and spirit were, we are not told. The married woman had several gentle stools some hours after the injection, and also next day; soon after which the disease vanished; the young woman, it is said, *cast herself away* by going into the air, catching cold, and not observing any diet. It was remarked that all the three patients vomited frequently and severely soon after the injection.

Whether this practice of injecting proper medicines into the blood may not be found of use in apoplexies, quinies, hydrophobia, &c. is worthy to be tried by repeated experiments. The method of injecting liquors into the blood of living animals is said to be the invention of Sir Christopher Wren. His method was by making ligatures on the veins, and opening them on the side of the ligature towards the heart; then putting into them small syringes or quills fastened to bladders, in the manner of clyster-pipes, containing the matter to be injected. Mr Boyle soon made the experiment upon dogs with infusions of opium and crocus metallorum; all which he circumstantially described in his *Usefulness of Experimental Philosophy*, part ii. *ess.* 2.

The ingenious Dr Hales made a variety of experiments of this kind on different animals.

Many disorders of particular parts are now curable, unless the parts affected are injected with a proper liquor, by means of a syringe and proper tube. The method of performing this is too obvious to need any directions; but these general cautions are neces-

Injection
||
Kalmia.

Insects
||
Keratophy-
tum.

fary in regard to it, that the syringe or tube be applied tenderly and carefully to the parts, especially in very sensible or nervous parts, to avoid giving the patient any pain; and that the liquor to be injected be neither too hot nor too cold.

In ulcerations and inflammations of the uvula, tonsils, and fauces, injections are generally useful; but care must be taken to press down the tongue with a spatula, or with the flat end of a spoon; and having introduced the syringe two or three fingers breadth into the mouth, the injection is to be carefully and gently thrown in at several times. In gonorrhoeas, injections are often necessary, to allay the heat and soreness of the urethra, and to wash out the matter. The safest and best injections on this occasion are warm milk and barley-water, sweetened with sugar, honey, or syrup of marshmallows; and towards the end a little saccharum saturni, dissolved in plantane-water.

SYMPATHETIC INKS. Line 8. for *invisible*, read *visible*.

INSECTS. (*Encycl.*) See also **GENERATION of Insects**, and **ENTOMOLOGY**, in this APPENDIX.

ISSUE, in law, is the fourth part or stage of an action, (see **SUIT**, **WRIT**, **PROCESS**, and **PLEADINGS**); wherein the parties join, and put their cause to the trial of the jury.

Issues are of two kinds; that upon matter of *fact*,

and that upon matter of *law*. An issue in fact is when the plaintiff and defendant have agreed upon a point to be tried by a jury; an issue in law is when there is a demurrer to a declaration, plea, &c. and a joinder in demurrer, which is an issue at law to be determined by the judges.

Issues in fact are either *general* or *special*.

Issue general, seems to be that whereby it is referred to the jury to bring in their verdict, whether or no the defendant hath done any thing as the plaintiff lays to his charge. For example, if it be an offence against any statute, and the defendant plead not guilty; this being put to the jury, is called the *general issue*. So if a man complains of a private wrong, which the defendant denies, and pleads no wrong, nor disseisin, and this be referred to the jury; it is likewise the general issue.

Issue special, is that, wherein special matters being alleged by the defendant in his defence, both parties join in this point, and so go to a demurrer, if it be *questio facti*; as in assault and battery, where the defendant pleads that the plaintiff struck first.

JUNCI LAPIDÆ, in natural history, the name given by authors to a piece of fossil coral, of the *tubularia* kind, and composed of a congeries of small tubules, which are usually round and striated within. See Plate CCCXVII.

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KALMIA, (*Encycl.*) The two species are the latifolia and the angustifolia. The first, a most beautiful shrub, rises usually to the height of five or six feet, and sometimes twice that height in its native places. The stems of some are as big as the small of a man's leg, though generally they are smaller, and covered with a brown rough bark. The wood is very close grained, heavy, and hard like box. The limbs in general are crooked, and grow irregular; but are thick-clothed with stiff smooth leaves of a shining bright green. The flowers grow in bunches on the tops of the branches, to footstalks of three inches long: they are white, stained with purplish red, consisting of one leaf in form of a cup divided at the verge into five sections: in the middle is a stylus and 12 stamina; which, when the flower first opens, appear lying close to the sides of the cup at equal distances, their apices being lodged in ten little hollow cells, which being prominent on the outside, appear as so many little tubercles. The flowers are succeeded by small round capsulas; which when ripe open in five parts, and discharge its small dust like seeds. This plant is a native of Carolina, Virginia, and other parts of the northern continent of America; yet are not common, but are found only in particular places: they grow on rocks hanging over rivulets and running streams, and on the sides of barren hills. They blossom in May, and continue in flower the greatest part of the summer. The noxious qualities of this elegant plant lessen that esteem which its beauty claims: for although deer feed on its green leaves with impunity, yet when cattle and sheep, by severe winters deprived of better food, feed on the leaves of these plants, a great many of them die annually.

The *kalmia angustifolia*, rises to the height of about 16 feet, producing evergreen leaves in shape like the lauro-cerasus, but small, and of a shining dark green. The flowers grow in clusters, the buds of which appear in autumn wrapped up in a conic scaly perianthium, on which is lodged a viscous matter, which protects them from the severe cold in winter. These buds dilating in the following spring, break forth into twenty or more monopetalous flowers divided into five segments, and set singly on pedicles half an inch long. These flowers, when blown, appear white; but on a near view are of a faint blush colour, which as the flower decays grow paler. One of the five petals is longer and more concave than the rest, and is blended with purple, green, and yellow specks, being a viscous matter on the extremities of very fine hairs. The convex side of the same petal is also speckled with yellowish green. The point rises from the centre of the flower, and has its head adorned with scarlet, and surrounded by 10 stamens, whereof three are long and seven short, whose farina issues out at a small round hole at its top. This elegant tree adorns the western and remote parts of Pennsylvania, always growing in the most sterile soil, or on the rocky declivities of hills and river-banks, in shady moist places.

KERATOPHYTUM, in natural history, a species of **GORGONIA**.—The keratophyta are called the *frutices caralloides*, or sea-shrubs; and generally known among naturalists by the different appellations of *litophyta*, *liothoxyla*, and *keratophyta*; epithets tending to convey an idea of their composition, which at first view, seems to consist partly of a woody or horny, partly of a stony or calcareous, substance, variously disposed with

tc-

tophy' respect to each other. Their general form approaches to that of shrubs, having a root-like base, by which they adhere to some solid support in the ocean; and a stem, or trunk, and branches differently disposed; some rising up in one or more different twigs, subdivided into smaller and separate ramifications; while others have their smaller branches connected in such a manner, as to form a curious net-like structure: from this diversity of figure, they borrow the names of *sea-fans*, *sea-feathers*, &c. The seeming fibres of the base are, in reality, small tubes, of which the whole shrub consists: these tubes run up longitudinally into the trunk, and are also circularly disposed about the centre of the trunk: the woody part, as naturalists have called it, thus formed, affords, when burnt, a strong smell like burning horn; whence some have called it *the horny part*. Upon this part is superinduced a kind of stony or calcareous coat, which covers both trunk and branches to their extremities. In this coat may be discovered regular orders or pores of cells; and viewed by the microscope, it always appears to be an organical body consisting of a regular congeries, like the cells in which animals have been formed or existed. Some of this kind of bodies have lost their calcareous covering by the violence of the waves and other accidents. In some specimens of an advanced growth, the calcareous tubes just mentioned, find out little cells of animals of the polype kind, with proper openings to them all: these cells are diffused along the branches in some regular order, much in the same manner as they are in the corallines. From the cells the animals have been discovered extending themselves, as well to procure food as materials for the increase of this surprising structure: and therefore there is no reason to doubt that they are animal productions.

A small sprig of the keratophyton stelliforme, or warted sea-fan, is represented in Plate CCCXVI. fig. 7. c. The outside is covered with a crust full of little lumps like warts; which, when dissolved in vinegar, discover the contracted bodies of polypes, like claws. C and C1 are two views of one of the warts magnified; C2, is the appearance of the polype when the calcareous matter is dissolved; C3, represents the particles that compose the incrustation, magnified.—D, fig. 8. represents a sea-willow, or keratophyton dichotomum. On both edges of the flat branches are regular rows of little rising cells in the calcareous

part, with small holes for an entrance to each. See CORALLINES.

St KILDA, p. 4033. col. 1. line 8. For *having*, read *hanging*.

KINGSTON upon HULL, a town in the East Riding of Yorkshire, seated on the north side of the river Humber. It is a handsome large place with two parish-churches. It is very well fortified, is one of the principal places in England for trade; a county of itself; sends two members to parliament, and has the title of a duchy. W. Long. 0. 6. N. Lat. 53. 45.

KIRK-SESSIONS, the name of a petty ecclesiastical judicatory in Scotland. Each parish, according to its extent, is divided into several particular districts; every one of which has its own elder and deacon to oversee it. A consistory of the ministers, elders, and deacons of a parish form a kirk-session.

These meet once a week, the minister being their moderator, but without a negative voice. It regulates matters relating to public worship, elections, catechising, visitations, &c. It judges in matters of less scandal; but greater, as adultery, are left to the presbytery; and in all cases an appeal lies from it to the presbytery.

KNOT, is the name of a punishment inflicted in Russia, with a kind of whip called *knot*, and made of a long strap of leather prepared for this purpose. With this whip the executioners dexterously carry off a slip of skin from the neck to the bottom of the back laid bare to the waist, and repeating their blows, in a little while rend away all the skin off the back in parallel strips. In the common knot, the criminal receives the lashes suspended on the back of one of the executioners: but in the great knot, which is generally used on the same occasions as racking on the wheel in France, the criminal is raised into the air by means of a pulley fixed to the gallows, and a cord fastened to the two wrists tied together; a piece of wood is placed between his two legs, also tied together; and another of a crucial form under his breast. Sometimes his hands are tied behind over his back, and when he is pulled up in this position, his shoulders are dislocated. The executioners can make this punishment more or less cruel: and, it is said, are so dexterous, that when a criminal is condemned to die, they can make him expire at pleasure, either by one or several lashes.

L.

LAMPYRIS, the FIRE-FLY, a genus of insects belonging to the coleoptera order; the characters of which are: The antennæ are filiform; the elytra are flexible; the thorax is flat, of a semiobicular form, surrounding and concealing the head. The segments of the abdomen terminate in papillæ, which are turned up towards the elytra, and partly fold one over the other. The females in general are apterous.

There are 18 species; of which the most remarkable is the noctiluca. The male of this insect is less than the female: its head is shaped exactly in the same manner, and covered likewise by the plate of the thorax, only it appears rather longer than that of the female. Both the head and antennæ are black. The thorax of the male, which is smaller and shorter than that of the female,

has the folds and papillæ on its sides much less remarkable: but the greatest difference that is found between the two sexes is, that the male is covered with brown elytra, shagreened and marked with two lines longitudinally. The elytra are longer than the abdomen, and under them lie the wings. The two last rings of the abdomen are not so bright as those of the female, only there appear four luminous points, two upon each of the two last rings.

The insect called *glow-worm*, and which is frequently met with towards evening, in the month of June, in woods and meadows, is the female belonging to this species. By the shining light which it emits, it attracts the male; a wonderful instance of the divine providence. It is apparent that their shining light depends

Kilda
Lampyrus.

Barbut on
Insects.

depends on a liquor placed at the lower extremity of the insect, which when in motion, the light is more lively and shining, and of a finer green. This light the insect withdraws at pleasure, either by unfolding or contracting itself. As a proof that the light depends on a phosphorous matter, you may crush the animal, which, though dead and bruised, leaves a luminous substance on the hand, that only loses its lustre when dried.

The perfect insect flies about during the evening in autumn, and frequents the grassy plantations of juniper trees.

Beauty of LANGUAGE, p. 4095. col. 2. l. 4. from bottom, for *Part II.* read *Part III.*

LARVA, in natural history, a name given by Linnaeus to insects in that state called by other writers *cruca* or *caterpillar*.

LARVÆ, in antiquity, derived from the Hætruscan word *lar* or *larr*, signifying *prince* or *lord*; denoted the ghosts of the deceased, considered as wicked and mischievous. Hence is formed the term *larvatus*, i. e. *larvâ indutus*, or *demoniac*. The ingenious Mr Farmer urges the etymology and use of this term to prove, that the heathen demons were human ghosts.

LEASE, from the French *laiser*, *demiſſer*, “to lett,” in law, a demise, or letting of lands, tenements, or hereditaments, unto another for life, term of years, or at will, for a rent reserved.

A lease is either written, called an *indenture*, *deed-poll*, or *lease* in writing; or by word of mouth, called *lease parole*.

All estates, interests of freehold, or terms for years in lands, &c. not put in writing and signed by the parties, shall have no greater effect than as estates at will; unless it be of leases not exceeding three years from the making; wherein the rent reserved shall be two-thirds of the value of the things demised. Leases exceeding three years must be made in writing; and if the substance of a lease be put in writing, and signed by the parties, though it be not sealed, it shall have the effect of a lease for years, &c.

An *assignment* differs from a lease only in this; that by a lease one grants an interest less than his own, reserving to himself a reversion; in assignments he parts with the whole property, and the assignee stands to all intents and purposes in the place of the assignor.

LEASE, in Scots law. See **TACK**, (*Encycl.*)

LEPAS, the ACORN, in zoology, a genus belonging to the order of vermes testacea. The animal is the triton; and the shell is multivalve, unequal, fixed by a stem or sessile. There are several species, of which the most remarkable is the anatifera, consisting of five shells depressed, affixed to a pedicle and in clusters. It adheres to the bottom of ships by its pedicles. The tentacula from its animal are feathered; and have given the old English historians and naturalists the idea of a bird. They ascribed the origin of the barnacle goose to those shells. See Plate CLIX. fig. 8.

LEUCOMA, in medicine and surgery. See **ALBUGO** in this APPENDIX.

LIBELLULA, (*Encycl.*) See Plate CCCXXII.

LIBERTY, p. 4206. col. 2. line 5. from the bottom, for **PARLIAMENT** read **PRÆROGATIVE**.

LIBERTY, physical, is that principle of spontaneity or self-determination which constitutes us agents;

or which gives us a command over our actions, rendering them properly ours, and not effects of the operation of any foreign cause. See **METAPHYSICS**, (*Encycl.*) n° 78—80. Without this liberty, or being under a necessity of always following some will different from his own, man would be a machine acted upon by mechanical springs, having no principle of motion in himself, or command over events; and therefore incapable of all merit or demerit.

Whether man is endued with this kind of liberty or self-determining power, has been a subject of much controversy: it was agitated at the beginning of this century between Leibnitz, Collins, &c. on one side, and Clarke, Jackson, &c. on the other; and has been lately revived by Dr Priestley.

The principal arguments in favour of liberty, as it is popularly understood, and as it is defined above, are the following. This principle is necessary to constitute man an agent. For, as far as it is true of a being that he acts, so far he must himself be the cause of the action, and therefore not necessarily determined to act: but if he has no absolute power over his own actions, i. e. if he be not a free agent, the actions which he performs cannot properly be said to be his own, but must be ascribed to some other power by which he is led on to perform them; as a good clock or watch performs the motions assigned to it by the artist. This argument is excellently illustrated by Dr Clarke. Man, says he, either has within himself a principle of action; properly speaking, i. e. a self-moving faculty, a principle or power of beginning motion; or he has not. If he has within himself such a principle, then he is a free, and not a necessary agent: for every necessary agent is moved necessarily by something else; and then that which moves it, not the thing itself which is moved, is the true and only cause of the action. That any other thing operating upon an agent should efficiently and necessarily produce self-motion in that agent, is a direct contradiction in terms. If man has not within himself a principle or power of self-motion, then every motion and action of man is chiefly and properly produced by the efficiency of some extrinsic cause; which cause must be either what we usually call the motive or reason upon which a man acts; or else it must be some insensible subtle matter, or some other being or substance making an impression upon him. If the reasons or motives upon which a man acts be the immediate and efficient cause of the action, then either abstract notions, such as all reasons and motives are, have a real subsistence, that is, are themselves substances; or else that which has itself no real subsistence can put a body into motion; either of which is manifestly absurd. If insensible subtle matter, or any other being or substance, continually making impression upon a man, be the immediate and efficient cause of his acting; then the motion of that subtle matter or substance must be caused by some other substance, and the motion of that by some other, till at last we arrive at a free agent; and then liberty is a possible thing, and man possibly may have liberty: and if he may possibly have it, then experience will prove that he probably, nay, that he certainly has it. If we never arrive at any free cause, then there is either *in infinitum* a progression of motions without any mover, of effects with-

without any cause, of things acted without any agent; which is a manifest contradiction, or else motion exists necessarily of itself. If motion exists necessarily of itself, it must be either with a determination every way, or one certain way: if with a determination every way, this is no motion at all; if with a determination one certain way, then that determination is either necessary, and consequently all other determinations impossible, which is contrary to experience; or else there must be a particular reason of that determination, and so backwards in *infinitum*; which comes to the fore-mentioned absurdity, of effects existing without any cause.

Farther, liberty is the dictate of our own consciousness: we have really the same constant and necessary consciousness of liberty that we have that we think, choose, will, or even exist; and, whatever men may say to the contrary, it is impossible for them in earnest to think they have no active self-moving powers, and are not the causes of their own volitions, or not to ascribe to themselves what they must be conscious they think and do. Mr Hume, though he denies the reality of liberty, grants that we have a feeling of it; that the divine plan required that we should be so made, as to seem to ourselves free; that the whole constitution of things is as if we were free; and that being under a necessity of approving and disapproving actions and characters, we are so far under a necessity of believing ourselves and others free. After these concessions, it can hardly be imagined that the constitution of nature should be altogether imposition and deceit.

Besides, if man be not, in the strictest sense of the word, a free agent, he can be no moral agent. It is hard to say what virtue and vice, commendation and blame, mean, if they do not suppose agency, voluntary motion, free choice, and an absolute dominion over our resolutions. Can we applaud or reproach ourselves for what we were no more the causes of than of our own beings, and what it was no more possible for us to prevent than the returns of the seasons, or the revolutions of the planets? On the system of necessity, conscience is an inexcusable principle: its censures or applause are equally futile and groundless: the approbation of mankind is an insult with regard to those on whom it is bestowed, because they can have no merit; and the reproach of men unjust and cruel, because there can be no demerit and ground of blame. Whatever difficulties, therefore, may attend the nature of that influence which we ascribe to motives, they cannot be the efficient necessitating cause of human actions: since, on this supposition, there could be but one agent in the universe; who must equally be the author of all the good and evil in the world, and on whom must ultimately be charged the sin and misery, as well as the virtue and happiness, of his creatures.

Moreover, it has been urged by the advocates of liberty, that if mens determinations and actions flow necessarily from the previous state of their minds and the motives or influences resulting from a nature or condition imposed upon them without their own consent or choice, the idea of responsibility or accountability must vanish, and there can be no propriety or use of rewards or punishments. God cannot reward without virtue, and there can be no virtue without a self-deter-

mining power: he cannot punish without guilt, and there can be no guilt when men do what they cannot avoid doing, and when their actions arise from circumstances in which their Creator placed them.

It is also equally unjust and useless to threaten punishment or inflict it on men, to prevent crimes, when they are necessarily determined in all their actions. And if men are necessary agents, though we cannot well admit this verbal contradiction, it can be of no use to reason with them, to admonish or treat them; and God must be insincere in his addresses and invitations, and cruel in his requirements and commands. But such is the whole tenor of revelation; and therefore the conclusion is necessary, that man is a free agent, capable of good or evil, and of determining his pursuit of either, from the sole power of his own judgment or will. See on this subject Collins's Inquiry concerning Human Liberty, first printed in 1717. Clarke's Remarks, 1717; and Collection of Papers which passed between Mr Leibnitz and Dr Clarke, in 1715 and 1716. Jackson's Vindication and Defence of Human Liberty, 1730. Price's Review of the principal Questions, &c. in Morals, p. 315, &c. edit. 1758. Priestley's Doctrine of Philosophical Necessity, 1777.—For the objections against liberty, and the arguments in support of necessity, see NECESSITY.

LIEUTAUD (Dr Joseph), counsellor of state and first physician at the court of France, was born at Aix in Provence, and resided principally there till he took the degree of doctor of medicine. After this he prosecuted his studies for some years at Montpellier. He returned to Aix, where he soon acquired extensive practice, and became eminent for literary abilities. He resided there till the year 1750, when he was invited to act as physician to the royal infirmary at Versailles. There he practised with such reputation and success, that he soon arrived at the head of his profession; and in the year 1774, upon the death of M. Senac, he was appointed archibier. His extensive engagements in practice did not prevent him from cultivating the science of medicine in all its branches, and from freely communicating to others the result of his own studies. He published many valuable works; among which the following may be accounted the most remarkable, 1. *Elementa Philologie*. 2. *Precis de la Medecine*. 3. *Pratique Precis de la Matiere Medicale*. 4. *Essai Anatomique*. 5. *Synopsis Universae Praxeos Medicinæ*. 6. *Historia Anatomico-Medicæ*. He died at Versailles Dec. 8. 1780. in the 78th year of his age.

LINARIA, TOAD-FLAX, in botany. See ANTIRRHINUM, (*Encecl.*)

LIPOTHYMIA, FAINTING; in medicine. See there, n^o 207, 382, 383.

LITHOSTROTION, in natural history, the name of a species of fossil coral, composed of a great number of long and slender columns, sometimes round, sometimes angular, joined nicely to one another, and of a starry or radiated surface at their tops. These are found in considerable quantities in the northern and western parts of this kingdom, sometimes in single, sometimes in complex specimens. See Plate CCCXVII.

LUNARIA, MOON-WORT, in botany. See OS-MUNDA in this APPENDIX.

LYMINGTON, a town of Hampshire in England situated on a hill near the sea, in W. Long. 1.

Macbride. 45. N. Lat. 50. 45. It sends two members to parliament, and is remarkable for the great quantities of sea-salt made in the neighbourhood. At these salt-works are prepared great quantities of sal catharticus amarus, which being shot into large crystals is sold for true Glauber's salt, under the name of *Ly-mington's salts*.

LYCANTHROPIA, a terrible kind of madness; Lycanthro-
supposed to be that which in Scripture is called pos-
session with a legion of devils. See MEDICINE, Pis,
II
n° 86. Macbride.

LYCOPERSICON, in botany; *love apple, wolf's peach, or tomatoe*. See SOLANUM, (*Encycl.*)

M.

MACBRIDE (Dr David), an eminent physician and philosopher, was descended from an ancient family in the county of Galloway in Scotland. His grandfather, a clergyman, had settled in Ireland about the end of the last century, as minister to a Presbyterian congregation at Belfast; and his father, who followed the same line, was settled at Ballymony in the county of Antrim, where he married, and where our author was born in April 1726. After a proper school-education, and having passed some time under the tuition of an eminent surgeon in his native place, he was sent to the university of Glasgow. Having there completed the usual course of academical studies, he came to Edinburgh for the further prosecution of medical science. After a short stay here, a war then prevailing between France and Britain, he was induced to go on board the navy in the station of a surgeon's mate. In the service of his country he continued for several years; and after discharging for some time the duties of an assistant, he was raised to the rank of surgeon. In this situation, he first turned his thoughts towards the discovery of a remedy for the sea-scurvy. It was not, however, at this period, that either chance or reasoning suggested to him the employment of an article, which has since been attended with the most beneficial consequences. Here he had an opportunity only of observing the symptoms, of studying the nature, and of lamenting the consequences of the disease.

The termination of the war by the peace of Aix-la-Chapelle, put a period to Dr Macbride's employment as a naval surgeon. He had now probably obtained much medical knowledge in the school of experience; but he was sensible that he had still much to acquire in that of science. An ardent keanness to mingle in active life had led him from the schools of medicine at an earlier period than could have been wished; and an earnest desire to found his future practice in the best established principles led him back to them, when a judgment, matured by years, and informed from the observation of facts, rendered him capable of hearing teachers with greater advantage. He returned therefore to Edinburgh, and again entered on the career of academical pursuits, under the tuition of Dr Monro, and those other teachers, whose abilities raised the fame of the medical school at this place. But, not satisfied with the instructions to be had from any one set of professors, the celebrity of the medical teachers in London led him also to visit that capital. There he particularly became the pupil of those distinguished lecturers, Dr Hunter and Dr Smellie. And while from the former he laboured to acquire an accurate surgical knowledge, from the latter he endeavoured to obtain the true principles of midwifery considered as a science. At the same time, he was no less in-

dustrious in improving himself in the successful practice of both arts by attention at hospitals.

Thus prepared for the exercise of his profession, about the end of the year 1749 he fixed his residence in Dublin in the character of surgeon and accoucheur. If amiable manners, and extensive knowledge of his profession, could alone have been sufficient introductions to practice, he might in a short time have looked for a competent share of business in that capital; but while he had to combat that objection which very generally arises from youth, his progress was also not a little retarded by an uncommon degree of modesty. Hence for several years he remained almost in a state of obscurity, and was employed by but few people either of rank or fortune. But, if it is to be regretted that for many years his time was not so fully employed in the lucrative part of his profession as was due to his merit, it ought still to be remembered, that this essentially promoted the cause of science: for by this means his genius and industry were directed to medical researches; and were productive of discoveries which will with honour transmit his name to late posterity. These, though some of them might have been successfully turned to his own emolument, were fully communicated to the world in different publications; and he did not show greater ingenuity in making discoveries, than liberality of sentiment in publishing them for the advantage of others.—His first publication, intitled, "Experimental Essays on medical and philosophical Subjects," made its appearance in the year 1764.—These essays are five in number: 1. On the fermentation of alimentary mixture and the digestion of the food. 2. On the nature and properties of fixed air. 3. On the different kinds of antiseptics. 4. Of the dissolvent power of quicklime. 5. Of the sea-scurvy. The merit of all these is sufficiently known and acknowledged: but the last of them is unquestionably the most important; the method therein proposed of both the prevention and cure of that dreadful disease the scurvy, having been confirmed by repeated and undeniable observation.

Having thus equally distinguished himself as an ingenious philosopher and able practitioner, the world were not now slow in bestowing upon him the tribute of applause to which he was entitled. His name was enrolled with honour in the lists of many learned societies; and the university where his studies had first been commenced, were proud to confer upon him the degree of Doctor of Medicine.

The reputation, however, of being a distinguished author, was to him but a secondary object; and his talents were not confined to the advancement of medicine alone. Having successfully discovered a considerable improvement in the art of tanning, with that spirited generosity which is ever the concomitant of real

Macbride, real worth, he speedily and freely communicated it to the public, by publishing, first, "An account of a new method of tanning;" and afterwards, "Instructions for carrying on the new method of tanning." As a mark of approbation for this liberal conduct, as well as a testimony of respect for his ingenuity, prize-medals were conferred upon him by the Societies of Arts both in London and Dublin. But his last and most extensive publication was more immediately in the line of his own profession: It is intitled, "A Methodical Introduction to the Theory and Practice of Medicine." In that valuable work he has given a concise and connected view of the principles and practice of the healing art, as best established by sound reasoning, and confirmed by accurate observation. Most, if not all these publications, not only went thro' various editions, but were translated into different languages.

After the merit of Dr Macbride came to be properly known, the public seemed to show a desire of making compensation for having so long overlooked it. His employment increased so rapidly, that he had more business than he could transact either with ease or safety. This having kept him in perpetual agitation both of body and mind, at last induced an almost total incapacity of sleeping. From this circumstance his health could not fail to be impaired. In this situation, after accidental exposure to cold, he was attacked with a fever, which put an end to his life on the 13th of December 1778, in the 53d year of his age.

Those who were his most intimate acquaintance were inclined to believe that his death was not a little hastened by domestic calamities. During his residence in Dublin he was twice married, and was as often subjected to that inexpressible distress which must result from a final separation in this world from the most intimate and loving friends. By both of his wives he had several children; but none of them survived their father. And on these calamitous events, although he was able to conceal his feelings from the world, yet they gave a severe shock to his constitution. After his death, several of the playful trinkets of his infants, with the signature of *dulces exuvia*, were found in his repositories among papers on medical and other important subjects: an incontrovertible proof, that in him at least, the great mind of the philosopher was conjoined with the feeling heart of the affectionate father.

But if his abilities were remarkable as a philosopher and physician, if his conduct was exemplary as an husband and parent, his manners were no less amiable as a companion and friend. His polite and benevolent conduct, joined to his taste for the fine arts, conciliated the affections and esteem of all who knew him. His death was universally and sincerely lamented in the city of Dublin.

MADREPORA, in natural history, the name of a genus of submarine substances; the characters of which are, That they are almost of a stony hardness, resembling the corals, and are usually divided into branches, and pervious by many holes or cavities, which are frequently of a stellar figure.

In the Linnean system, this is a genus of lithophyta: The animal that inhabits it is the medusa; it comprehends 39 species. According to Donati, the madrepora is like the coral as to its hardness, which is equal to bone or marble; the colour is white

when polished; its surface is lightly wrinkled, and the wrinkles run lengthwise of the branches; in the centre there is a sort of cylinder, which is often pierced thro' its whole length by two or three holes. From this cylinder are detached about 17 laminae, which run to the circumference in straight lines; and are transversely intersected by other laminae, forming many irregular cavities; the cellules, which are composed of these laminae ranged into a circle, are the habitations of little polypes, which are extremely tender animals, generally transparent, and variegated with beautiful colours. M. de Peyssonel observes, that those writers who only considered the figures of submarine substances, denominated that class of them, which seemed pierced with holes, *pora*; and those, the holes of which were large, they called *madrepore*. He defines them to be all those marine bodies which are of a stony substance, without either bark or crust, and which have but one apparent opening at each extremity, furnished with rays that proceed from the centre to the circumference. He observes that the body of the animal of the madrepora, whose flesh is so soft that it divides upon the gentlest touch, fills the centre; the head is placed in the middle, and surrounded by several feet or claws, which fill the intervals of the partitions observed in this substance, and are at pleasure brought to its head, and are furnished with yellow papillae. He discovered that its head or centre was lifted up occasionally above the surface, and often contracted and dilated itself like the pupil of the eye: he saw all its claws moved, as well as its head or centre. When the animals of the madrepora are destroyed, its extremities become white. In the madrepora, he says, the animal occupies the extremity; and the substance is of a stony but more loose texture than the coral. This is formed, like other substances of the same nature, of a liquor which the animal discharges; and he farther adds, that there are some species of the polype of the madrepora, which are produced singly, and others in clusters.

MALALEUCA, the *CAYPUTI* TREE; a genus of the polyandria order, belonging to the polyadelphia class of plants. There is but one species, viz. the leucodendra, a native of the East Indies and South-Sea islands. Mr Forster relates that they were found in the island of New Caledonia. They were black at the root, but had a bark perfectly white and loose, with long narrow leaves like our willows. The leaves are extremely fragrant and aromatic; and Rumphius tells us, that from them the natives of the Moluccas make the oil called *cayputi*. This oil is commended as a nervous medicine, and as being useful in some cardialgies. The dose is four or five drops in some convenient liquor.

MAGNOLIA, (*Encycl.*) The glauca generally grows in a poor swampy soil, or on wet meadows. The English and Swedes in Pennsylvania and New Jersey call it *beaver-tree*, because the root of this tree is the dainty of beavers, which are caught by its means. It drops its leaves early in autumn, though some of the young trees kept them all the winter. This tree is seldom found to the north of Pennsylvania, where it begins to flower about the end of May. The scent of its blossoms is exquisite: for by it you can discover, within three quarters of an English mile, whether these little trees stand in the neighbourhood, provided

the wind be not against it; for the whole air is filled with this sweet and pleasant odour. It is beyond description agreeable to travel in the woods about that time, especially towards night. They retain their flowers for three weeks, and even longer, according to the quality of the soil on which the trees stand; and during the whole time of their being in blossom, they spread their odoriferous exhalations. The berries likewise look very fine when they are ripe; for they have a rich red colour, and hang in bunches on slender stalks. The cough and other pectoral diseases are cured by putting the berries into rum or brandy, of which a draught every morning may be taken: the virtues of this remedy were universally extolled, and even praised, for their salutary effects in consumptions. The bark being put into brandy, or boiled in any other liquor, is said not only to ease pectoral diseases, but likewise to be of some service against all internal pains and heat; and it was thought that a decoction of it could stop the dysentery. Persons who had caught cold boiled the branches of the beaver-tree in water, and drank it of their great relief. *Kalm.*

MAN-OF-WAR BIRD, (*Pelecanus Aquilus*, Lin.) Its bill is more than a hand's-breadth long, and is narrow: the upper jaw is somewhat the longest, with a hook-shaped point: the cere, which is blue, covers the bill from the eyes to the hook-shaped point: the mandibles have no such serrated incisions (supplying the place of teeth) as are usually found in sea-birds: the head is covered with short feathers as far as the eyes, which are pretty large: the tongue is large, almost trifid at the top; the corner at its bottom is split: the temples are naked: the wings consist of three parts, and are very long; of the 22 quill feathers, the first ten are of a considerable length; the two inner joints contain, besides the coverts, 22 secondary feathers: the outward of the 12 tail-feathers are much longer than the middle ones, which make the tail look like a pair of scissars. The bird is about the size of a goose, and is a yard long: the colour of the whole body, and of the toes, is black; but the head, breast, belly, and fore-part of the neck, are of a fine white. Its food is fishes, which it takes from others, because it is not formed to catch them itself: the English for this reason call it *man of war*.

MARANTA, line 4. for *Galanea*, read *Galanga*.

MARELLA, a town of Andalusia in Spain, situated at the mouth of the Rio Verde, 30 miles north-east of Gibraltar, and 28 south-west of Malaga. W. Long. 5. 25. N. Lat. 30. 25.

MARINE REMAINS, a term used by many authors to express the shells of sea-fishes, and parts of crustaceous and other sea-animals, found in digging at great depths in the earth, or on the tops of high mountains. Their being lodged in these places, is an evident and unquestionable proof of the sea's having once been there, since it must have covered those places where it has left its productions. It has been a favourite system with many, and particularly with the late Dr Woodward, that all these marine bodies were brought to the places where they now lie, by the waters of the universal deluge; which, as we are informed by holy writ, covered the whole surface of the globe, and even the highest mountains. But though this is a very ready expedient to account for many of the natural

phenomena, yet there are evident proofs that it cannot have been the cause of all that is attributed to it; and there must necessarily have been some other cause of many of these remains having been placed where we now find them. Neither does the opinion of some particular authors, that partial inundations of different places have left these marine bodies behind them at the reefs of the waters, seem sufficient to account for the multitudes of these remains, many of which we find thrown upon places inaccessible to such floods.

Signior Moro has attempted to account for these phenomena on a new plan of reasoning. He observes, that it is the best basis of argument to begin from facts; and that if we can certainly find how some part of these animal remains come to be deposited at such great distances from their natural residence, we may very rationally conclude, that by the same means, be they what they will, all the rest were also brought thither. He adds, that the earth, once the bottom of the sea, or the level surface of a plain, may be, and frequently has been, in the memory of man, raised up into a mountain by subterranean fires, earthquakes, and volcanoes. He mentions the famous instance of the new island raised out of the bottom of the sea near Santorini in the year 1707, which became of a circumference not less than six miles, and of the new mountain raised near Puzzoli in 1538.

These, and many other like facts, prove that the origin of mountains and islands may have been such, and that the matter they consist of may have been the same with what was once the bottom of the sea; and that the marine bodies found in these mountains were such as were living, or remaining of living fish at the time when the islands or mountains were so raised above the surface of the water which before covered it.

This is no new opinion; but this author has set it in a new and much stronger light than it ever had appeared in before, by the instances and examples he has brought in proof of it. Some have been fond of believing that the bodies we call *marine remains*, were never indeed any parts of living animals, but that they are mere *lusi naturæ* formed in the places where they are found; but Fabius Columna proved this to be an error, showing that the shark's teeth, or glossopetræ of the island of Malta, when calcined by a strong fire, yielded almost the same with those from animal-bodies, and by no means of the same nature with those produced from calcined stones.

That changes of parts of the bottom of the sea into dry land, have often been made, is proved not only from the late known instances, but from the testimonies of Strabo, Pliny, and other writers of credit; and nothing is more obvious to reason, than that in the sudden rise of such parts of the bottom of the sea, all its contents, all the shells, and other hard parts of fishes lying there, would be carried up with it.

As some mountains and some islands must have certainly been produced in this manner, it is not impossible but that all of them may have been so; and there is no more than this required to account clearly and evidently for all the vast profusion of marine bodies at land as we find them, without having recourse to the improbable means of the universal deluge, which for many plain reasons cannot have been the cause; or to the

the effects of particular inundations, which must have been wholly incapable of lodging many of them there. The lodgment of shells in the solid strata of mountains, is better accounted for by this system of Signior Moro than any other: and if it be asked why some mountains afford them in great plenty, and others not at all, it will not be difficult to answer, by observing, that among the mountains of the more known parts of the world, some consist of mere solid rock, and others of various strata of earthy and other matter; that the first of these may be supposed primary or natural mountains, and the others secondary or accidental ones; and that these marine remains are always wanting in the former, and usually are found in the latter, which is a fact greatly favourable to this system.

There are many difficulties attending the accounts of all authors of the formation of the earth, and the lodging these bodies in it; nor is this last system without difficulty. The causes here assigned as to the origin of mountains and islands, doubtless have been so in regard to some, but scarce to all; and the bodies here treated of are so numerous, in some particular places, that scarce any account can solve the difficulty of their being collected together in so strange a manner.

MARITAGIUM, (*Encycl.*) In the feudal customs, *maritagiū* (as contradistinguished from *matrimonium*) signifies the power which the lord or guardian in chivalry had of disposing of his infant ward in matrimony. For while the infant was in ward, the guardian had the power of tendering him or her a suitable match, without disparagement or inequality: which if the infants refused, they forfeited the value of the marriage, *valorem maritaggi*, to their guardian; that is, so much as a jury would assess, or any one would *bona fide* give to the guardian for such an alliance: and if the infants married themselves without the guardian's consent, they forfeited double the value, *duplicem valorem maritaggi*.

MASCULUS FLOS. See *Flos Masculus* in this APPENDIX.

MASORA, a term in the Jewish theology, signifying a work on the Bible, performed by several learned rabbins, to secure it from any alterations which might otherwise happen.

Their work regards merely the letter of the Hebrew text; in which they have, first, fixed the true reading by vowels and accents: they have, secondly, numbered not only the chapters and sections, but the verses, words, and letters of the text: and they find in the Pentateuch 5245 verses, and in the whole Bible 23206. The masora is called, by the Jews, the *bedge or fence of the law*, because this enumeration of the verses, &c. is a means of preserving it from being corrupted and altered. They have, thirdly, marked whatever irregularities occur in any of the letters of the Hebrew text; such as the different size of the letters, their various positions and inversions, &c. and they have been fruitful in finding out reasons for these irregularities and mysteries in them. They are, fourthly, supposed to be the authors of the *Keri* and *Chetibh*, or the marginal corrections of the text in our Hebrew Bibles.

The text of the sacred books, it is to be observed, was originally written without any breaks or divisions into chapters or verses, or even into words; so that a whole book, in the ancient manner, was but one continued word; of this kind we have still several ancient

manuscripts, both Greek and Latin. In regard, therefore, the sacred writings had undergone an infinite number of alterations, whence various readings had arisen, and the original was become much mangled and disguised, the Jews had recourse to a canon, which they judged infallible, to fix and ascertain the reading of the Hebrew text; and this rule they call *masora*, "tradition," from *מסר*, *tradidit*, as if this critique were nothing but a tradition which they had received from their forefathers. Accordingly they say, that when God gave the law to Moses at mount Sinai, he taught him, first, the true reading of it; and, secondly, its true interpretation; and that both these were handed down by oral tradition, from generation to generation, till at length they were committed to writing. The former of these, viz. the true reading, is the subject of the masora; the latter, or true interpretation, that of the *mishtva* and *gemara*.

According to Elias Levita, they were the Jews of a famous school at Tiberias, about 500 years after Christ, who composed, or at least began, the masora; whence they are called *masorites*, and *masoretic doctors*. Aben Ezra makes them the authors of the points and accents in the Hebrew text, as we now find it; and which serve for vowels.

The age of the masorites has been much disputed. Archbishop Usher places them before Jerom; Capel, at the end of the fifth century; father Morin, in the tenth century. Basnage says, that they were not a society, but a succession of men; and that the masora is the work of many grammarians, who, without associating and communicating their notions, composed this collection of criticisms on the Hebrew text. It is urged that there were masorites from the time of Ezra and the men of the great synagogue, to about the year of Christ 1030; and that Ben Asher and Ben Naphtali, who were the best of the profession, and who, according to Basnage, were the inventors of the masora, flourished at this time. Each of these published a copy of the whole Hebrew text, as correct, says Dr Prideaux, as they could make it. The eastern Jews have followed that of Ben Naphtali, and the western that of Ben Asher; and all that has been done since is to copy after them, without making any more corrections or masoretic criticisms.

The Arabs have done the same thing by their *Koran* that the masorites have done by the Bible; nor do the Jews deny their having borrowed this expedient from the Arabs, who first put it in practice in the seventh century.

There is a great and little masora printed at Venice and at Basil, with the Hebrew text, in a different character. Buxtorf has written a masoretic commentary, which he calls *Tiberias*.

MASQUE, or **MASK**, a cover for the face, contrived with apertures for the eyes and mouth; originally worn chiefly by women of condition, either to preserve their complexion from the weather, or out of modesty, to prevent their being known.

Poppæa, wife of Nero, is said to be the first inventor of the masque; which she did to guard her complexion from the sun and weather, as being the most delicate woman, with regard to her person, that has been known.

Theatrical masques were in common use both among

Masquerade the Greeks and Romans: Suidas and Athæneus ascribe the invention of them to the poet Cherilus, a contemporary of Theopis; Horace attributes them to Æschylus; but Aristotle informs us, that the real inventor, and consequently the time of their first introduction and use, were unknown. Brantome observes, that the common use of modern masques was not introduced till towards the end of the 16th century.

MASQUERADE, or **MASCARADE**, an assembly of persons masked or disguised, meeting to dance and divert themselves. This was much in use with us, and has been long a very common practice abroad, especially in carnival time.

The word comes from the Italian *mascarata*, and that from the Arabic *maskara*, which signifies "rallery, buffoonery." Granacci, who died in 1543, is said to have been the first inventor of masquerades.

MEASURES, (*Encycl.*) It is necessary, for the convenience of commerce, that an uniformity should be observed in weights and measures, and regulated by proper standards. A foot-rule may be used as a standard for measures of length, a bushel for measures of capacity, and a pound for weights. There should be only one authentic standard of each kind, formed of the most durable materials, and kept with all possible care. A sufficient number of copies, exactly corresponding to the principal standard, may be distributed for adjusting the weights and measures that are made for common use. There are several standards of this kind both in England and Scotland. See the article **WEIGHTS and MEASURES**, (*Encycl.*)

If any one of the standards above-mentioned be justly preserved, it will serve as a foundation for the others, by which they may be corrected, if inaccurate, or restored, if entirely lost. For instance, if we have a standard foot, we can easily obtain an inch, and can make a box, which shall contain a cubical inch, and may serve as a standard for measures of capacity. If it be known that a pint contains 100 cubical inches, we may make a vessel five inches square, and four inches deep, which will contain a pint. If the standard be required in any other form, we may fill this vessel with water, and regulate another to contain an equal quantity. Standards for weights may be obtained from the same foundation; for if we know how many inches of water it takes to weigh a pound, we have only to measure that quantity, and the weight which balances it may be assumed as the standard of a pound.

Again, if the standard of a pound be given, the measure of an inch may be obtained from it: for we may weigh a cubical inch of water, and pour it into a regular vessel; and having noticed how far it is filled, we may make another vessel of like capacity, in the form of a cube. The side of this vessel may be assumed as the standard for an inch; and standards for a foot, a pint, or a bushel, may be obtained from it. Water is the most proper substance for regulating standards; for all other bodies differ in weight from others of the same kind; whereas it is found by experience that spring and river water, rain, and melted snow, and all other kinds, have the same weight; and this uniformly holds in all countries when the water is pure, alike warm, and free from salt and minerals.

Thus, any one standard is sufficient for restoring all the rest. It may further be desired to hit on some ex-

pedient, if possible, for restoring the standards, in case that all of them should ever fall into disorder, or should be forgotten, through the length of time, and the vicissitudes of human affairs. This seems difficult, as no words can convey a precise idea of a foot-rule, or a pound weight. Measures, assumed from the dimensions of the human body, as a foot, a handbreadth, or a pace, must nearly be the same in all ages, unless the size of the human race undergo some change; and therefore, if we know how many square feet a Roman acre contained, we may form some judgment of the nature of the law which restricted the property of a Roman citizen to seven acres; and this is sufficient to render history intelligible; but it is too inaccurate to regulate measures for commercial purposes. The same may be said of standards, deduced from the measure of a barley-corn, or the weight of a grain of wheat. If the distance of two mountains be accurately measured and recorded, the nature of the measure used will be preferred in a more permanent manner than by any standard; for if ever that measure fall into disuse, and another be substituted in its place, the distance may be measured again, and the proportion of the standards may be ascertained by comparing the new and ancient distances.

But the most accurate and unchangeable manner of establishing standards is, by comparing them with the length of pendulums. The longer a pendulum is, it vibrates the slower; and it must have one precise length in order to vibrate in a second. The slightest difference in length will occasion a difference in the time; which will become abundantly sensible after a number of vibrations, and will be easily observed if the pendulum be applied to regulate the motion of a clock. The length of a pendulum which vibrates seconds in London is about 39½ inches, is constantly the same at the same place; but it varies a little with the latitude of the place, being shorter as the latitude is less. Therefore, though all standards of weights and measures were lost, the length of a second pendulum might be found by repeated trials; and if the pendulum be properly divided, the just measure of an inch will be obtained; and from this all other standards may be restored.

1. *Measures of length.* *Lineal* measure is regulated by the yard. The use of this measure was established by Henry I. of England, and the standard taken from the length of his own arm. It is divided into 36 inches, and each inch is supposed equal to 3 barley-corns. When used for measuring cloth, it is divided into 4 quarters, and each quarter subdivided into 4 nails. The English ell is equal to a yard and a quarter, or 45 inches, and is used in measuring linens imported from Germany and the Low-Countries.

The Scots *elwand* was established by king David I. and divided into 37 inches. The standard is kept in the council chamber of Edinburgh, and being compared with the English yard, is found to measure 37½ inches; and therefore the Scots inch and foot are larger than the English, in the proportion of 180 to 185; but this difference being so inconsiderable, is seldom attended to in practice. The Scots ell, though forbidden by law, is still used for measuring some coarse commodities, and is the foundation of the land-measure of Scotland.

A hand in horfemanfhip is 4 inches.
 A fpan 9 inches.
 A geometrical pace 5 feet.
 A fathom, chiefly ufed in meafuring depth, 6 feet.

Itinerary meafure is regulated by Table IX. (fee ARITHMETIC, p. 655.) both in England and Scotland. The length of the chain is 4 poles, or 22 yards; 80 chains make a mile. The old Scots computed miles were generally about a mile and a half each.

The reel for yarn is $2\frac{1}{2}$ yards, or 10 quarters, in circuit; 120 threads make a cut, 12 cuts make a half or hank, and 4 hanks make a fpindle.

2. *Land meafure.* This, in England, is regulated by Tab. VII. (fee ARITHMETIC, p. 655.) Because the length of a pole is 5 yards and a half, the fquare of the fame contains $30\frac{1}{4}$ fquare yards. A fquare mile contains 640 fquare acres. In meafuring fens and woodlands, 18 feet are generally allowed to the pole, and 21 feet in foreft-lands.

A hide of land, frequently mentioned in the earlier part of the Englifh hiftory, contained about 100 arable acres; and 5 hides were efteemed a knight's fee. At the time of the Norman conqueft, there were 243,600 hides in England.

Scots land-meafure is founded on the Scots ell, and regulated by Tab. VIII. (See ARITHMETIC, p. 655.) The proportion between the Scots and Englifh acre, fuppoing the feet in both meafures alike, is as 1369 to 1089, or nearly as 5 to 4. If the difference of the feet be regarded, the proportion is as 10,000 to 7869. The length of the chain for meafuring land in Scotland is 24 ells, or 74 feet.

A husband-land contains 6 acres of fock and fcythe land, that is, of land that may be tilled with a plough or mown with a fcythe: 13 acres of arable land make one ox-gang, and 4 ox-gangs make a pound-land of old extent.

3. *Liquid meafure.* The Englifh gallon was originally founded on the Troy weight. It was appointed that 8 lb. Troy of wheat, gathered from the middle of the ear, and well dried, fhould make a gallon. When averdupois weight came into ufe, another gallon was formed from it in the fame manner; which therefore is greater than the former, in the fame proportion that the lb. averdupois exceeds the lb. Troy.

The wine-gallon is now appointed to contain 231 inches; and a cylindrical vefiel, 7 inches diameter and 6 inches deep, which answers almoft exactly to that capacity, is alfo appointed to be a legal wine-gallon. This meafure is ufed for wine, fpirits, vinegar, oil, cyder, perry, and honey.

The ale-gallon is appointed to contain 282 inches; and is ufed in felling malt-liquors of all kinds, and in collecting the revenue of excife.

Table of Wine Meafure.

2 pints=1 quart
2 quarts=1 pottle
3 pottles=1 gallon
10 gallons=1 anker
18 gallons=1 runlet
$3\frac{1}{4}$ gallons=1 barrel
42 gallons=1 tierce
2 bar. or =1 hogfhead
63 gallons=1 butt

Table of Ale Meafure.

2 pints=1 quart
2 quarts=1 pottle
2 pottles=1 gallon
8 gallons=1 firkin ale
9 gallons=1 firkin beer
2 firkins=1 kilderkin
4 firkins=1 barrel
2 barrels=1 hd.
2 hds.=1 butt

84 gallons=1 puncheon 2 butts=1 ton
 2 hds.=1 pipe or butt
 2 butts=1 ton

The barrel for ale in London is 32 gallons, and the barrel for beer 36 gallons. In all other places of England, the barrel, both for ale and beer, is 36 gallons.

For the Scots meafures, fee PINT, (*Encycl.*)

4. *Dry meafures.* The ftandard for meafuring corn, falt, coals, and other dry goods, in England, is the Winchefter gallon, which contains $272\frac{1}{2}$ cubic inches. The bufhel contains 8 gallons, or 2178 inches. A cylindrical vefiel, $18\frac{1}{2}$ inches diameter, and 8 inches deep, is appointed to be ufed as a bufhel in levying the malt-tax. A vefiel of thefe dimensions is rather lefs than the Winchefter bufhel of 8 gallons, for it contains only 2150 inches; though probably there was no difference intended.

The denominations of dry meafure commonly ufed, are given in Tab. V. (fee ARITHMETIC, p. 655.) Four quarters corn make a chaldron, 5 quarters make a wey or load, and 10 quarters make a ton. In meafuring fea-coal, 5 pecks make a bufhel, 9 bufhels make a quarter or vatt, 4 quarters make a chaldron, and 21 chaldrons make a fcore.

There was formerly only one meafure of capacity in Scotland; and fome commodities were heaped, others *ftreaked*, or meafured exactly to the capacity of the ftandard. The method of heaping was afterwards forbidden, as unequal, and a larger meafure appointed for fuch commodities as that cuftom had been extended to.

The wheat-firlot, ufed alfo for rye, peafe, beans, falt, and grafs-feeds, contains 21 pints 1 mutchkin, meafured by the Stirling jug. The barley-firlot, ufed alfo for oats, fruit, and potatoes, contains 31 pints. A different method of regulating the firlot was appointed, from the dimensions of a cylindrical vefiel. The diameter for both meafures was fixed at $19\frac{1}{2}$ inches, the depth $7\frac{1}{2}$ inches for the wheat-firlot, and $10\frac{1}{2}$ for the barley-firlot. A ftandard contructed by thefe meafures is rather lefs than when regulated by the pint; and as it is difficult to make vefiels exactly cylindrical, the regulation by the pint has prevailed, and the other method gone into difufe.

If the Stirling jug contain $103\frac{1}{2}$ inches, the wheat-firlot will contain 2109 inches; which is more than 2 per cent. larger than the legal malt-bufhel of England, and about 1 per cent. larger than the Winchefter bufhel: and the barley-firlot will contain 3208 inches. The barley-boll is nearly equal to fix legal malt bufhels.

In Stirlingfhire, 17 pecks are reckoned to the boll: in Invernefshire, 18 pecks: in Ayrfhire, the boll is the fame as the Englifh quarter. And the firlots, in many places, are larger than the Linlithgow ftandard.

40 feet hewn timber make a load.
 50 feet unhewn timber make a load.
 32 gallons make a herring barrel.
 42 gallons make a falmon barrel.
 1 cwt. gun-powder makes a barrel.
 256 lb. foap make a barrel.
 10 dozen candles make a barrel.
 12 barrels make a laft.

Medicine MEDICINE, n^o 494. See further the article SEP-
PENT, in this APPENDIX.

Mine. MEDINE, an Egyptian piece of money, of iron
silvered over, and about the size of a silver threepence.

MERCURY. Line 2. for 214, read 414.

MERCURIFICATION, in metallurgic chemi-
stry, the obtaining the mercury from metallic minerals
in its fluid form. For the effecting this, those who
have been engaged in these researches have proposed
three methods. The first is by means of a certain
mercury, so prepared as to have a dissolving power,
by which it could take up the mercuries of metals in
the same manner as water dissolves salt from ashes.
The second is by means of certain regenerating salts,
such as sal ammoniac, which are to detain the more
earthy parts of metals, and leave their mercuries se-
parate or separable from them by sublimation or other-
wise; and the third method is by means of a large lens
or burning-glass, in the focus whereof, if any metal be
applied, its mercurial part is said to separate and go off
in fume, which when collected and condensed, appears
to be running mercury.

The first of these methods would be very easy if the
proper mercury were to be readily produced; the se-
cond is extremely laborious, and requires much pa-
tience and reiteration. But the third seems easy e-
nough, and practicable to advantage, when a glass of
three or four feet in diameter is at hand, the sky serene,
and the sun shines strong.

For other processes, the reader may consult Junker's
Conspectus Chemicæ. But these mercurified metals, or
their mercurial principle rendered sensible, are a kind
of philosophical mercury, which, although they re-
semble ordinary mercury, are nevertheless said by per-
sons exercised in such studies, to differ from it consi-
derably, by having a greater specific gravity, by more
effectually penetrating and dissolving metals, by a
stronger adhesion to these, and by a less volatility.

MILLEPORA, in natural history, a name by
which Linnæus distinguishes that genus of lithophytes,
of a hard structure and full of holes, which are not
stellate or radiated, and whose animal is the hydra, in
which it differs from the madrepora, and comprehend-
ing 14 different species.

In the millepora, the animal which forms and inha-
bits it occupies the substance; and it is observed that
the milleporæ grow upon one another: their little ani-
mals produce their spawn; which attaching itself ei-
ther to the extremity of the body already formed, or
underneath it, gives a different form to this produc-
tion. Hence the various shapes of the millepora,
which is composed of an infinite number of the cells of
those little insects, which all together exhibit different
figures, though every particular cellula has its essen-
tial form, and the same dimensions, according to its
own species.

MINE, in the military art, (*Encycl.*) Mines are
either dug within the body of the earth, as those made
by the besieged to blow up the works of the besiegers
before they make a lodgment on the covered way; or
in eminences and rising grounds, as to make a breach
in the ramparts, &c. or to blow up walls, or, lastly,
to tear up rocks.

Two ounces of powder have been found, by experi-
ment, capable of raising two cubic feet of earth; con-

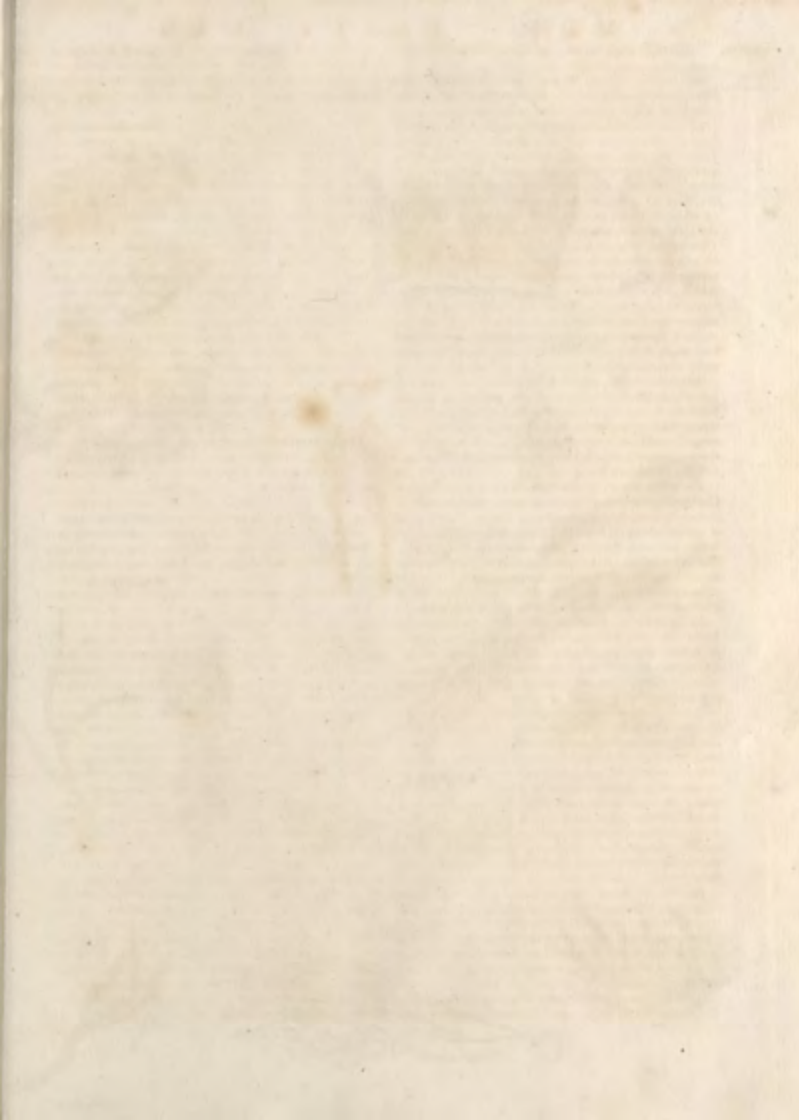
sequently 200 ounces, that is, 12 pound 8 ounces,
will raise 200 cubic feet, which is only 16 feet short
of a cubic toise, because 200 ounces joined together
have proportionably a greater force than 2 ounces, as
being an united force.

All the turnings a miner uses to carry on his mines,
and through which he conducts the fauceille, should be
well filled with earth and dung; and the masonry in
proportion to the earth to be blown up, as 3 to 2.
The entrance of the chamber of the mine ought to be
firmly shut with thick planks, in the form of a St An-
drew's cross, so that the inclosure be secure, and the
void spaces shut up with dung or tempered earth. If
a gallery be made below or on the side of the chamber,
it must absolutely be filled up with the strongest ma-
sonry, half as long again as the height of the earth;
for this gallery will not only burst, but likewise ob-
struct the effect of the mine. The powder should al-
ways be kept in sacks, which are opened when the
mine is charged, and some of the powder threwed
about: the greater the quantity of earth to be raised
is, the greater is the effect of the mine, supposing it
to have the due proportion of powder. Powder has
the same effect upon masonry as upon earth, that is,
it will proportionably raise either with the same ve-
locity.

The branches which are carried into the solidity of
walls do not exceed three feet in depth, and two feet
six inches in width nearly: this sort of mine is most
excellent to blow up the strongest walls.

The weight of a cubic foot of powder should be
80lb. 1 foot 1 inch cube will weigh 100lb. and 1 foot
2 inches and $\frac{1}{2}$, 150lb. and 200lb. of powder will be
1 foot 5 inches cube; however, there is a diversity in
this, according to the quantity of saltpetre in the gun-
powder.

If, when the mines are made, water be found at the
bottom of the chamber, planks are laid there, on
which the powder is placed either in sacks or barrels,
of 100lb. each. The fauceille must have a clear passage
to the powder, and be laid in an auget or wooden
trough, through all the branches. When the powder
is placed in the chamber, the planks are laid to cover
it, and others again across these; then one is placed
over the top of the chamber, which is shaped for that
purpose: between that and those which cover the
powder, props are placed, which shore it up; some
inclining towards the outside, others to the inside of
the wall; all the void spaces being filled with earth,
dung, brick, and rough stones. Afterwards planks are
placed at the entrance of the chamber, with one across
the top, whereon they buttress three strong props,
whose other ends are likewise propped against another
plank situated on the side of the earth in the branch;
which props being well fixed between the planks with
wedges, the branch should then be filled up to its en-
trance with the forementioned materials. The fauceilles
which pass through the side-branches must be exactly
the same length with that in the middle, to which they
join: the part which reaches beyond the entrance of
the mine is that which conveys the fire to the other
three; the fauceilles being of equal length, will spring
together. From a great number of experiments, it
appears, 1. That the force of a mine is always towards
the weakest side; so that the disposition of the cham-
ber



HYDRI.



UNDES.



TERRES.



MINUM.



CONFERVE.



SPHAGNUM.



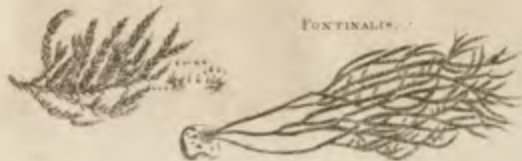
PHIEGES.



PTINI.



FONTINALIS.



ber of a mine does not at all contribute to determine this effect. 2. That the quantity of powder must be greater or less, in proportion to the greater or less weight of the bodies to be raised, and to their greater or less cohesion; so that you are to allow for each cubic fathom

Of loose earth,	-	9 or 10 lb.
Firm earth and strong sand,	-	11 or 12
Fat clayey earth,	-	15 or 16
New masonry, not strongly bound,	-	15 or 20
Old masonry, well bound,	-	25 or 30

3. That the aperture, or entonnoir of a mine, if rightly charged, is a cone, the diameter of whose base is double the height taken from the centre of the mine.

4. That when the mine has been overcharged, its entonnoir is nearly cylindrical, the diameter of the upper extreme not much exceeding that of the chamber.

5. That besides the shock of the powder against the bodies it takes up, it likewise crushes all the earth that borders upon it, both underneath and sideways.

To charge a mine so as to have the most advantageous effect, the weight of the matter to be carried must be known; that is, the solidity of a right cone, whose base is double the height of the earth over the centre of the mine: thus, having found the solidity of the cone in cubic fathoms, multiply the number of fathoms by the number of pounds of powder necessary for raising the matter it contains; and if the cone contains matters of different weights, take a mean weight between them all, always having a regard to their degree of cohesion.

As to the disposition of mines, there is but one general rule, which is, that the side towards which one would determine the effect be the weakest; but this varies according to occasions and circumstances.

The calculation of mines is generally built upon this hypothesis, That the entonnoir of a mine is the frustum of an inverted cone, whose altitude is equal to the radius of the excavation of the mine, and the diameter of the whole lesser base is equal to the line of least resistance; and though these suppositions are not quite exact, yet the calculations of mines deduced from them have proved successful in practice; for which reason this calculation should be followed, till a better and more simple be found out.

M. de Valliere found that the entonnoir of a mine was a paraboloid, which is a solid generated by the rotation of a semiparabola about its axis; but as the difference between these two is very insignificant in practice, that of the frustum of a cone may be used.

MINERALOGY, (*Encycl.*) P. 5065, line 13. from the bottom, for *n m v*, mark *d e f*; and line 5. from the bottom, after *acids*, supply "mentioned, n° 68."

MORGO, anciently *Amorgos*, an island in the Archipelago, fertile in wine, oil, and corn. It is well cultivated, and the inhabitants are affable, and generally of the Greek church. The best parts belong to a monastery. The greatest inconvenience in this island is the want of wood. It is 30 miles in circumference. E. Long. 26. 15. N. Lat. 36. 30.

MOSES, (*Encycl.*) Moyses, by the inconsiderate mind, are generally deemed an useless or insignificant part of the creation. That they are not, is evident from hence; that he who made them has made no-

thing in vain, but on the contrary has pronounced all his works to be very good. Many of their uses we know; that they have many more which we know not, is unquestionable, since there is probably no one thing in the universe of which we dare to assert that we know all their uses. Thus much we are certain of with respect to mosses, that as they flourish most in winter, and at that time cover the ground with a beautiful green carpet, in many places which would be otherwise naked, and when little verdure is elsewhere to be seen; so at the same time they shelter and preserve the seeds, roots, gems, and embryo plants of many vegetables, which would otherwise perish; they furnish materials for birds to build their nests with; they afford a warm winter's retreat for some quadrupeds, such as bears, dormice, and the like, and for numberless insects, which are the food of birds and fishes, and these again the food or delight of men. Many of them grow on rocks and barren places, and rotting away afford the first principles of vegetation to other plants, which could never else have taken root there. Others grow in bogs and marshes, and, by continual increase and decay, fill up and convert them either into fertile pastures, or into peat-bogs the source of inexhaustible fuel to the polar regions.—They are applicable also to many domestic purposes: the lycopodiums are some of them used in dyeing of yarn, and in medicine; the sphagnum and polytrichum furnish convenient beds for the Laplanders; the hypnum are used in tiling of houses, stopping crevices in walls, packing up of brittle wares and the roots of plants for distant conveyance.—To which may be added, that all in general contribute entertainment and agreeable instruction to the contemplative mind of the naturalist, at a season when few other plants offer themselves to his view.

MOATAZALITES, or SEPARATISTS, a religious sect among the Turks, who deny all forms and qualities in the Divine Being; or who divest God of his attributes.

There are two opinions among the Turkish divines concerning God. The first admits metaphysical forms, or attributes; as, that God has wisdom, by which he is wise; power, by which he is powerful; eternity, by which he is eternal, &c.

The second allows God to be wise, powerful, eternal; but will not allow any form or quality in God, for fear of admitting a multiplicity.

Those who follow this latter opinion are called *Moatazalites*; they who follow the former, *Sephalites*.

The Moatazalites also believed that the word of God was created in *subjection*, as the schoolmen term it, and to consist of letters and sound; copies thereof being written in books to express or imitate the original; they denied absolute predestination, and affirmed that man is a free agent. This sect is said to have first invented the scholastic divinity, and is subdivided into no less than 20 inferior sects, which mutually brand one another with infidelity.

MUNDA, (*Encycl.*) This city was anciently famous for a victory gained by Cæsar over the sons of Pompey, who had collected an army in Spain after the defeat of their father at Pharsalia. An account of the battle was referred from ROME, n° 218. to MUNDA, but omitted.

Mosses
||
Munda.

The Pompeys posted their army advantageously upon a rising ground, whereof one side was defended by the city of Munda, and the other by a small river which watered the plain, and by a marsh; so that the enemy could not attack them but in front. Cæsar likewise drew up his troops with great art, and having advanced a little way from his camp, ordered them to halt, expecting the enemy would abandon their advantageous post, and come to meet him. But as they did not stir, Cæsar made as if he intended to fortify himself in that post; which induced the young general, who looked upon this as a sign of fear, to advance into the plain, and attack the enemy before they could secure themselves with any works. Pompey's army was by far the most numerous; for it consisted of 13 legions, 6000 horse, and an incredible number of auxiliaries, among whom were all the forces of Bocchus king of Mauritania, commanded by his two sons, both youths of great valour and bravery. Cæsar had 80 cohorts, three legions, to wit, the third, the fifth, and the tenth, and a body of 8000 horse. As the enemy drew near, Cæsar betrayed a great deal of uneasiness and concern, as if he were doubtful of the success, knowing he was to engage men no way inferior in valour and experience to his own, and commanded by officers who had on many occasions given signal proofs of their bravery and conduct. Cocæus, the elder of the two brothers, was generally looked upon as an able commander; and Labienus, who had revolted, esteemed scarce inferior to Cæsar himself.

However, the dictator, desirous to put an end to the civil war, either by his own death, or that of his rivals, gave the signal for the battle, and fell upon the enemy with his usual vigour and resolution. At the first onset, which was dreadful, the auxiliaries on both sides betook themselves to flight, leaving the Romans to decide their quarrel by themselves. Then the legionaries engaged, with a fury hardly to be expressed; Cæsar's men being encouraged by the hopes of putting an end to all their labours by this battle, and those of Pompey exerting themselves out of necessity and despair, since most of them expected no quarter, as having been formerly pardoned. Never was victory more obstinately disputed. Cæsar's men, who had been always used to conquer, found themselves so vigorously charged by the enemy's legionaries, that they began to give ground; and though they did not turn their backs, yet it was manifest that shame alone kept them in their posts. All authors agree, that Cæsar had never been in so great danger; and he himself, when he came back to his camp, told his friends, that he had often fought for victory, but this was the first time he had ever fought for life. Thinking himself abandoned by fortune, which had hitherto favoured him, he had some thoughts of stabbing himself with his own sword, and, by a voluntary death, preventing the disgrace of a defeat: but returning soon to himself, and concluding it would be more to his reputation to fall by the enemy's hand at the head of his troops, than, in a fit of despair, by his own, he dismounted from his horse, and snatching a buckler from one of his legionaries, he threw himself, like a man in despair, into the midst of the enemy; crying out to his men, *Are you not ashamed to deliver your general into the hands of boys?* At these words, the sol-

diers of the tenth legion, animated by the example of their general, fell upon the enemy with fresh vigour, and made a dreadful havoc of them. But, in spite of their utmost efforts, Pompey's men still kept their ground, and, though greatly fatigued, returned to the charge with equal vigour. Then the Cæsarians began to despair of victory; and the dictator, running thro' the ranks of his disheartened legionaries, had much ado to keep them together. The battle had already lasted from the rising to the setting of the sun, without any considerable advantage on either side.

At length a mere accident decided the dispute in favour of the dictator. Bogud, a petty king of Mauritania, had joined Cæsar, soon after his arrival in Spain, with some squadrons of Numidian horse; but, in the very beginning of the battle, being terrified at the shouting of the soldiers, intermingled with groans, and the clashing of their arms, he had abandoned his post, and retired with the auxiliaries under his command to a rising ground at a small distance from the enemy's camp. There he continued the whole day an idle spectator of the battle that was fought in the plain. But towards the evening, partly out of shame, and partly out of compassion for his friend Cæsar, he resolved to fall upon Pompey's camp; and accordingly flew thither with all the forces he had with him. Labienus, apprised of his design, hastened after him, to the defence of the camp; which Cæsar observing, cried to his legionaries, *Courage, fellow-soldiers! the victory at length is ours; Labienus flies.* This artifice had the desired effect: Cæsar's men, believing that Labienus was truly fled, made a last effort, and charged the wing he commanded so briskly, that after a most obstinate dispute they put them to flight.

Though the enemy's left wing was thus entirely defeated, the right wing, where the elder Pompey commanded, still kept their ground for some time. Pompey dismounting from his horse, fought on foot like a private man in the first line, till most of his legionaries being killed, he was forced to save himself by flight from falling into the enemy's hands. Part of his troops fled back to their camp, and part took shelter in the city of Munda. The camp was immediately attacked, and taken sword in hand; and as for the city, Cæsar, without loss of time, drew a line of circumvallation round it. This victory was gained on the 16th of the calends of April, i. e. according to our way of counting, on the 17th day of March, when the Dionysian festival, or the Liberalia, were celebrated at Rome; the very day, as Plutarch observes, in which Pompey the Great, four years before, had set out for the war. In this action Pompey lost 30,000 men; among whom were the famous Labienus, Attius Varus, and 3000 Roman knights. Seventeen officers of distinction were taken, and all the enemy's eagles and ensigns, together with Pompey's sables, which he had assumed as governor of Spain. On Cæsar's side only 1000 men were killed, and 500 wounded.

MULLEIN, VERBASCUM, (*Encyel.*) White mullein has received the name of *cow's lungwort*, from the great reputation it had formerly among the country people for inveterate coughs among the horned cattle. Parkinson tells us, that in his time it was used in such cases with great success. It still retains the same credit in several parts of Europe.

MUSCA, (*Encycl.*) Line 1. for *gnat*, read *fly*.

Flies form one of the most numerous classes of insects. Variety runs through their forms, their structure, their organization, their metamorphoses, their manner of living, propagating their species, and providing for their posterity. Every species is furnished with implements, adapted to its exigencies. What exquisite-ness, what proportion, in the several parts that compose the body of a fly! What precision, what mechanism in the springs and motion! Some are oviparous, others viviparous; which latter have but two young ones at a time, whereas the propagation of the former is by hundreds. Flies are lascivious, troublesome insects, that put up with every kind of food. When storms impend, they have most activity, and sting with greatest force. They multiply most in hot moist climates; and so great was formerly their numbers in Spain, that there were fly-hunters commissioned to give them chase. The vapour of sulphur or arsenic destroys them; and their numbers may be reduced by taking them in phials of honeyed water, or between boards done over with honey.

MYA MARGARITIFERA, (*Encycl.*) Linnæus has made a remarkable discovery relating to the generation of pearls in this fish. This must not be confounded with what is called the *mother-of-pearl shell*, as that belongs to another genus, is a sea-shell, and an inhabitant of the warmer countries only. The shell-fish in question is found in rivers in all the northern parts of the world; in Norway and Sweden it abounds; it is found in the rivers of the county of Tyrone in Ireland, and in those of Donegal; in Scotland, the Don is said to abound with it; and it is not unfrequent in the rivers of England. This fish will bear removal remarkably well; and it is said, that in some places they form reservoirs for the purpose of keeping it, and taking out the pearl, which, in a certain period of time, will be again renewed. From observations on the growth of these shells, and the number of their annular laminae, or scales, it is supposed the fish will attain a very great age; 50 or 60 years are imagined to be a

moderate computation. The discovery turned on a method which Linnæus found, of putting these muscles into a state of producing pearls at his pleasure; though the final effect did not take place for several years: He says, that in five or six years after the operation the pearl would have acquired the size of a vetch. We are unacquainted with the means by which he accomplished this extraordinary operation; but it was probably published at the time, and considered as important, since it is certain that the author was rewarded with a munificent premium from the States of the kingdom on this account. We regret that we cannot speak more fully on this head; but may observe, that it is probable, from a paper published many years afterwards in the Berlin Acts, that the method consisted in injuring the shell externally, perhaps by a perforation; as it has been observed, that these concretions in shell-fish are found on the inside, exactly opposite to perforations and injuries made from without by serpulae and other animals.

MYCETITES DISCOIDES, in natural history, a name given by Dr Woodward to those kinds of fossil coralloide bodies which the generality of writers had called, after Dr Plott, *porpita*. These are usually small, and of a roundish, but flattened figure; they are hollowed on one side with a sort of umbilicus, and striated on the other; they are found on the ploughed lands in Oxfordshire, and some other of our midland counties, and in other places, buried in the solid strata of stone; they are sometimes yellowish, sometimes brownish, and are from the breadth of an inch to a fourth part or less of that size; when broken, they are usually found to consist of a kind of spar, not unlike that of which the shelly coats of the echinite, or the lapides indici, and other spines of echini consist in their fossil state; and in some of them the ridges and striæ are thick set with little knobs and tubercles. The basis in some of these is flat, as it is in others rising in form of a circular elevation from the umbilicus, and others have a circular cavity in the same place.

N.

NARVA, a strong town of the Russian empire, in Livonia, with a castle, and a harbour. It was taken by the Muscovites from the Danes in 1558, by the Swedes in 1581, and they defeated the Muscovites near it in 1700; but it was retaken by the Russians in 1704, by storm, and the inhabitants sent to Astrachan. It is seated on the river Narva, 95 miles S. W. of Wiburgh, and 172 N. E. of Riga. E. Long. 29. o. N. Lat. 59. 8.

NECESSITY, (*Encycl.*) Mr Hobbes, who is said to have been the first who understood and maintained the proper doctrine of philosophical necessity, gives the following account of it in his *Leviathan*, p. 108. Liberty and necessity are consistent; as in the water, that hath not the liberty, but a necessity of descending in the channel: so likewise in the actions which men voluntarily do, which, because they proceed from their will, proceed from liberty; and yet, because every act of man's will, and every desire and inclination, proceedeth from some cause, and that from another cause, in a continual

chain (whose first link is in the hand of God, the first of all causes), proceed from necessity; so that to him who could see the connection of those causes, the necessity of all men's voluntary actions would appear manifest: and therefore God that seeth and disposeth all things, seeth also, that the liberty of man, in doing what he will, is accompanied with the necessity of doing that which God will, and no more or less: for though men may do many things, which God does not command, nor is, therefore, the author of them, yet they can have no passion, will, or appetite to any thing, of which appetite God's will is not the cause: and did not his will assure the necessity of man's will, and consequently of all that on man's will dependeth, the liberty of men would be a contradiction and impediment to the omnipotence and liberty of God.

Mr Collins, one of the most admired writers on the subject of necessity, has stated the question concerning human liberty in the following manner. Man, he says, is a necessary agent, if all his actions are so determined by the causes preceding each action, that not one past

Mycetites,
Necessity.

action could possibly not have come to pass, or have been otherwise than it hath been; nor one future action can possibly not come to pass, or be otherwise than it shall be. But he is a free agent, if he is able, at any time, under the circumstances and causes he then is, to do different things; or, in other words, if he is not unavoidably determined, in every point of time, by the circumstances he is in, and causes he is under, to do that one thing he does, and not possibly to do any other. According to this state of the question, he undertakes to prove, that man is a necessary agent; and that there neither is nor can be such a thing as liberty.

1. He appeals to experience; alleging, that though the vulgar urge this in proof of liberty, it is not a proof of it: that many celebrated philosophers and theologians, both ancient and modern, have given definitions of liberty, that are consistent with fate or necessity: that some great patrons of liberty do, by their concessions in this matter, destroy all arguments from experience: that all the actions of men may be ranked under the four heads of perception, judging, willing, and doing as we will; and that experience does not prove any of these to be free; and that experience not only does not prove liberty, but, on the contrary, men may see by experience, that they are necessary agents. It is, says he, matter of experience, that man is ever determined in his willing: we experience perfect necessity: and they, who think liberty a matter of experience, yet allow that the will follows the judgment of the understanding; and that, when two objects are presented to a man's choice, one whereof appears better than the other, he cannot chuse the worst.

2. Man is a necessary agent, because all his actions have a beginning; for whatever has a beginning must have a cause, and every cause is a necessary cause; and if any action whatsoever can be done without a cause, then effects and causes have no necessary relation; and, consequently, we should not be necessarily determined in any case at all.

3. Liberty would not be a perfection, but an imperfection; whereas, on the contrary, necessity is an advantage and a perfection.

4. Liberty is inconsistent with the divine prescience; for if God foreknows the existence of any thing, as it depends on its own causes, that existence is no less necessary than if it were the effect of his decree: for it no less implies a contradiction, that causes should not produce their effects, than that an event should not come to pass which is decreed by God.

This last argument for necessity has been urged by a variety of writers; and the advocates for liberty have felt its force, and endeavoured to obviate it. Some have actually given up the divine prescience: some have allowed the seeming contradiction implied in the foreknowledge of a contingent event, and have acknowledged themselves incapable of removing it. Others have endeavoured to reconcile the foreknowledge of God and the liberty of man, by alleging, that there is a great difference between God's foreknowledge and his decrees, with regard to the necessity of future events; for God's prescience has no influence at all on our actions: his infallible judgment, concerning contingent truths, does no more alter the nature of the things, and cause them to be necessary, than our judging right, at any time, concerning a contingent truth,

makes it cease to be contingent; or, than our sense of a present truth is any cause of its being true or present.

In the argument, says Dr Clarke, drawn against liberty from the divine prescience, it must not first be supposed that things are in their own nature necessary; but from the divine prescience or power of judging infallibly (which power is as much more extensive and infallible than in man, as the divine nature and understanding are superior to ours) concerning free events, it must be proved, that things otherwise supposed free, will therefore unavoidably become necessary; which can no more be proved, than it can be proved that an action, supposed at this present time to be free, is yet (contrary to the supposition) at the same time necessary; because, in all past time, whether foreknown or not foreknown, it could not, upon that very supposition of its being now freely done, be free.

In another place, he acknowledges, that, though it is impossible for us to explain distinctly the manner how God can foresee future events without a chain of necessary causes, yet we may form some general notion of it. For, as a man, who has no influence over another person's actions, and yet often perceives before hand what that other will do; and a wiser and more experienced man will still, with greater probability, foresee what another, whose disposition he is perfectly acquainted with, will in certain circumstances do; and an angel, with still much less degree of error, may have a farther prospect into mens future actions: so it is very reasonable to apprehend, that God, without influencing mens wills by his power, yet by his foresight cannot but have as much more certain a knowledge of future free events than either men or angels can possibly have, as the perfection of his nature is greater than that of theirs. The certainty of foreknowledge, says this excellent writer, does not cause the certainty of things, but is itself founded on the reality of their existence; nor does it imply any other certainty than such as would be equally in things, tho' there was no foreknowledge; nor again does this certainty of event, in any sort, imply necessity. To the same purpose Origen has long ago observed, that prescience is not the cause of things future, but their being future is the cause of God's prescience that they will be.

It cannot reasonably be disputed, that there is an essential difference between the foreknowledge and permission of events, and the preordination and production of them: and the scheme of necessity seems directly to charge God with being the efficient cause or author of those vices and evils which arise from circumstances and connections of his previous and absolute appointment. Indeed, many of the advocates of this scheme will not admit the consequence that seems to be fairly deducible from their opinion: however, Dr Priestley very candidly allows it. It certainly (says he) sounds harsh to vulgar ears to say, that in all those crimes that men charge themselves with, and reproach themselves for, God is the agent; and that, in such cases, they are in reality no more agents, than a sword is an agent when employed to commit a murder. It does require strength of mind not to startle at such a conclusion; but then it requires nothing but strength of mind; i. e. such a

view of things as shall carry us beyond first and fallacious appearances.

5. Another argument in favour of necessity is the following: if man was not a necessary agent, determined by pleasure and pain, there would be no foundation of rewards and punishments, which are the essential supports of society. These would be useless, because if men were free or indifferent to pleasure and pain, they could be no motives to a man to do or forbear any action.

6. Another argument of the same kind is deduced from the nature of morality: for if man was not a necessary agent, determined by pleasure and pain, he would have no notion of morality, or motive to practise it; and if he were indifferent to pleasure and pain, he would have no rule to go by, and might never judge, will, and practise right. Every act of the will, it is said, is excited by some motive, which motive is the cause of that act: and if volitions are properly the effects of motives, then they are necessarily connected with their motives: whence it is inferred, that volition is necessary, and doth not proceed from any self-determining power in the will. This argument has been illustrated and urged in all its force by many modern writers, from M. Leibnitz to Dr Priestley, the last and most zealous advocate for necessity: and it has often been answered by Dr Clarke and others, who have strenuously maintained, that liberty is perfectly consistent with mens acting from a regard to motives.

Supposing, says Dr Price, a power of self-determination to exist, it is by no means necessary that it should be exerted without a regard to any end or rule: on the contrary, it can never be exerted without some view or design. Whoever acts, means to do somewhat. The power of determining ourselves, by the very nature of it, wants an end or rule to guide it; and no probability or certainty of its being exerted agreeably to a rule can have the least tendency to infringe or diminish it. All that should be avoided here is the intolerable absurdity of making our reasons and ends, in acting, the physical causes or efficient of action. This is the same with ascribing the action of walking, not to the feet, or the power which moves the feet, but to the eye, which only sees the way. The perception of a reason for acting, or the judgment of the understanding, is no more than seeing the way; it is the eye of the mind which informs and directs; and whatever certainty there may be that a particular determination will follow, such determination will be the self-determination of the mind; and not any change of its state stamped upon it, over which it has no power, and in receiving which, instead of being an agent, it is merely a passive subject of agency. Although the views and ideas of beings may be the occasions of their acting; yet it is a contradiction to make them the mechanical efficient of their actions: so necessary and important is the distinction insisted upon by Dr Clarke, between the operation of physical causes and the influence of moral reasons.

Upon the whole, the question concerning liberty is not, Whether the views or ideas of beings influence their actions; but, What is the nature of that influence. If we say, that it is some kind of mechanical or physical efficiency; or, with Dr Priestley, after Hobbes

and Leibnitz, that man has no other liberty, in following motives, than water has in running down hill, or than the arms of a scale, pressed by weights, have in rising and falling; then it must follow, that man never acts, and it must be folly to applaud or reproach ourselves for our conduct, and there is an end of all moral obligation and accountableness.

However, the necessarians do not allow these consequences; but, on the contrary, maintain, that the doctrine of the necessary influence of motives upon the mind of man, makes him the proper subject of discipline, reward, and punishment, praise and blame, both in the common and the philosophical use of the words; and that the doctrine of self-determination, independently of the influence of motives, entirely disqualifies a man from being the proper subject of them.

Mr Edwards, an acute writer on this subject, has endeavoured to prove, that liberty of indifference is not only not necessary to virtue, but utterly inconsistent with it; and that all habits and inclinations, whether virtuous or vicious, are inconsistent with the Arminian notions of liberty and moral agency. And Dr Priestley observes, that the sense of self-reproach and shame is excited by our finding that we have a disposition of mind leading to vice, and on which motives to virtue, in particular cases, have had no influence. If we ask, whence proceeds that disposition, and how it comes to pass that motives to virtue had not a greater influence, we must ultimately ascribe the inefficacy of the one, and the evil tendency of the other, to God, who made us what we are, and placed us in the situation which we occupy. Dr Priestley overcomes this difficulty by alleging, that the distinction between things natural and moral entirely ceases in the scheme of necessity; that the vices of men come under the class of common evils, producing misery for a time, but, like all other evils, in the same great system, ultimately subservient to greater good. In this light, he says, every thing without distinction may be ascribed to God. However, he acknowledges, that this is a view of moral evil, which, though innocent, and even useful, in speculation, no wise man can or would choose to act upon himself, because our understandings are too limited for the application of such a means of good; though a Being of infinite knowledge may introduce it with the greatest advantage. If there be any foundation for the doctrine of necessity, i. e. if all events arise from preceding situations, and the original situations of all things, together with the laws by which all changes of situation take place, were fixed by the Divine Being, there can be no difference whatever with respect to his causation of one thing more than another; and even whatever takes place in consequence of his withholding his special and extraordinary influence, is as much agreeable to his will as what comes to pass in consequence of the general laws of nature. But our supposing that God is the author of sin, (as by the scheme of necessity he must in fact be the author of all things), by no means implies that he is a sinful being; for it is the disposition of mind and the design which constitute the sinfulness of an action. If therefore his disposition and design be good, what he does is morally good. To the same purpose he observes, that the proper foundation, or rather the

ultimate object, of virtue, is general utility; since it consists of such conduct as tends to make intelligent creatures the most truly happy in the whole of their existence; though, with respect to the agent, no action is denominated virtuous that is not voluntary, or that does not proceed from some good motive. And this reasoning he applies to the Deity, who pursues the happiness of his creatures by such means as are best calculated to secure that end, and which are sanctified by it. And he further adds, that the Deity may adopt some things which he would not have chosen on their own account, but for the sake of other things with which they were necessarily connected.

The scriptures, according to this last writer, are favourable to the doctrine of necessity; though he does not think that the sacred writers were, strictly speaking, necessarians, for they were not philosophers: but their habitual devotion led them to refer all things to God, without reflecting on the rigorous meaning of their language: and very probably, had they been interrogated on the subject, they would have appeared not to be apprised of the proper extent of the necessary scheme, and would have answered in a manner unfavourable to it.

The reader, who is desirous of being farther acquainted with the reasoning of different writers on this subject, may consult the collection of papers between Leibnitz and Clarke, 1717. Collins's Philosophical Inquiry concerning Human Liberty, 1735, 3d Ed. with Clarke's Answer. Edwards on the Freedom of the Will, 8vo, 1775, 4th edit. Priestley's Doctrine of Philosophical Necessity, 8vo, 1777. Correspondence between Dr Price and Dr Priestley, 8vo, 1778. Hartley's Observations on Man, 8vo, 1749. See LIBERTY, (*Append.*)

NEREIS, (*Encycl.*) The head of this insect is roundish, flattened, with the rostrum extending to a point; tentacula (feelers) two, very short, subulate; eyes, two, prominent, on the sides of the head; body consisting of 23 segments, diminishing toward the tail; the side of every segment has a conical apex cut short at the vertex, and denticulated; from which springs a small pencil of hairs, under each pencil a filament resembling a foot, subulate, flexible, unarmed. Colour, glassy, pellucid. Length, two lines. Habitation, sea-plants, as the fuci and alga, which sometimes it leaves, and wanders on the surface of the sea.

This insect is frequent in all seasons of the year, but particularly in summer, and on the approach of a tempest, when it seems through inquietude to give a much greater quantity of light; its appearance also is very brilliant when the wind is in the east and south-east points, and in winter-nights preceded by a warm day. If water containing these animacules be kept warm, they retain their light two whole days after they are dead; but in cold weather lose it in eight hours: motion and warmth, which increase their vivacity and strength, increase their light also.

NEWTON (Bishop), late lord bishop of Bristol and dean of St Paul's, London, was born on the first of January 1704. His father, John Newton, was a considerable brandy and cyder merchant, who, by his industry and integrity, having acquired what he thought a competent fortune, left off trade several years before he died.

He received the first part of his education in the free school of Litchfield; a school which, the bishop observes with some kind of exultation, had at all times sent forth several persons of note and eminence; from bishop Smalbridge and Mr Wollaston, to Dr Johnson and Mr Garrick.

From Litchfield he was removed to Westminster-school, in 1717, under the care of Dr Freind and Dr Nicoll.

During the time he was at Westminster, there were, he observes, more young men who made a distinguished figure afterwards in the world, than perhaps at any other period, either before or since. He particularly mentions William Murray, the present earl of Mansfield, with whom he lived on terms of the highest friendship to the last.

He continued six years at Westminster-school, five of which he passed in college. He went to Cambridge, and entered at Trinity college. Here he constantly resided eight months at least in every year, till he had taken his Bachelor of Arts degree. Soon after he was chosen Fellow of Trinity college, he came to settle in London. As it had been his inclination from a child, and he was also designed for holy orders, he had sufficient time to prepare himself, and composed some sermons, that he might have a stock in hand when he entered on the ministry. His title for orders was his fellowship; and he was ordained deacon in December 1729, and priest in the February following, by bishop Gibson.

At his first setting out in the world, he officiated as curate at St George's, Hanover-square; and continued for several years assistant-preacher to Dr Trebeck. His first preferment was that of reader and afternoon-preacher at Grosvenor chapel, in South-Audley street.

This introduced him to the family of lord Tyrconnel, to whose son he became tutor. He continued in this situation for many years, very much at his ease, and on terms of great intimacy and friendship with lord and lady Tyrconnel, "without so much (says he) as an unkind word or a cool look ever intervening."

In the spring of 1744, he was, through the interest of the earl of Bath (who was his great friend and patron, and whose friendship and patronage were returned by grateful acknowledgments and the warmest encomiums) presented to the rectory of St Mary le Bow; so that he was 40 years old before he obtained any living.

At the commencement in 1745, he took his Doctor's degree. In the spring of 1747 he was chosen lecturer of St George's Hanover-square, by a most respectable vestry of noblemen and gentlemen of high distinction. In August following he married his first wife, the eldest daughter of Dr Trebeck, an unaffected, modest, decent young woman, with whom he lived very happy, in mutual love and harmony, near seven years.

In 1749 he published his edition of Milton's Paradise Lost, which (says he, very modestly) it is hoped hath not been ill received by the public, having, in 1775, gone through eight editions. After the Paradise Lost, it was judged (says he) proper that Dr Newton should also publish the Paradise Regained, and other poems of Milton; but these things he thought detained him from other more material studies, though he had the good fortune to gain by them more than

Milton,

Milton did by all his works put together. But his greatest gain (he says) was their first introducing him to the friendship and intimacy of two such men as bishop Warburton and Dr Jortin, whose works will speak for them better than any private commendation.

In 1754 he lost his father, at the age of 83; and within a few days his wife, at the age of 38. This was the severest trial he ever underwent, and almost overwhelmed him. At that time he was engaged in writing his *Dissertations on the Prophecies*; and happy it was for him: for in any affliction he never found a better or more effectual remedy, than plunging deep into study, and fixing his thoughts as intensely as he possibly could upon other subjects. The first volume was published the following winter; but the other did not appear till three years afterwards, as, for the encouragement of his work, he was appointed, in the mean time, to preach the Boyle's lecture. The bishop informs us, that 1250 copies of the *Dissertations* were taken at the first impression, and 1000 at every other edition: and "though (says he) some things have been since published upon the same subjects, yet they still hold up their head above water, and having gone through five editions, are ready prepared for another. Abroad, too, their reception hath not been unfavourable, if accounts from thence may be depended upon." They were translated into the German and Danish languages; and received the warmest encomiums from persons of learning and rank.

In the spring of 1757, he was made prebendary of Westminster, in the room of Dr Green, and promoted to the deanery of Salisbury. In October following, he was made sub-almoner to his majesty. This he owed to bishop Gilbert. He married a second wife in September 1761. She was the widow of the Rev. Mr Hand; and daughter of John lord viscount Lisburne. In the same month he kissed his majesty's hand for his bishopric.

In the winter of 1764, Dr Stone, the primate of Ireland, died. Mr Grenville sent for bishop Newton, and in the most obliging manner desired his acceptance of the primacy. Having maturely weighed the matter in his mind, he declined the offer.

In 1768 he was made dean of St Paul's. His ambition was now fully satisfied; and he firmly resolved never to seek or ask for any thing more.

From this time to his death, ill health was almost his constant companion. It was wonderful that such

a poor, and weak, and slender thread as the bishop's life, should be spun out to such an amazing length. In the autumn of 1781 (usually the most favourable part of the year to him) he laboured under repeated illnesses; and on Saturday the 9th of February 1782, he began to find his breath much affected by the frost. His complaints grew worse and worse till the Thursday following. He got up at five o'clock, and was placed in a chair by the fire; complained to his wife how much he had suffered in bed, and repeated to himself that portion of the Psalms, "O my God, I cry unto thee in the day-time," &c. &c. About six o'clock he was left by his apothecary in a quiet sleep. Between seven and eight he awoke, and appeared rather more easy, and took a little refreshment. He continued dozing till near nine, when he ordered his servant to come and dress him, and help him down stairs. As soon as he was dressed, he inquired the hour, and bid his servant open the shutter and look at the dial of St Paul's. The servant answered, it was upon the stroke of nine. The bishop made an effort to take out his watch, with an intent to set it; but sunk down in his chair, and expired without a sigh, or the least visible emotion, his countenance still retaining the same placid appearance which was so peculiar to him when alive.

NIDDUI, in the Jewish customs, is used to signify "separated or excommunicated." This, according to some, was to be understood of the lesser sort of excommunication in use among the Hebrews. He that had incurred it was to withdraw himself from his relations, at least to the distance of four cubits: it commonly continued a month. If it was not taken off in that time, it might be prolonged for 60 or even 90 days: but if, within this term, the excommunicated person did not give satisfaction, he fell into the *cherem*, which was a second sort of excommunication; and thence into the third sort called *shammata*, or *shematta*, the most terrible of all. But Selden has proved that there were only two kinds of excommunication, viz. the greater and less; and that these three terms were used indifferently.

NILOMETER, a column built by the side of the river Nile in Egypt, on purpose to show the increase and decrease of the waters of that river. See *Indicative COLUMN*, (*Encycl.*)

NOUN. See *GRAMMAR*, n° 6. (*Encycl.*)

O.

ODIN, in mythology, called also in the dialect of the Anglo-Saxons *Woden* or *Wodan*, a name given by the ancient Scythians to their supreme god, and assumed, about 70 years before the Christian æra, by Sigge, a Scythian prince, who conquered the northern nations, made great changes in their government, manners, and religion, enjoyed great honours, and had even divine honours paid him. According to the account given of this conqueror by Snorro, the ancient historian of Norway, and his commentator Torfaus, Odin was a Scythian, who withdrew himself, with many others in his train, by flight, from the vengeance of the Romans, under the conduct of Pompey; and having officiated as priest in his own country, he assumed the direction of the religious worship, as well as

the civil government, of the nations which he conquered. Having subdued Denmark, Sweden, and Norway, he retired to Sweden, where he died. There is nothing certain in this account; but it is probable, that the god, whose prophet or priest this Scythian pretended to be, was named *Odin*, and that the ignorance of succeeding ages confounded the Deity with his priest, composing out of the attributes of the one, and the history of the other, the character of the northern conqueror. He deluded the people by his enchantments and skill in magic: having cut off the head of one Mimer, who in his lifetime was in great reputation for wisdom, he caused it to be embalmed, and persuaded the Scandinavians that he had restored it to the use of speech; and he caused it to pronounce what-

Oestrus
||
Palmæ.

ever oracles he wanted. The Icelandic chronicles represent Odin as the most eloquent and persuasive of men; they ascribe to him the introduction of the art of poetry among the Scandinavians, and likewise the invention of the Runic characters. He had also the address to persuade his followers, that he could run over the world in the twinkling of an eye; that he had the direction of the air and tempests; that he could transform himself into all sorts of shapes, could raise the dead, could forest things to come, deprive his enemies, by enchantment, of health and vigour, and discover all the treasures concealed in the earth. They add, that by his tender and melodious airs, he could make the plains and mountains open and expand with delight; and that the ghosts, thus attracted, would leave their infernal caverns, and stand motionless about him. Nor was he less dreadful and furious in battle; changing himself into the shape of a bear, a wild bull, or a lion, and amidst ranks of enemies committing the most horrible devastation, without receiving any wound himself.

CÆSTRUS, (Enycl.) See Plate CCCXXII.—This is one of the most curious genera of insects. They are distinguished into several species, by reason of the different places wherein they deposit their eggs. Some, instructed by nature that their eggs cannot be hatched but under the skins of living creatures, such as bulls, cows, rein-deer, stags and camels, fix upon them at the instant of laying their eggs. From the hinder-part of their body issues a whimble of wonderful structure. It is a scaly cylinder, composed of four tubes, which draw out like the pieces of a spying-glass; the last is armed with three hooks, and is the gimblet with which the cæstri bore through the tough hides of horned cattle. The animal seems to experience no pain from the puncture, unless the insect, plunging too deep, attacks some nervous fibre; in which case, the beast runs about, and becomes furious. The egg being hatched, the grub feeds on the matter of the wound. The place of its abode forms upon the body of the quadrupeds a bunch sometimes above an inch high. When full-grown, the larva breaks through the tumor, and slides down to the ground; for doing which it takes the cool of the morning, that it may neither be overpowered by the heat of the day, nor chilled by the cold of the night: it then digs itself a burrow, into which it retires. Its skin grows hard, and turns to a very solid shell. There it is transformed to a chrysalis, and afterwards to a winged insect. Nature has provided for every exigence: the shell wherein the cæstrus is inclosed, is of so strong a texture that it could not make its way out, if at one of the ends there were not a small valve, fastened only by a very slight filament. The first push the cæstrus makes, the door gives way, the prison opens. The insect wings its way to woods and places frequented by cattle. See **OÆSTRUS**, and **BOTTES, (Enycl.)**

ONONIS, RESTHARROW; a genus of the decandria order, belonging to the diadelphia class of plants. There are a number of different species; but the most

remarkable is the arvensis or cammock, growing in barren pastures in several parts of Scotland and England. The stalks recline towards the ground; are tough and branched, and have a red hairy bark. The flowers are red, and come out from the alze of the branches. As the plant grows old, the branches are all terminated by a sharp woody spine; in which state several authors, among whom is Dr Withering, have described it as a distinct species. The smooth sort is sometimes pickled as samphire. The whole plant is diuretic, and has been recommended in cases of jaundice and gravel. The plant abounds in Palestine; whence Mr Hasselquist conjectures (very probably according to Mr Lightfoot) that it is the thorn mentioned in the Scripture which the ground produced after the curse.

OPERA. For POETRY, chap. i. read POETRY, Part II. chap. ii.

OPORTO, or PORTO; a rich, handsome, and considerable town of Portugal, in the province of Entre Douro and Minho, with a bishop's see. It is a place of great importance, and by nature almost impregnable. It is noted for its strong wines; and a large quantity is from thence exported into Britain, whence all red wines that come from Spain or Portugal are called *port-wines*. It is seated on the declivity of a mountain near the river Douro, which forms an excellent harbour. W. Long. 8. 1. N. Lat. 41. 0.

OPPENHEIM, a town of Germany, in the lower palatinate of the Rhine, and capital of a bailiwick of the same name; seated on the declivity of a hill near the Rhine. E. Long. 8. 20. N. Lat. 49. 48.

OPTION, the power or faculty of wishing or choosing, or the choice a person makes of any thing.

When a new suffragan bishop is consecrated, the archbishop of the province, by a customary prerogative, claims the collation of the first vacant benefice or dignity in that see, according as he shall choose; which choice is called the *archbishop's option*.

But in case the bishop dies, or is translated before the present incumbent of the promotion chosen by the archbishop shall die or be removed, it is generally supposed that the option is void; inasmuch as the greater, singly and by himself, could not convey any right or title beyond the term of his continuance in that see. And if the archbishop dies before the avoidance shall happen, the right of filling up the vacancy shall go to his executors or administrators.

OSMUNDA, MOONWORT, a genus of the order of filices, belonging to the cryptogamia class of plants. There are several species; the most remarkable of which is the regalis, osmund-royal, or flowering-fern. This is a native of Britain, growing in putrid marshes. Its leaf is doubly winged, bearing bunches of flowers at the ends. The root boiled in water is very slimy; and is used in the north to stiffen linen instead of starch. Only some of the leaves bear flowers.

OTALGIA, (Enycl.) Instead of, "See there, n° 314. and p. 4869." read, See **EAR-ACH**, in **APPENDIX**.

P.

PAINTER'S BALANCE. See **PAINTING**, n° 18.
PALMÆ, PALMS. Under this name Linnæus has

arranged several genera, which, although capable of a place in separate classes of his system, he has chosen rather,

Opera
||
Otalgia.

rather, on account of their singular structure, to place apart, in an appendix to the work.—See *ARECA*, *CHAMEROPS*, *PHOENIX*, *COCOS*, &c. (*Encycl.*); and *CORYPHA*, in this APPENDIX.

The same plants constitute one of the seven families or tribes into which all vegetables are distributed by Linnæus in his *Philosophia Botanica*. They are defined to be plants with simple stems, which at their summit bear leaves resembling those of the ferns, being a composition of a leaf and a branch; and whose flowers and fruit are produced on that particular receptacle or seat called a *spadix*, protruded from a common calyx in form of a sheath or scabbard, termed by Linnæus *spatha*.

Palme is likewise the name of the first order in Linnæus's *Fragments of a Natural Method*. See *BOTANY*, p. 1304.

PANAX, (*Encycl.*) See Plate CCCXXII.

PARONYCHIA, the *WHITLOW*, in surgery, is an abscess at the end of the fingers. According as it is situated more or less deep, it is differently denominated, and divided into species.

It begins with a slow heavy pain, attended with a slight pulsation, without swelling, redness, or heat; but soon the pain, heat, and throbbing, are intolerable; the part grows large and red, the adjoining fingers and the whole hand swell up; in some cases, a kind of red and inflated streak may be observed, which beginning at the affected part, is continued almost to the elbow; nor is it unusual for the patient to complain of a very sharp pain under the shoulder, and sometimes the whole arm is excessively inflamed and swelled; the patient cannot sleep, the fever, &c. increasing; and sometimes delirium or convulsions follow.

1. When it is seated in the skin or fat, in the back or the fore part of the finger, or under or near the nail, the pain is severe, but ends well. 2. When the periosteum is inflamed or corroded, the pain is tormenting. 3. When the nervous coats of the flexor tendons of the fingers or nerves near them are seized, the worst symptoms attend. If the first kind suppurates, it must be opened, and treated as abscesses in general; but the best method of treating the other two species is, on the first, or at furthest the second day, to cut the part where the pain is seated quite to the bone; if this operation is longer deferred, a suppuration will come on; in which case suppuration should be speedily promoted, and as early a discharge given to the matter as possible. As the pain is so considerable as to occasion a fever, and sometimes convulsions, the tinct. theb. may be added to the suppurating applications, and also given in a draught at bed-time. The second species proves very troublesome, and sometimes ends in a caries of the subjacent bone. The third species is very tedious in the cure, and usually the phalanx on which it is seated, is destroyed.

PARMESAN CHEESE, a sort of cheese much esteemed among the Italians; so named from the duchy of Parma where it is made, and whence it is conveyed to various parts of Europe.

The excellent pasture-grounds of this country are watered by the Po; and the cows from whose milk this cheese is made yield a great quantity of it. Of this cheese there are three sorts; the *fromaggio di for-*

ma, about two palms in diameter, and seven or eight inches thick; and the *fromaggio di ribbole* and *di ribolini*, which are not so large. This cheese is of a sallow-colour; and the best is kept three or four years.

PARRA, in ornithology, a genus of birds belonging to the order of grallæ; the characters of which are: The bill is tapering and a little obtuse; the nostrils are oval, and situated in the middle of the bill; the forehead is covered with fleshy caruncles, which are lobated; the wings are small, and spinous. There are five species; of which the most remarkable is the chavaria, which is about the size of the domestic cock. The Indians in the neighbourhood of Carthage, who breed large flocks of poultry that stray in the woods, train up the chavaria to defend them against the numerous birds of prey, no one of which will dare to encounter it. It is never known to desert the flock, and it returns every evening to roost.

PARTING, in chemistry, an operation by which gold and silver are separated from each other. As these two metals resist equally well the action of fire and of lead, they must therefore be separated by other methods. This separation could not be effected if they were not soluble by different menstrua.

Nitrous acid, marine acid, and sulphur, which cannot dissolve gold, attack silver very easily; and therefore these three agents furnish methods of separating silver from gold, or of the operation called *parting*.

Parting by nitrous acid is the most convenient, and therefore most used, and even almost the only one employed by goldsmiths and coiners. Wherefore it is called simply *parting*. That made with the marine acid is only made by cementation, and is known by the name of *concentrated parting*. Lastly, parting by sulphur is made by fusion, which the chemists call the *dry way*, and is therefore called *dry parting*.

PARTING by Aquafortis. Although parting by aquafortis be easy, as we have said, it cannot however succeed or be very exact, unless we attend to some essential circumstances.

1. The gold and silver must be in a proper proportion; for if the gold was in too great quantity, the silver would be covered and guarded by it from the action of the acid.

Therefore, when essayers do not know the proportion of these two metals in the mass to be operated upon, they discover it by the following method.

They have a certain number of needles composed of gold and silver alloyed together in graduated proportions, and the alloy of each needle is known by a mark upon it. These are called *proof-needles*.

When essayers want to know nearly the proportion of gold and silver in a mass, they rub this mass upon a touchstone, so as to leave a mark upon it. They then make marks upon the touchstone with some of the needles the colour of which they think comes nearest to that of the mass. By comparing the marks of these needles with the mark of the mass, they discover nearly the proportion of the gold and silver in the mass.

If this trial shows, that in any given mass the silver is not to the gold as three to one, this mass is improper for the operation of parting by aquafortis. In this case, the quantity of silver necessary to make an alloy of that proportion must be added.

This operation is called *quartation*, probably because

Parting. it reduces the gold to a fourth part of the whole mafs.

2. That the parting may be exact, the nitrous acid or aquafortis employed muſt be very pure, and eſpecially free from mixture of vitriolic and marine acids. For if this was not attended to, a quantity of ſilver, proportionable to theſe two foreign acids would be ſeparated during the ſolution; and this portion of ſilver reduced by theſe acids to vitriol of ſilver and to luna cornea, would remain mingled with the gold, which conſequently would not be entirely purified by the operation.

When the metallic maſs is properly allayed, it is to be reduced to plates, rolled up ſpirally, called cornets; or to grains. Theſe are to be put into a matraſs, and upon them a quantity of aquafortis is to be poured, the weight of which is to that of the ſilver as three to two: and as the nitrous acid employed for this operation is rather weak, the ſolution is aſſiſted, eſpecially at firſt, by the heat of a ſand-bath, in which the matraſs is to be placed. When, notwithstanding the heat, no further mark of ſolution appears, the aquafortis charged with ſilver is to be decanted. Freſh nitrous acid is to be poured into the matraſs, ſtronger than the former, and in leſs quantity, which muſt be boiled on the reſiduous maſs, and decanted as the former. Aquafortis muſt even be boiled a third time on the remaining gold, that all the ſilver may be certainly diſſolved. The gold is then to be waſhed with boiling water. This gold is very pure, if the operation has been performed with due attention. It is called *gold of parting*.

No addition of ſilver is required, if the quantity of ſilver of the maſs is evidently much more conſiderable than that of the gold: perſons who have not proof needles and other apparatus to determine the proportion of the alloy, may add to the gold an indeterminate quantity of ſilver, obſerving that this quantity be rather too great than too ſmall, and ſo conſiderable as to render the maſs nearly as white as ſilver; for a large quantity of ſilver is rather favourable than hurtful to the operation: It has no other inconvenience than an uſeleſs expence, as the larger the quantity is of ſilver, the more aquafortis muſt be employed. We ought to attend to this fact, that the colour of gold is ſcarcely perceptible in a maſs two-thirds of which is ſilver and one-third is gold; this colour then muſt be much leſs perceptible when the gold is only one-fourth part, or leſs, of the whole maſs.

If the quantity of gold exceeds that of the ſilver, the maſs may be expoſed to the action of aquaregia, which would be a kind of inverſe parting, becauſe the gold is diſſolved in that menſtruum, and the ſilver is not, but rather reduced to a luna cornea, which remains in form of a precipitate after the operation. But this method is not much practiſed, for the following reaſons.

Fiſt, the gold cannot be eaſily ſeparated from the aquaregia; for if the parting has been made with an aquaregia prepared with ſal ammoniac, or if the gold be precipitated by a volatile alkali, this gold has a fulminating quality, and its reduction requires particular operations. If the aquaregia has been made with ſpirit of ſalt, and the precipitation effected by a fixed alkali, the gold will not then be fulminating, but the precipitation will be very ſlow, and probably incomplete.

Secondly, in the parting by aquaregia, the ſilver is indeed precipitated into a luna cornea, and thus ſeparated; but this ſeparation is not perfect, as a ſmall quantity of luna cornea will always remain diſſolved by the acids, if this ſolution even could be only effected by the ſuperabundant water of theſe acids. Accordingly the ſilver is not ſo accurately ſeparated from the gold by aquaregia, as the gold is from the ſilver by aquafortis.

The gold, after the parting by aquafortis, is much more eaſily collected when it remains in ſmall maſſes, than when it is reduced to a powder.

When the maſs has been regularly parted, that is, when it contains three parts of ſilver and one part of gold, we muſt employ, particularly for the firſt ſolution, an aquafortis ſo weakened that heat is required to aſſiſt the ſolution of the ſilver: by which means the ſolution is made gently; and the gold which remains, preſerves the form of the ſmall maſſes before the ſolution. If the aquafortis employed were ſtronger, the parts of the gold would be diſuniting and reduced to the form of a powder, from the activity with which the ſolution would be made.

We may indeed part by aquafortis a maſs containing two parts of ſilver to one part of gold: but then the aquafortis muſt be ſtronger; and if the ſolution be not too much haſtened, the gold will more eaſily remain in maſſes after the operation. In both caſes, the gold will be found to be tarniſhed and blackened, probably from the phlogiſton of the nitrous acid. Its parts have no adheſion together, becauſe the ſilver diſſolved from it has left many interſtices; and the cornets or grains of this gold will be eaſily broken, unleſs they be handled very carefully. To give them more ſolidity, they are generally put into a teſt under a muffle and made red-hot, during which operation they contract conſiderably, and their parts are approximated. Theſe pieces of gold are then found to be rendered much more ſolid, ſo that they may be handled without being broken. By this operation alſo the gold reſumes its colour and luſtre; and as it generally has the figure of cornets, it is called *gold in cornets*, or *grain gold*. Eſſayers avoid melting it, as they chooſe to preſerve this form, which ſhows that it has been parted.

The gold and ſilver thus operated upon ought to have been previously refined by lead, and freed from all alloy of other metallic matters, ſo that the gold which remains ſhould be as pure as is poſſible. However, as this is the only metal which reſiſts the action of aquafortis, it might be purified by parting from all other metallic ſubſtances; but this is not generally done, for ſeveral reaſons. Firſt, becauſe the refining by lead is more expeditious and convenient for the ſeparation of the gold from the imperfect metals; ſecondly, becauſe the ſilver, when afterwards ſeparated from the aquafortis, is pure; laſtly, becauſe moſt imperfect metals do not remain completely and entirely diſſolved in nitrous acid, from the portion of phlogiſton which this acid deprives them of, the gold would be found after the parting mixed with the part of theſe metals which is precipitated.

The gold remaining after the parting ought to be well waſhed, to cleanſe it from any of the ſolution of ſilver which might adhere to it; and for this purpoſe diſtilled

Parting.

led water ought to be used, or at least water the purity of which has been ascertained by its not forming a precipitate with a solution of silver, because such a precipitate would alter the purity of the gold.

The silver dissolved in the aquafortis may be separated either by distillation, in which case all the aquafortis is recovered very pure, and fit for another parting; or it may be precipitated by some substance which has a greater affinity than this metal with nitrous acid. Copper is generally employed for this purpose at the mint.

The solution of silver is put into copper vessels. The aquafortis dissolves the copper, and the silver precipitates. When the silver is all precipitated, the new solution is decanted, which is then a solution of copper. The precipitate is to be well washed, and may be melted into an ingot. It is called *parted silver*. When this silver has been obtained from a mass which had been refined by lead, and when it has been well washed from the solution of copper, it is very pure.

Mr Cramer observes justly in his Treatise on Essaying, that however accurately the operation of parting has been performed, a small portion of silver always remains united with the gold, if the parting has been made by aquafortis; or a small portion of the gold remains united with the silver, if the parting has been made by aquaregia; and he estimates this small alloy to be from a two hundredth to a hundredth and fiftieth part; which quantity may be considered as nothing for ordinary purposes, but may become sensible in accurate chemical experiments. *Chem. Dict.*

The mass of gold and silver to be parted, ought previously to be granulated; which may be done by melting it in a crucible, and pouring it into a large vessel full of cold water, while at the same time a rapid circular motion is given to the water by quickly stirring it round with a stick or broom.

The vessels generally used for this operation, called *parting-glasses*, have the form of truncated cones, the bottom being commonly about seven inches wide, the aperture about one or two inches wide, and the height about 12 inches. These glass-vessels ought to have been well annealed, and chosen free from flaws; as one of the chief inconveniences attending the operation is, that the glasses are apt to crack by exposure to cold, and even when touched by the hand. Some operators secure their glasses by a coating. For this purpose they spread a mixture of quicklime slaked with beer and whites of eggs upon linen cloth, which they wrap round the lower part of the vessel, leaving the upper part uncovered, that they may see the progress of the operation; and over this cloth they apply a composition of clay and hair. Schlutter advises to put the parting-glasses containing some water, and supported by trestle, with fire under them. When the heat communicated by the water is too great, it may be diminished by adding cold water, which must be done very carefully by pouring against the sides of the pan, to prevent too sudden an application of cold to the parting-glass. The intention of this contrivance is, that the contents of the glasses, if these should break, may be received by the copper vessel. Into a glass 15 inches high, and 10 or 12 inches wide at bottom, placed in a copper-pan 12 inches wide at bottom, 15 inches wide at top, and 10 inches high, he usually put about 80 ounces of metal, with twice as

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much aquafortis.

The aquafortis ought to be so strong as to be capable of acting sensibly on silver when cold, but not so strong as to act violently. If the aquafortis be very strong, however pure, and if the vessels be well closed, a small quantity of the gold will be dissolved along with the silver, which is to be guarded against.

Little heat ought to be applied at the beginning, the liquor being apt to swell and rise over the vessel; but when the acid is nearly saturated, the heat may be safely encreased.

When the solution ceases, which may be known by the discontinuance of the effervescence, or emission of air-bubbles, the liquor is to be poured off. If any grains appear entire, more aquafortis must be added, that all the silver may be dissolved. If the operation has been performed slowly, the remaining gold will have still the form of distinct masses, which are to receive solidity and colour by fire, in the manner directed by the author of the Dictionary. If the operation has been performed hastily, the gold will have the appearance of a black mud or powder, which after five or six washings with pure water must be melted.

The silver is usually recovered by precipitating it from the aquafortis by means of copper-vessels into which the liquor is poured, or of plates of copper which are thrown along with the liquor into glass-vessels. A considerable heat is required to accelerate this precipitation. Dr Lewis says, he has observed that when the aquafortis was perfectly saturated with silver, no precipitation was occasioned by plates of copper, till a drop or two of aquafortis was added to the liquor, and then the precipitation began and continued as usual.

The precipitated silver must be well washed in boiling water, and fused with some nitre; the use of which is to scoriify any cupreous particles, which may adhere to the silver.

From the solution of copper in aquafortis, a blue pigment, called *verditer*, is obtained by precipitation with whiting. *Notes to Chem. Dict.*

Concentrated Parting, also called *Parting by Cementation*, because it is actually performed by cementation, is used when the quantity of it is so great in proportion to the silver, that it cannot be separated by aquafortis. This operation is done in the following manner.

A cement is first prepared, composed of four parts of bricks powdered and sifted, of one part of green vitriol calcined till it becomes red, and of one part of common salt. The whole is very accurately mixed together, and a firm paste is made of it by moistening it with a little water or urine. This cement is called *cement royal*, because it is employed to purify gold, which is considered by chemists as the king of metals.

The gold to be cemented is to be reduced to plates as thin as small pieces of money. At the bottom of the crucible or cementing-pot, a stratum of cement, of the thickness of a finger, is to be put, which is to be covered with plates of gold; upon these another stratum of cement is to be laid; and then more plates of gold, till the crucible or pot is filled with these alternate strata of cement and of gold. The whole is then to be covered with a lid, which is to be luted with a mixture of clay and sand. This pot is to be placed

in a furnace, or oven, and heated by degrees till it is moderately red, which heat is to be continued during 24 hours. The heat must not be so great as to melt the gold. The pot or crucible is then left to cool, and the gold is to be carefully separated from the cement, and boiled at different times in a large quantity of pure water. This gold is to be elayed upon a touchstone or otherwise; and if it be found not sufficiently purified, it is to be cemented a second time in the same manner.

The vitriolic acid of the bricks and of the calcined vitriol disengages the acid of the common salt during this cementation: and this latter acid dissolves the silver allayed with the gold, and separates it by that means.

This experiment proves, that although marine acid, while it is liquid, cannot attack silver, it is nevertheless a powerful solvent of that metal. But for this purpose it must be applied to the silver in the state of vapours, extremely concentrated, and assisted with a considerable heat. All these circumstances are united in the concentrated parting.

This experiment proves also, that notwithstanding all these circumstances, which favour the action of the marine acid, it is incapable of dissolving gold.

Lastly, the marine acid in this state more effectually dissolves the silver than the nitrous acid does in the parting by aquafortis, since this operation succeeds well when the silver is in so small a proportion as that it would be protected from the action of the nitrous acid in the ordinary parting.

Instead of sea-salt, nitre may be used with equal success; because the nitrous acid is then put in a state to attack the silver, notwithstanding the quantity of gold which covers it.

Dry Parting. Dry parting, or parting by fusion, is performed by sulphur, which has the property of uniting easily with silver, while it does not attack gold.

This method of separating these two metals would be the cheapest, the most expeditious and convenient of any, if the sulphur could dissolve the silver, and separate it from the gold as well and as easily as nitrous acid does: but, on the contrary, we are obliged to employ particular treatment, and a kind of concentration, to begin the union of the sulphur allayed with gold. Then repeated and troublesome fusions must be made, in each of which we are obliged to add different intermediate substances, and particularly the metals which have the strongest affinity with sulphur, to assist the precipitation, which in that case does not give a regulus of pure gold, but a gold still allayed with much silver, and even with a part of the precipitating metals; so that, to complete the operation, cupellation is necessary, and also parting by aquafortis.

From what we have said concerning this operation, we may perceive, that it ought not to be made but when the quantity of silver with which the gold is allayed is so great, that the quantity of gold which might be obtained by the ordinary parting is not sufficient to pay the expences; and that it is only proper for concentrating a larger quantity of gold in a smaller quantity of silver. As this dry parting is troublesome, and even expensive, it ought not to be undertaken but on a considerable quantity of silver allayed with gold. Accordingly Cramer, Schlutter, Schlinder, and all good

chemists and artists who have given processes for the dry parting, recommend its use only in the abovementioned cases. We wish that this operation could be improved: it would be much more advantageous if it could be done by two or three fusions; and if by these an exact separation could be obtained of a small quantity of gold mixed with a large quantity of silver.

Chem. Dict.

As this operation for extracting a small quantity of gold from a large quantity of silver is, notwithstanding its inconveniences, approved by Schlutter, Scheffer, and other authors, and practised in Hartz, we shall add what Dr Lewis, in his excellent History of Gold, has said upon the subject.

The most advantageous method of separating a small portion of gold from a large one of silver, appears to be by means of sulphur, which unites with and scorifies the silver without affecting the gold: but as sulphurated silver does not flow thin enough to suffer the small particles of gold diffused through it to reunite and settle at the bottom, some addition is necessary for collecting and carrying them down.

In order to the commixture with the sulphur, 50 or 60 pounds of the mixed metal, or as much as a large crucible will receive, are melted at once, and reduced into grains, by lading out the fluid matter, with a small crucible made red-hot, and pouring it into cold water stirred with a rapid circular motion. From an eighth to a fifth of the granulated metal, according as it is richer or poorer in gold, is reserved, and the rest well mingled with an eighth of powdered sulphur. The grains enveloped with the sulphur are again put into the crucible, and the fire kept gentle for some time, that the silver, before it melts, may be thoroughly penetrated by the sulphur; if the fire was hastily urged, great part of the sulphur would be dissipated, without acting upon the metal.

If to sulphurated silver in fusion pure silver be added, the latter falls to the bottom, and forms there a distinct fluid not miscible with the other. The particles of gold, having no affinity with the sulphurated silver, join themselves to the pure silver, wherever they come in contact with it, and are thus transferred from the former into the latter, more or less perfectly according as the pure silver was more or less thoroughly diffused through the mixed. It is for this use that a part of the granulated metal was reserved. The sulphurated mass being brought into perfect fusion, and kept melted for near an hour in a close covered crucible, one-third of the reserved grains is thrown in; and as soon as this is melted, the whole is well stirred, that the fresh silver may be distributed through the mixed, to collect the gold from it. The stirring is performed with a wooden rod; an iron one would be corroded by the sulphur, so as to deprive the mixed of its due quantity of sulphur, and likewise render the subsequent purification of the silver more troublesome. The fusion being continued an hour longer, another third of the unsulphurated grains is added, and an hour after this the remainder; after which the fusion is further continued for some time, the matter being stirred at least every half hour from the beginning to the end, and the crucible kept closely covered in the intervals.

The sulphurated silver appears in fusion of a dark-brown

ing. brown colour: after it has been kept melted for a certain time, a part of the sulphur having escaped from the top, the surface becomes white, and some bright drops of silver, about the size of pease, are perceived on it. When this happens, which is commonly in about three hours after the last addition of the reserved grains, sooner or later according as the crucible has been more or less closely covered, and the matter more or less stirred, the fire must be immediately discontinued; for otherwise more and more of the silver, thus losing its sulphur, would subside and mingle with the gold at the bottom in which the gold is collected. The whole is poured out into an iron mortar greased and duly heated; or if the quantity is too large to be safely lifted at once, a part is first laded out from the top with a small crucible, and the rest poured into the mortar. The gold, diffused at first through the whole mass, is now found collected into a part of it at the bottom, amounting only to about as much as was reserved unsulphurated. This part may be separated from the sulphurated silver above it by a chisel and hammer; or more perfectly, the surface of the lower mass being generally rugged and unequal, by placing the whole mass with its bottom upwards in a crucible: the sulphurated part quickly melts, leaving unmelted that which contains the gold, which may thus be completely separated from the other. The sulphurated silver is essayed by keeping a portion of it in fusion in an open crucible till the sulphur is dissipated, and then dissolving it in aquafortis. If it should still be found to contain any gold, it is to be melted again; as much more unsulphurated silver is to be added as was employed in each of the former injections, and the fusion continued about an hour and a half.

The gold thus collected into a part of the silver may be further concentrated into a smaller part, by granulating the mass and repeating the whole process. The operation may be again and again repeated, till so much of the silver is separated, that the remainder may be parted by aquafortis without too much expence.

The foregoing process, according to Mr Schlutter, is practised at Rammelsberg in the Lower Hartz. The prevailing metal in the ore of Rammelsberg is lead: the quantity of lead is at most 40 pounds on a quintal or 100 pounds of the ore. The lead worked off on a test or concave hearth yields about 110 grains of silver, and the silver contains only a 384th part of gold; yet this little quantity of gold, amounting scarcely to a third of a grain in a hundred weight of this ore, is thus collected with profit. The author abovementioned confines this method of separation to such silver as is poor in gold, and reckons parting with aquafortis more advantageous where the gold amounts to above a 64th of the silver: he advises also not to attempt concentrating the gold too far, as a portion of it will always be taken up again by the silver. Mr Scheffer, however, relates, (in the Swedish Memoirs for the year 1752), that he has by this method brought the gold to perfect fineness; and that he has likewise collected all the gold which the silver contained; the silver of the last operations, which had taken up a portion of the gold, being reserved to be worked over again with a fresh quantity of gold-holding silver. The sulphurated silver is purified by continuing it in

fusion for some time with a large surface exposed to the air; the sulphur gradually exhales, and leaves the silver entire.

PASSIFLORA, or PASSION-FLOWER, a genus of the pentandria order, belonging to the gynandria class of plants. There are near 30 different species; all of them natives of warm foreign countries, only one of which is sufficiently hardy to succeed well in the open ground here; all the others requiring the shelter of a green-house or stove, but chiefly the latter. The most remarkable are,

1. The *cærulea*, or blue-rayed common palmated passion-flower, hath long, slender, shrubby, purplish-green stalks, branchy, and ascending upon support by their claspers thirty or forty feet high; with one large palmated leaf at each joint, and at the axillas large spreading flowers, with whitish-green petals, and a blue radiated nectarium; succeeded by a large, oval, yellowish fruit. It flowers from July until October; the flowers are very large, conspicuous, and their composition is exceedingly curious and beautiful. The general structure of the singular flowers of this plant is, they come out at the axillas on pedunculi about three inches long, which they terminate, each flower having just close under the calix a three-lobed involucre-like appendage; a five-lobed calix, and a five-petalous corolla, the size, figure, and colour of the calix, &c. the petals arranging alternately with the calicinal lobes; the whole, including the involucre, calix, and corolla, make just 13 lobes and petals, all expanded flat: and within the corolla is the nectarium, composed of a multitude of thread-like fibres, of a blue and purple colour, disposed in circular rays round the column of the fructification; the outer ray is the longest, flat, and spreading on the petals; the inner is short, erect, and narrows towards the centre: in the middle is an erect cylindric club-shaped column, or pillar, crowned with the roundish germen, having at its base five horizontal spreading filaments, crowned with incumbent yellow anthers, that move about every way; and from the side of the germen arise three slender spreading styles, terminated by headed stigmas: the germen afterwards gradually becomes a large oval fleshy fruit, ripening to a yellowish colour.—These wonderful flowers are only of one day's duration, generally opening about 11 or 12 o'clock, and frequently in hot sunny weather burst open with elasticity, and continue fully expanded all that day; and the next they gradually close, assuming a decayed-like appearance, and never open any more; the evening puts a period to their existence, but they are succeeded by new ones daily on the same plant.—This plant and flowers are held in great veneration in some foreign Catholic countries, where the religious make the leaves, tendrils, and different parts of the flower, to represent the instruments of our blessed Saviour's passion; hence the name *passiflora*.

2. The *incarnata*, incarnated, or flesh-coloured Italian passion-flower, hath a strong perennial root; slender, herbaceous stalks, rising upon support four or five feet high; leaves composed of three sawed lobes, each leaf attended by a twining tendril; and at the axillas long slender pedunculi, terminated each by one whitish flower, having a greenish calix, and a reddish or purple radiated nectarium, surrounding the column of the

fructification, which succeed to a large, round, fleshy fruit, ripening to a beautiful orange colour.—The flowers of this species are also very beautiful, though of short duration, opening in the morning, and night puts a period to their beauty; but they are succeeded by a daily supply of new ones.—The fruit of this sort is also very ornamental, as ripening to a fine reddish orange colour; but these rarely attain perfection here, unless the plants are placed in the stove; therefore when there is such accommodation, it highly merits that indulgence, where it will exhibit both flowers and green and ripe fruit, all at the same time, in a beautiful manner.

3. The *vespertilio*, or bat's-wing passion-flower, hath slender, striated, branchy stalks; large, bilobate, or two-lobed leaves, the base roundish and glandular, the lobes acute, widely divaricated like a bat's wings, and dotted underneath; and axillary flowers, having white petals and rays. The leaves of this species have a singular appearance, the two lobes being expanded six or seven inches wide, resembling the wings of a bat upon flight; hence the name *vespertilio*.

As all the species are natives of warm climates, in this country they are mostly of a tender quality, except the first sort, which succeeds very well in the full ground, in a warm situation; only their young branches are sometimes killed in very severe winters; but plenty of new ones generally rise again in spring following: the others, denominated *stove* kinds, must always be retained in that repository.

PAWN, a pledge or gage for surety of payment of money lent. It is said to be derived a *pugno, quia res quæ pignori dantur, pugno vel manu traduntur*. The party that pawns goods hath a general property in them; they cannot be forfeited by the party that hath them in pawn for any offence of his, nor be taken in execution for his debt; neither may they otherwise be put in execution till the debt for which they are pawned is satisfied.

If the pawn is laid up, and the pawnee robbed, he is not answerable; though if the pawnee use the thing, as a jewel, watch, &c. that will not be the worse for wearing, which he may do, it is at his peril; and if he is robbed, he is answerable to the owner, as the using occasioned the loss, &c.

If the pawn is of such a nature that the keeping is a charge to the pawnee, as a cow, or a horse, &c. he may milk the one, and ride the other, and this shall go in recompence for his keeping.

Things which will grow the worse by using, as apparel, &c. he may not use.

PAVING, the construction of ground-floors, streets, or high-ways, in such a manner that they may be conveniently walked upon. In Britain, the pavement of the grand streets, &c. are usually of flint, or rubble-stone; courts, stables, kitchens, halls, churches, &c. are paved with tiles, bricks, flags, or fire-stone; sometimes with a kind of free-stone, and rag-stone.

In some streets, *e. gr.* of Venice, the pavement is of brick; churches sometimes are paved with marble, and sometimes with mosaic work, as the church of St Mark at Venice. In France, the public roads, streets, courts, &c. are all paved with gres or gritt, a kind of free-stone.

In Amsterdam and the chief cities of Holland, they

call their brick pavement the *burgher-masters pavement*, to distinguish it from the stone or flint pavement, which usually takes up the middle of the street, and which serves for carriages; the brick which borders it being destined for the passage of people on foot.

Pavements of free-stone, flint, and flags, in streets, &c. are laid dry, *i. e.* in a bed of sand; those of courts, stables, ground rooms, &c. are laid in a mortar of lime and sand; or in lime and cement, especially if there be vaults or cellars underneath. Some masons, after laying a floor dry, especially of brick, spread a thin mortar over it; sweeping it backwards and forwards to fill up the joints. The several kinds of pavement are as various as the materials of which they are composed, and whence they derive the name by which they are distinguished; as,

1. *Pebble-paving*, which is done with stones collected from the sea-beach, mostly brought from the islands of Guernsey and Jersey; they are very durable, indeed the most so of any stone used for this purpose. They are used of various sizes, but those which are from six to nine inches deep, are esteemed the most serviceable. When they are about three inches deep, they are denominated *bolders*, or *bowlers*; these are used for paving court-yards, and other places not accustomed to receive carriages with heavy weights; when laid in geometrical figures, they have a very pleasing appearance.

2. *Rag-paving* was much used in London, but is very inferior to the pebbles; it is dug in the vicinity of Maidstone, in Kent, from which it has the name of *Kentish rag-stone*; there are squared stones of this material for paving coach-tracks and foot-ways.

3. *Purbeck pitchens*; square stones used in footways; they are brought from the island of Purbeck, and also frequently used in court-yards; they are in general from six to ten inches square, and about five inches deep.

4. *Squared paving*, for distinction by some called *Scotch paving*, because the first of the kind paved in the manner that has been and continues to be paved, came from Scotland; the first was a clear close stone, called *blue whyn*, which is now disused, because it has been found inferior to others since introduced in the order they are hereafter placed.

5. *Granite*, a hard material, brought also from Scotland, of a reddish colour, very superior to the blue whyn quarry.

6. *Guernsey*, which is the best, and now almost the only stone in use; it is the same stone with the pebble before spoken of, but broken with iron hammers, and squared to any dimensions required of a prismoidal figure, set with its smallest base downwards. The whole of the foregoing paving should be bedged and paved in small gravel.

7. *Purbeck-paving*, for footways, is in general got in large surfaces about 2½ inches thick; the blue fort is the hardest and the best of this kind of paving.

8. *Yorkshire paving*, is an exceeding good material for the same purpose, and is got of almost any dimensions of the same thickness as the Purbeck. This stone will not admit the wet to pass through it, nor is it affected by the frost.

9. *Ryegate, or fire-stone paving*, is used for hearths, stoves, ovens, and such places as are liable to great heat, which does not affect this stone if kept dry.

10. *Newcastle flags*, are stones about two feet square, and 1½ or two inches thick; they answer very well for paving out-offices; they are somewhat like the Yorkshire.

11. *Portland paving*, with stone from the island of Portland; this is sometimes ornamented with black marble dots.

12. *Swedland paving*, is a black slate dug in Leicestershire, and looks well for paving halls, or in party-coloured paving.

13. *Marble paving*, is mostly variegated with different marbles, sometimes inlaid in mosaic.

14. *Flat brick paving*, done with brick laid in sand, mortar, or grout, as when liquid lime is poured into the joints.

15. *Brick-on-edge paving*, done with brick laid edge-wise in the same manner.

16. Bricks are also laid flat or edgewise in herring-bone.

17. Bricks are also sometimes set endwise in sand, mortar, or grout.

18. Paving is also performed with paving bricks.

19. With ten inch tiles.

20. With foot tiles.

21. With clinkers for stables and outer offices.

22. With the bones of animals, for gardens, &c.

And, 23. We have knob-paving, with large gravel-stones, for porticoes, garden-seats, &c.

Pavements of churches, &c. frequently consist of stones of several colours; chiefly black and white, and of several forms, but chiefly squares and hexagons, artfully disposed. Indeed, there needs no great variety of colours to make a surprising diversity of figures and arrangements. M. Truchet, in the Memoir of the French Academy, has shown by the rules of combination, that two square-stones, divided diagonally into two colours, may be joined together chequerwise, 64 different ways; which appears surprising enough; see two letters, or figures, can only be combined two ways.

The reason is, that letters only change their situation with regard to the first and second, the top and bottom remaining the same; but in the arrangement of these stones, each admits of four several situations, in each whereof the other square may be changed 16 times, which gives 64 combinations.

Indeed, from a farther examination of these 64 combinations, he found there were only 32 different figures, each figure being repeated twice in the same situation, though in a different combination; so that the two only differed from each other by the transposition of the dark and light parts.

PERIAGUA, a sort of large canoe made use of in the Leeward islands, South America, and the gulf of Mexico. It is composed of the trunks of two trees, hollowed and united together; and thus differs from the Canoe which is formed of one tree.

PERSIMON (*Diospyros Virginiana*, Linn.) a tree pretty common in North America; the fruit of which, when ripe, is sweet and glutinous, with a little astringency. From the persimon is made a very palatable liquor, in the following manner. As soon as the fruit is ripe, a sufficient quantity is gathered, which is very easy, as each tree is well stocked with them. These persimon apples are put into a dough of wheat or other flour, formed into cakes, and put into an oven, in which they continue till they are quite baked and sufficiently dry, when they are taken out again; then,

in order to brew the liquor, a pot full of water is put on the fire, and some of the cakes are put in: these become soft by degrees as the water grows warm, and crumble in pieces at last; the pot is then taken from the fire, and the water in it well stirred about, that the cakes may mix with it; this is then poured into another vessel, and they continue to steep and break as many cakes as are necessary for a brewing: the malt is then infused, and they proceed as usual with the brewing. Beer thus prepared is reckoned much preferable to other beer. They likewise make brandy of this fruit in the following manner: having collected a sufficient quantity of persimons in autumn, they are all together put into a vessel, where they lie for a week till they are quite soft: then they pour water on them, and in that state they are left to ferment of themselves, without promoting the fermentation by any addition. The brandy is then made in the common way, and is said to be very good, especially if grapes (in particular of the sweet sort) which are wild in the woods, be mixed with the persimon fruit. Some persimons are ripe at the end of September, but most of them later, and some not before November and December, when the cold first overcomes their acrimony. The wood of this tree is very good for joiners instruments, such as planes, handles to chisels, &c. but if after being cut down it lies exposed to sunshine and rain, it is the first wood which rots, and in a year's time there is nothing left but what is useless. When the persimon trees get once into a field, they are not easily got out of it again, as they spread so much.

PEZIZA, *CUP-MUSHROOM*, in botany, a genus of the class of cryptogamia, and order of fungi. This mushroom is bell-shaped and sessile. Linnæus enumerates eight species.

PHAETON, in ornithology, a genus of birds belonging to the order of anseres; the characters of which are: The bill is sharp, straight, and pointed; the nostrils are oblong, and the hinder toe is turned forward. There are two species, viz.

1. The demersus, or penguin, has a thick, arched, and bill; the head, hind-part of the neck, and the back, of a dusky purplish hue, and breast and belly white; brown wings, with the tips of the feathers white; inside of a tail, a few black bristles; and red legs. It is found on Penguin isle, near the Cape of Good Hope.

2. The ethereus, or tropic bird, is about the size of a partridge, and has very long wings. The bill is red, with an angle under the lower mandible. The eyes are encircled with black, which ends in a point towards the back of the head. Three or four of the larger quills, towards their ends, are black, tipped with white; all the rest of the bird is white, except the back, which is variegated with curved lines of black. The legs and feet are of a vermilion red. The tail consists of two long straight narrow feathers, and a set of equal breadth from their quills to their point. See Plate CCCXXI. These birds are rarely seen but between the tropics, at the remotest distance from the equator. Their name seems to imply the limits of their residence; and although they are seldom seen but a few degrees north or south of either tropic, yet one of their breeding-places is almost nine degrees from the northern tropic, viz. at Bermudas. They breed also in great numbers on some little islands at the east end of Porto Rico.

PHARMACY, (*Encycl.*) n° 288. Correct thus: "Let the iron-silings be put below a lawn or gauze sieve, and the magnet applied above; it will attract them through the pores of the sieve, and thus free them more effectually from heterogeneous matter."

PHASCUM, in botany, a genus of the class of cryptogamia, and order of fungi or mosses. Its characters are, that the anthera is covered, and guarded at the margin by parallel bristles; and that the calyptra, or veil, is small. There are four species.

PHORMIUM, *New Zealand FLAX-PLANT*. See *FLAX-Plant*, (*Append.*)

PHOSPHORUS. P. 6168, col. i. line 35, for *quicksilver* read *quickslime*.

PIRENETIC, a term used to denote those who, without being absolutely mad, are subject to such strong fallacies of imagination as in some measure pervert their judgment, and cause them act in a way different from the more rational part of mankind.

PILEUS, in Roman antiquity, was the ordinary cap or hat worn at public shows and sacrifices, and by the freedmen. It was one of the common rewards assigned to such gladiators as were slaves, in token of their obtaining freedom.

PINANG, the Chinese name of the areca catechu, *Lin.* See *ARECA*, (*Encycl.*)

PINCHBECK. See *SIMILOR* and *ZINC*, (*Encycl.*)

PINGICULA VULGARIS, *Butterwort*, or *Yorkshire fanicle*. The Laplanders receive the milk of the rein-deer upon the fresh leaves of this plant, which they immediately strain off and set aside till it becomes somewhat acedent; and the whole acquires in a day or two the consistence of cream without separating the serum, and thus becomes an agreeable food. When thus prepared, a small quantity of the same has the property of rennet in producing the like change on fresh milk.

PIUS II. (*Pope*), before called *Aeneas Sylvius Bar. Piccolomini*, was born at Corsignano of Siena in 1405. He was, at the age of 26, secretary to Dominico Capranico at the council of Bale, and had the provostship of St Laurence's church in Milan. Afterwards Frederick III. honoured him with the poetical crown, and employed him in divers embassies to Rome, Naples, Bohemia, &c. He managed several employments with success, especially in the diet which he called for the forming of a league against the Turks at Ratibon and Francfort, where he delighted himself with wonderful eloquence. Calixtus III. made him cardinal in 1456; and that pope died, he was advanced to his place, and took the name of Pius II. In 1458 he summoned the Christians against the Turks; and would have led some army in order to die at Ancona, whither he was going, but he died at Ancona, having sat 6 years, &c. His works were published at Bale 1571. He was a person of true courage, singular prudence, the best and most learned pope that ages before.

PLANTS, FOSSILE. Most species of tender and herbaceous plants are found at this day, in great abundance, buried at considerable depths in the earth, and converted, as it were, to the nature of the matter they lie among; fossil food is often found very little altered, and often ingenerated with substances of al-

most all the different fossil kinds, and lodged in all the several strata, sometimes firmly imbedded in hard matter; sometimes loose: but this is by no means the case with the tenderer and more delicate subjects of the vegetable world. These are usually immersed either in a blackish slaty substance, found lying over the strata of coal, else in loose nodules of ferruginous matter of a pebble-like form, and they are always altered into the nature of the substance they lie among: what we meet with of these are principally of the fern kind; and what is very singular, though a very certain truth, is, that these are principally the ferns of American growth, not those of our own climate. The most frequent fossil plants are the polypody, spleen-wort, osmund, trichomanes, and the several larger and smaller ferns; but beside these there are also found pieces of the equisetum or horsetail, and joints of the dellated plants, as the clivers, madder, and the lile; and these have been too often mistaken for flowers; sometimes there are also found complete grasses, or parts of them, as also reeds, and other watery plants; sometimes the ears of corn, and not unfrequently the twigs or bark, and impressions of the bark, and fruit of the pine or fir kind, which have been, from their scaly appearance, mistaken for the skins of fishes; and sometimes, but that very rarely, we meet with mosses and sea-plants.

Many of the ferns not unfrequently found, are of very singular kinds, and some species yet unknown to us; and the leaves of some appear set at regular distances, with round protuberances and cavities. The stones which contain these plants split readily, and are often found to contain, on one side, the impression of the plant; and on the other the prominent plant itself; and, beside all that have been mentioned, there have been frequently supposed to have been found with us, ears of common wheat, and of the maize or Indian corn; the first being in reality no other than the common endmost branches of the fern, and the other the thicker boughs of various species of that and of the pine kind, with their leaves fallen off; such branches in such a state cannot but afford many irregular tubercles and papillae, and, in some species, such as are more regularly disposed.

These are the kinds most obvious in England; and these are either immersed in the slaty stone which constitutes whole strata, or in flatted nodules, usually of about three inches broad, which readily split into two pieces on being struck.

They are most common in Kent, on coal-pits near Newcastle, and the forest of Dean in Gloucestershire; but are more or less found about almost all our coal-pits, and many of our iron mines. Though these seem the only species of plants found with us, yet in Germany there are many others, and those found in different substances. A whitish stone, a little harder than chalk, frequently contains them: they are found also often in a grey slaty stone of a firmer texture, not unfrequently in a blackish one, and at times in many others. Nor are the bodies themselves less various here than the matter in which they are contained: the leaves of trees are found in great abundance, among which those of the willow, poplar, whitethorn, and pear trees, are the most common; small branches of box, leaves of the olive-tree, and stalks of garden thyme, are also found there; and sometimes ears of the various species

cies of corn, and the larger as well as the smaller mofes in great abundance.

These feem the tender vegetables, or herbaceous plants, certainly found thus immerfed in hard ftone, and buried at great depths in the earth: others of many kinds there are alfo named by authors; but, as in bodies fo imperfect, errors are eafily fallen into, thefe feem all that can be afcertained beyond mere conjecture.

PLANTS, Method of PRESERVING them in their original Shape and Colour. Wash a fufficient quantity of fine fand, fo as perfectly to feparate it from all other fubftances; dry it; pafs it through a fieve to clear it from any grofs particles which would not rife in the washing: take an earthen vefel of a proper fize and form, for every plant and flower which you intend to preferve; gather your plants and flowers when they are in a ftate of perfection, and in dry weather, and always with a convenient portion of the ftalk: heat a little of the dry fand prepared as above, and lay it in the bottom of the vefel, fo as equally to cover it; lay the plant or flower upon it, fo as that no part of it may touch the fides of the vefel: lift or shake in more of the fame fand by little upon it, fo that the leaves may be extended by degrees, and without injury, till the plant or flower is covered about two inches thick: put the vefel into a ftove, or hot-houfe, heated by little and little to the 50th degree; let it ftand there a day or two, or perhaps more, according to the thicknefs and fucculence of the flower or plant; then gently shake the fand out upon a fheet of paper, and take out the plant, which you will find in all its beauty, the ftape as elegant, and the colour as vivid as when it grew.

Some flowers require certain little operations to preferve the adherence of their petals, particularly the tulip; with refpect to which it is neceffary, before it is buried in the fand, to cut the triangular fruit which riles in the middle of the flower; for the petals will then remain more firmly attached to the ftalk.

A hortus ficcus prepared in this manner would be one of the moft beautiful and ufeul curiofities that can be.

PLAY, in poetry, &c. See **DRAMA, TRAGEDY, COMEDY, &c.** (*Encycl.*)

PLAY-HOUSE. The moft ancient Englifh play-houfes were the Curtain in Shoreditch, and the Theatre. In the time of Shakefpeare, who commenced a dramatic writer about the year 1592, there were no lefs than ten theatres open, four private houfes, and fix that were called public theatres. Moft, if not all, of Shakefpeare's plays were performed either at the Globe, which was an hexagonal building, partly open to the weather and partly covered with reeds, on the fouthern fide of the river Thames, called the *Bank-fide*, and a public theatre, where they always acted by day-light; or at the theatre in Blackfriars, which was a private play-houfe, and where plays were ufually reprefented by candle-light. Both thefe belonged to the fame company of comedians, viz. his majesty's fervants; which title they affumed after a licence had been granted to them by king James in 1603, having before this time been called the fervants of the lord chamberlain. The exhibitions at the Globe feem to have been calculated chiefly for the lower clafs of peo-

ple, and thofe at Blackfriars for a more select and judicious audience. The former was a fummer, and the latter a winter theatre. Many of our ancient dramatic pieces were performed in the yards of carrier's inns; in which, in the beginning of queen Elizabeth's reign, the comedians, who then firft united themfelves in companies, erected an occasional ftage. The form of thefe temporary play-houfes feems to be preferved in our modern theatre. Many circumftances concur to render it probable, that our ancient theatres, in general, were only furnifhed with curtains, which opened in the middle, and a fingle fcene compofed of tapeftry, fometimes ornamented with pictures. In the year 1605, Inigo Jones exhibited an entertainment at Oxford, in which moveable fcenes were ufed; but they were not then ufed in the public theatres. When Sir William Davenant firft opened, by virtue of his patent, the duke of York's theatre in Lincoln's-Inn fields, in the fpring of the year 1662, with one of his own plays, the ftege of Rhodes, then fcenes made their firft appearance upon the Englifh ftage; and about the fame time actresses were alfo introduced, probably by him, in imitation of the foreign theatres; and Mrs Betterton is faid to have been the firft woman that appeared on the Englifh ftage. Before this time female characters were reprefented by boys or young men. In the time of Shakefpeare plays began at one o'clock in the afternoon, and the exhibition was ufually finifhed in two hours; and fo late as 1667, they commenced at three o'clock. See *Malone's Supplemental Observations to Steevens's edition of Shakefpeare*.

If any perfons fhall, in plays, &c. jellingly or profanely ufe the name of God, they fhall forfeit 10 l. Stat. 1. Jac. I. cap. 21. And players fpeaking any thing in derogation of religion, &c. are liable to forfeitures and imprifonments. 1. Eliz. Alfo acting plays or interludes on a Sunday is fubject to penalties, by 1 Car. I. cap. 1. No perfon fhall act any new play, or addition to an old one, &c. unlefs a true copy thereof, figned by the mafter of the play-houfe, be fent to the lord chamberlain 14 days before it be acted, who may prohibit the reprefenting any ftage-play; and perfons acting contrary to fuch prohibitions fhall forfeit 50 l. and their licences, &c. Stat. 10. Geo. II. cap. 28. And by this ftatute, no licence is to be given to act plays, but in the city and liberties of Weftminfter, or places of his majesty's refidence.

PLEASURE. (*Encycl.*) Pleafure and pain are no other than engines in nature's hand, whereby we are directed to confult our own prefervation, and avoid our ruin. To things that may contribute to the one, as food, venery, &c. fhe has annexed pleafure; and to thofe that may conduce to the other, as hunger, difeafes, &c. pain. She durft not leave it to our difcretion, whether we would preferve and propagate the fpecies or not; but, as it were, conftains us to both. Were there no pleafure in eating, nor pain in hunger, what numbers would be ftarved through negligence, forgetfulnefs, or floth? What is it induces people to the office of generation, but pleafure? Without this the world had fcarce fubfifted to this time.

Among the multiplicity of things to be done, and to be avoided, for the prefervation of animal life, &c. how fhould we have diftinguifhed between the one and the

Pleasure
Point.

the other, but for the sensation of pleasure and pain? These are not only spurs to urge us on, but also guides to direct us whither we are to go. Wherever nature has fixed a pleasure, we may take it for granted she there enjoins a duty; and something is to be there done, either for the individual, or for the species.

Hence it is, that our pleasures vary at different stages of life; the pleasures, *e. g.* of a child, a youth, a grown man, an old man, &c. all tending to those particular things required by nature in that particular state of life, either for the preservation simply, or jointly for that and propagation, &c.

Hence, from the different constitutions of the body, at different ages, it were very easy to account for all the particular tastes and pleasures thereof: not by deducing the pleasures mechanically from the disposition of the organs in that state, but by considering what is necessary for the perfection and well-being of the individual in that state, and what is to contribute to that of the species. In a child, *e. g.* mere preservation in the present state is not enough; it must likewise grow: to bring this to pass, nature has made the returns of hunger, &c. more frequent, as well as more acute, and the pleasures of feeding more exquisite. And that the excess of aliment, in proportion to the bulk of the body, may be dispensed with, she has made one of the great pleasures of this state to consist in a series of sportive exercises; by means whereof the parts of the body come to be opened and expanded, and arrive at maturity. This done, the pleasures that conducted thereto disappear; and others, suited to the new state, succeed.

PLUMBAGO, LEAD-WORT; a genus of the monogynia order, belonging to the pentandria class of plants. There are four species; the most remarkable of which are the *Europæa* and *Zeylonica*. The first grows naturally in the southern parts of Europe, and has a perennial root striking deep in the ground. There are many slender channelled stalks, about three feet high, terminated by tufts of small funnel-shaped flowers, of a blue or white colour. The second grows naturally in both the Indies. The upper part of the stalk and empalement are covered with a glutinous juice, which catches the small flies that light upon it. The former species is propagated by parting the roots, and by seeds; but the latter is too tender to thrive in the open air in this country.

POE-BIRD, in ornithology, is an inhabitant of some of the South Sea islands, where it is held in great esteem and veneration by the natives. It goes by the name of *Koko* in New Zealand; but is better known by that of *Poe-bird*. It is somewhat less than our blackbird. The feathers are of a fine mazarine blue, except those of its neck, which are of a most beautiful silver grey, and two or three short white ones which are on the pinion-joint of the wing. Under its throat hang two little tufts of curled snow-white feathers, called its *poies*, (the Otaheitian word for ear-rings); which occasioned the name of *poe bird* being given to it. It is remarkable for the sweetness of its note, as well as the beauty of its plumage. Its flesh is also delicate food. See Plate CCLXIV.

POINT-BLANK, in gunnery, denotes the shot of a gun levelled horizontally, without either mounting or sinking the muzzle of the piece.—In shooting point-

blank, the shot or bullet is supposed to go directly forward, in a straight line, to the mark; and not to move in a curve, as bombs and highly elevated random-shots do.—When a piece stands upon a level plane, and is laid level, the distance between the piece and the point where the shot touches the ground first, is called the *point-blank* range of that piece; but as the same piece ranges more or less, according to a greater or less charge, the point-blank range is taken from that of a piece loaded with such a charge as is used commonly in action. It is, therefore, necessary that these ranges of all pieces should be known, since the gunner judges from thence what elevation he is to give to his pieces when he is either farther from or nearer to the object to be fired at; and this he can do pretty nearly by sight, after considerable practice.

POLYGALA. At the end of the paragraph, delete the remark which follows the word *rattlesnake*.

POLYGAMY, (*Encycl.*) Dr Percival, Phil. Trans. vol. lvi. part i. p. 163. has very justly observed, that the practice is brutal, destructive to friendship and moral sentiment, inconsistent with one great end of marriage the education of children, and subversive of the natural rights of more than half of the species. Besides, it is injurious to population, and therefore can never be countenanced or allowed in a well-regulated state: for, though the number of females in the world may considerably exceed the number of males, yet there are more men capable of propagating their species than women capable of bearing children; and it is a well-known fact, that Armenia, in which a plurality of wives is not allowed, abounds more with inhabitants than any other province of the Turkish empire.

Yet Selden has proved, in his *Uxor Hebraica*, that plurality of wives was allowed of, not only among the Hebrews, but also among all other nations, and in all ages. It is true, the ancient Romans were more severe in their morals, and never practised it, though it was not forbid among them: and Mark Anthony is mentioned as the first who took the liberty of having two wives.

From that time it became pretty frequent in the empire, till the reigns of Theodosius, Honorius, and Arcadius, who first prohibited it by express law in 393. After this the emperor Valentinian, by an edict, permitted all the subjects of the empire, if they pleased, to marry several wives: nor does it appear, from the ecclesiastical history of those times, that the bishops made any opposition to this introduction of polygamy. In effect, there are some even among the Christian casuists, who do not look on polygamy as in itself criminal. Jurieu observes, that the prohibition of polygamy is a positive law; but from which a man may be exempted by sovereign necessity. Baillet adds, that the example of the patriarchs is a very powerful argument in favour of polygamy.

It has been much disputed among the doctors of the civil law, whether polygamy be adultery. In the Roman law it is called *stuprum*, and punished as such, that is, in some cases, capitally. But a smaller punishment is more consistent with the Jewish law, wherein the prohibition of adultery is perpetual, but that of polygamy temporary only.

In Germany, Holland, and Spain, this offence is
1 diff.

Polygala,
Polygamy.

poly. differently punished. By a constitution of Charles V. it was a capital crime. By the laws of ancient and modern Sweden, it is punished with death. In Scotland it is punished as perjury.

In England it is enacted by statute 1 Jac. I. cap. 11. that if any person, being married, do afterwards marry again, the former husband or wife being alive, it is felony, but within the benefit of clergy. The first wife in this case shall not be admitted as an evidence against her husband, because she is the true wife; but the second may, for she is indeed no wife at all; and so *vice versa*, of a second husband. This act makes an exception to five cases, in which such second marriage, tho' in the three first it is void, is, however, no felony. 1. Where either party hath been continually abroad for seven years, whether the party in England had notice of the other's being living or no. 2. Where either of the parties hath been absent from the other seven years, within this kingdom, and the remaining party hath had no notice of the other's being alive within that time. 3. Where there is a divorce or separation *a mensa et thoro* by sentence in the ecclesiastical court. 4. Where the first marriage is declared absolutely void by any such sentence, and the parties loosed *a vinculo*. Or, 5. Where either of the parties was under the age of consent at the time of the first marriage; for in such case the first marriage was voidable by the disagreement of either party, which this second marriage very clearly amounts to. But if at the age of consent the parties had agreed to the marriage, which completes the contract, and is indeed the real marriage, and afterwards one of them should marry again, judge Blackstone apprehends that such second marriage would be within the reason and penalties of the act.

Bernardus Ochinus, general of the order of Capuchins, and afterwards a Protestant, published, about the middle of the 16th century, Dialogues in favour of Polygamy, which were answered by Theodore Beza. And about the conclusion of the last century we had at London an artful treatise published in behalf of a plurality of wives, under the title of *Polygamia Triumphatrix*: the author whereof assumes the name of *Theophilus Aletheus*; but his true name was *Lysurus*: he was a native of Saxony. It has been answered by several.

In the year 1780, the rev. Mr Madan published a treatise, artfully vindicating and strongly recommending polygamy, under the title of *Thelyphthora*; or, *A Treatise on Female Ruin, in its Causes, Effects, Consequences, Prevention, and Remedy*, &c. Marriage, according to this writer, simply and wholly consists in the act of personal union, or *actus coitus*. Adultery, he says, is never used in the sacred writings but to denote the defilement of a betrothed or married woman, and to this sense he restricts the use of the term; so that a married man, in his opinion, is no adulterer, if his commerce with the sex be confined to single women, who are under no obligations by espousals or marriage to other men: but, on the other hand, the woman who should dare to have even but once an intrigue with any other man besides her husband, (let him have as many wives as Solomon), would, *ipso facto*, be an adulteress, and ought, together with her gallant, to be punished with immediate death. This,

he boldly says, is the law of God: and on this foundation he limits the privilege of polygamy to the man; in support of which he refers to the polygamous connections of the patriarchs and saints of the Old Testament, and infers the lawfulness of their practice from the blessings which attended it, and the laws which were instituted to regulate and superintend it. He contends for the lawfulness of Christians having, like the ancient Jews, more wives than one; and labours much to reconcile the genius of the evangelical dispensation to an arrangement of this sort. With this view he asserts, that there is not one text in the New Testament that even hints at the criminality of a polygamous connection; and he would infer from St Paul's direction that bishops and deacons should have but one wife, that it was lawful for laymen to have more. Christ, he says, was not the giver of a new law; but the business of marriage, polygamy, &c. had been settled before his appearance in the world, by an authority which could not be revoked. Besides, this writer not only thinks polygamy lawful in a religious, but advantageous in a civil light, and highly politic in a domestic view.

In defence of his notion of marriage, which, according to his account of it, consists in the union of man and woman as one body, the effects of which in the sight of God no outward forms or ceremonies of man's invention can add to or detract from, he grounds his principal argument on the Hebrew words made use of in Gen. ii. 24. to express the primitive institution of marriage, viz. *והיו בשר אחד*, rendered by the LXX. *πρωτοκληνησιναι προς την υνικαιαν αυην*, which translation is adopted by the evangelist (Mat. xix. 5.) with the omission only of the superfluous proposition (*προς*) after the verb. Our translation, "shall cleave to his wife," doth not, he says, convey the idea of the Hebrew, which is literally, as Montanus renders the words, "shall be joined or cemented *in* his woman, and they shall become (*i. e.* by this union) one flesh." But on this criticism it is well remarked, that both the Hebrew and Greek terms mean simply and literally attachment or adherence; and are evidently made use of in the sacred writings to express the whole scope of conjugal fidelity and duty, though he would restrain them to the grosser part of it.

With respect to the Mosaic law, for which Mr Madan is a warm advocate, it was certainly a local and temporary institution, adapted to the ends for which it was appointed, and admirably calculated, in its relation to marriage, to maintain and perpetuate the separation of the Jewish people from the Gentiles. In attempting to depreciate the outward forms of marriage, this writer would make his readers believe, that because none are explicitly described, therefore none existed; and consequently that they are the superfluous ordinances of human policy. But it is evident, from comparing Ruth iv. 10, 13. with Tobit. vii. 13, 14. and from the case of Dinah, related Gen. xxxiv. that some forms were deemed essential to an honourable alliance by the patriarchs and saints under the Old Testament, exclusive of the carnal knowledge of each other's persons. It is also evident in the case of the woman of Samaria, whose connection with a man not her husband, is mentioned in John iv. that something besides cohabitation is necessary

Polygamy. fary to constitute marriage in the sight of God.

Having stated his notion of marriage, he urges, in defence of polygamy, that, notwithstanding the seventh commandment, it was allowed by God himself, who made laws for the regulation of it, wrought miracles in support of it by making the barren woman fruitful, and declared the issue legitimate to all intents and purposes. God's allowance of polygamy is argued from Exod. xxi. 10. and particularly from Deut. xxi. 15. which, he says, amounts to a demonstration. This passage, however, at the utmost, only presupposes that the practice might have existence among so hard-hearted and sordid a people as the Jews; and therefore wisely provides against some of its more unjust and pernicious consequences, such as tended to affect the rights and privileges of heirship. Laws enacted to regulate it cannot be fairly urged in proof of its lawfulness on the author's own hypothesis; because laws were also made to regulate divorce, which Mr Madan condemns as absolutely unlawful, except in cases of adultery. Besides, it is more probable that the "hated wife" had been dismissed by a bill of divorcement, than that she was retained by her husband; and moreover, it is not certain that the two wives, so far from living with the same husband at the same time, might not be dead; for the words may be rendered thus, "if there *should have been* to a man two wives, &c." The words expressing the original institution of marriage, Gen. ii. 24. compared with Mat. xix. 4, 5, 8. afford insuperable objections against Mr Midan's doctrine of polygamy.

If we appeal on this subject, from the authority of scripture to the writings of the earliest fathers in the Christian church, there is not to be found the faintest trace of any thing resembling a testimony to the lawfulness of polygamy; on the contrary, many passages occur, in which the practice of it is strongly and explicitly condemned.

We shall close this article with the words of an excellent anonymous writer, to whose critique on Mr Madan's work we are indebted for the above remarks: "In a word, when we reflect, that the primitive institution of marriage limited it to one man and one woman; that this institution was adhered to by Noah and his sons, amidst the degeneracy of the age in which they lived, and in spite of the examples of polygamy which the accursed race of Cain had introduced; when we consider how very few (comparatively speaking) the examples of this practice were among the faithful; how much it brought its own punishment with it; and how dubious and equivocal those passages are in which it appears to have the sanction of divine approbation; when to these reflections we add another, respecting the limited views and temporary nature of the more ancient dispensations and institutions of religion—how often the imperfections and even vices of the patriarchs and people of God, in old time, are recorded, without any express notification of their criminality—how much is said to be commanded, which our reverence for the holiness of God and his law, will only suffer us to suppose, were, for wise ends, permitted—how frequently the messengers of God adapted themselves to the genius of the people to whom they were sent, and the circumstances of the times in which they lived;—above all, when we consider the purity, equity, and

benevolence of the Christian law; the explicit declarations of our Lord, and his apostle St Paul, respecting the institution of marriage, its design and limitation;—when we reflect too, on the testimony of the most ancient fathers, who could not possibly be ignorant of the general and common practice of the apostolic church; and, finally, when to these considerations we add those which are founded on justice to the female sex, and all the regulations of domestic economy and national policy, we must wholly condemn the revival of polygamy; and thus bear our honest testimony against the leading design of this dangerous and ill-advised publication."

POLYPE, or POLYPUS, in zoology, a small fresh-water insect, belonging to the genus of hydra, in the class of worms, and order of zoophytes, in the Linnean system; which, when cut into a number of separate pieces, becomes in a day or two so many distinct and separate animals; each piece having the surprising property of producing a head and tail, and the other organs necessary for life, and all the animal-functions.

The first discovery of this animal was owing to M. Leuwenhoek, who, in the year 1703, presented to the Royal Society of London a description of it, and an account of its uncommon way of producing its young; but the discovery of its amazing property of reproducing the several organs from its various pieces was not made till the year 1740, by M. Trembley, at the Hague.

The production of its young is indeed different from the common course of nature in other animals: for the young one issues from the sides of its parent in form of a small pimple or protuberance, which, lengthening and enlarging every hour, becomes in about two days a perfect animal, and drops from off its parent to exist for itself: but before it does this, it has often another growing from its side; and sometimes a third from it, even before the first is separated from its parent.

M. Trembley observes, that there is no distinguishable place in the body of the polypus by which the young are brought forth. He has seen some of them that have produced young ones from all the exterior parts of their bodies.

They breed quicker in hot than in cold weather; and what is very extraordinary is, that there never has yet been discovered among them any distinction of sex or appearance of copulation; every individual of the whole species being prolific, and that as much if kept separate, as if suffered to live among others.

If the method of this little animal's producing its young be very amazing, its reproduction of the several parts, when cut-off, is much more so. The discovery of this was perfectly accidental; for M. Trembley, who had often met with the creature in the water, and from its fixed residence in one place, and some other observations, not being able to determine whether it was an animal or a vegetable, made the trial by cutting it asunder; when, to his amazement, he found, that in a few days each of those pieces was become a perfect animal, the head part having shot forth a tail, and the tail a head.

A thousand other trials, by cutting the animal in different manners, first by M. Trembley, and afterwards, at his request, by Mons. Reaumur and Bernard

Polygamy.
Polype.

de Jussieu at Paris, and Mr Folkes, Mr Baker, and the other naturalists in England, were the result of this; and all succeeded in the same manner by those who repeated them.

It is not easy to say what is the size of this creature; for it can contract or extend its body at pleasure from the length of an inch or more, and the thickness of a hog's bristle, to the shortness of a single line, with a proportionable increase of thickness. Its body is round and tubular; at one end of which is the head, surrounded with six, eight, ten, or more arms, with which it catches its prey; and at the other, the anus and tail, by which it fixes itself to any thing it pleases.

There have been many different species of it discovered; the most elegant of which, the *polype a panache*, or plumed polype of M. Trembley, seems much to resemble the wheel-animal † (so called from having the appearance of two wheels in its head) which Mr Leuwenhoek discovered, living in a sheath or case, and affixed to the roots of duckweed.

All the species are found in clear and slowly-running waters, adhering by the tail to sticks, stones, and water plants; and live on small insects. They are easily kept alive a long time in glasses, often changing the water, keeping the glasses clean, and feeding them with a small red worm common in the mud of the Thames, or with other small insects.

The creature has its name from the Greek πολυς "many," and πους a "foot," signifying an animal with many feet; but a more apposite one might easily have been invented, since it has in reality no feet at all. What were originally taken for feet, are what have since been called its horns, and of late, more properly, its arms, their office being to catch its prey.

This animal is first of a worm-shaped figure, and of the same kind of tender substance with the horns of a common snail: it adheres by one end, like a sucker, to water-plants and other substances; the other end, which is the head, is surrounded by many arms or feeders, placed like rays round a centre: this centre is its mouth; and with these tender arms, which are capable of great extension, it seizes minute worms, and various kinds of water-insects, and brings them to its mouth; and often swallows bodies larger than itself, having a surprising property of extending its mouth wider in proportion than any other animal. After its food is digested in its stomach, it returns the remains of the animals upon which it feeds through its mouth again, having no other observable excretory. In a few days there appear small knobs or papillæ on its sides: as these increase in length, little fibres are seen rising out of the circumference of their heads, as in the parent animal; which fibres they soon begin to use for the purpose of procuring nourishment, &c. When these are arrived at mature size, they send out other young ones on their sides in the same manner; so that the animal branches out into a numerous offspring, united together, and growing out of one common parent. Each of these provides nourishment not only for itself, but for the whole society; an increase of the bulk of one polype, by its feeding, tending to an increase in the rest. Thus a polype of the fresh-water kind becomes like a plant branched out, or composed of many bodies; each of which has this singular cha-

racteristic, that if one of them be cut in two in the middle, the separated part becomes a complete animal, and soon adhering to some fixed base, like the parent from which it was separated, produces a circle of arms: a mouth is formed in the centre; it increases in bulk, emits a numerous progeny, and is in every respect as perfect an animal as that from which it was severed.

The several strange properties recorded of this animal, though very surprising, are, however, none of them peculiar to it alone. The Surinam toad is well known to produce its young, not in the ordinary way, but in cells upon its back. Mr Sherwood has very lately discovered the small eels in four parts to be without exception full of living young ones. And as to the most amazing of all its properties, the reproduction of its parts, we know the crab and lobster, if a leg be broken off, always produce a new one: and M. Bonet, M. Lyonet, Monf. de Reaumur, and Mr Folkes, have all found, on experiment, that several earth and water worms have the same property, some of them even when cut into thirty pieces. The urtica marina, or sea-nettle, has been also found to have the same; and the sea star-fish, of which the polype is truly a species, though it had long escaped the searches of the naturalists, was always well known by the fishermen to have it also.

POLYPE, marine, is different in form from the fresh-water polype already described; but is nourished, increases, and may be propagated after the same manner; Mr Ellis having often found, in his inquiries, that small pieces cut off from the living parent, in order to view the several parts more accurately, soon gave indications that they contained not only the principles of life, but likewise the faculty of increasing and multiplying into a numerous issue. It has been lately discovered and sufficiently proved by Pylæonell, Ellis, Jussieu, Reaumur, Donati, &c. that many of those substances, which had formerly been considered by naturalists as marine vegetables or sea-plants, are in reality animal-productions; and that they are formed by polypes of different shapes and sizes, for their habitation, defence, and propagation. To this class may be referred the corals, corallines, keratophyta, eschara, sponges, and alcyonium: nor is it improbable that the more compact bodies, known by the common appellations of *star-jones*, *brain-jones*, *petrified fungi*, and the like, brought from various parts of the East and West Indies, are of the same origin. To this purpose Mr Ellis observes, that the ocean, in all the warmer latitudes near the shore, and wherever it is possible to observe, abounds so much with animal-life, that no inanimate body can long remain unoccupied by some species. In those regions, the ships bottoms are soon covered with the habitations of thousands of animals: rocks, stones, and every thing lifeless, are covered with them instantly; and even the branches of living vegetables that hang into the water, are immediately loaded with the spawn of different animals, shell-fish of various kinds: and shell-fish themselves, when they become impotent and old, are the basis of new colonies of animals, from whose attacks they can no longer defend themselves. For a farther account of this system, see CORAL and CORALLINES.

POLYTRICHUM, (*Encycl.*) See Plate CCCXXI.

POPERY, in Ecclesiastical History, comprehends the religious doctrines and practices adopted and maintained by the church of Rome. The following summary, extracted chiefly from the decrees of the council of Trent, continued under Paul III. Julius III. and Pius IV. from the year 1545 to 1563, by successive sessions, and the creed of pope Pius IV. subjoined to it, and bearing date November 1564, may not be unacceptable to the reader. One of the fundamental tenets, strenuously maintained by popish writers, is the infallibility of the church of Rome; though they are not agreed, whether this privilege belongs to the pope, or a general council, or to both united; but they pretend that an infallible living judge is absolutely necessary to determine controversies, and to secure peace in the Christian church. However, Protestants allege, that the claim of infallibility in any church is not justified by the authority of Scripture; much less does it pertain to the church of Rome; and that it is inconsistent with the nature of religion, and the personal obligations of its professors; and that it has proved ineffectual to the end for which it is supposed to be granted, since popes and councils have disagreed in matters of importance, and they have been incapable, with the advantage of this pretended infallibility, of maintaining union and peace.

Another essential article of the popish creed is the supremacy of the pope, or his sovereign power over the universal church. On this subject it is maintained, that every Christian, under pain of damnation, is bound to be subject to the pope; that no appeals may be made from him; and that he alone is the supreme judge of all persons, in all ecclesiastical causes, but that he himself can be judged by no man. To this purpose they assert, that the church of Rome is the catholic church; the mother and mistress of all churches; that the pope is the vicar of Christ, successor of St Peter, and the supreme pastor over all the world. And they likewise assert his dominion over temporal princes; pretending that he may over-rule what they command; excommunicate and depose them, if they contradict his commands; and absolve their subjects from allegiance, and exempt the clergy from their jurisdiction.

This exorbitant power hath been challenged by the pope for many successive ages, and in several instances actually exercised. Thus Gregory VII. excommunicated the emperor Henry IV. and gave away his kingdoms to Rudolphus duke of Sweden. Gregory IX. excommunicated the emperor Frederick II. and absolved his subjects from their oath of allegiance. Pope Paul III. excommunicated and deposed Henry VIII. king of England, and commanded all his subjects, under a curse, to withdraw their obedience from him. Pope Pius V. and Gregory XIII. damned and deposed queen Elizabeth, and absolved her subjects from their allegiance. And this practice has been warranted by the decrees of the third Lateran council under pope Alexander III. and by the fourth Lateran council under pope Innocent III. though it is contrary to the express language of Scripture, to the doctrine and conduct of the apostles and primitive fathers, and to the confessions and practice of the ancient bishops of Rome, and altogether inconsistent with the rights of government and the welfare of society.

Farther, the doctrine of the seven sacraments is a peculiar and distinguishing doctrine of the church of Rome: these are baptism, confirmation, the eucharist, penance, extreme unction, orders, and matrimony.

The council of Trent (sess. 7. can. 1.) pronounces an anathema on those who say, that the sacraments are more or fewer than seven, or that any one of the above number is not truly and properly a sacrament. And yet it does not appear that they amounted to this number before the 12th century, when Hugo de St Victor and Peter Lombard, about the year 1144, taught that there were seven sacraments. The council of Florence, held in 1438, was the first council that determined this number. These sacraments confer grace, according to the decree of the council of Trent (sess. 7. can. 8.) *ex opere operato*, by the mere administration of them: three of them, viz. baptism, confirmation, and orders, are said (can. 9.) to impress an indelible character, so that they cannot be repeated without sacrilege; and the efficacy of every sacrament depends on the intention of the priest by whom it is administered (can. 11.) Pope Pius expressly enjoins, that all these sacraments should be administered according to the received and approved rites of the catholic church. With regard to the eucharist in particular, we may here observe, that the church of Rome holds the doctrine of transubstantiation; the necessity of paying divine worship to the consecrated bread, or host; the propitiatory sacrifice of the mass, according to their ideas of which Christ is truly and properly put to death as a sacrifice as often as the priest says mass; and solitary mass, in which the priest alone, who consecrates, communicates, and allows communion only in one kind, viz. the bread, to the laity. Sess. 14.

The doctrine of merits is another distinguishing tenet of popery; with regard to which the council of Trent has expressly decreed (sess. 6. can. 32.) that the good works of justified persons are truly meritorious; deserving not only an increase of grace, but eternal life, and an increase of glory; and it has anathematized all who deny this doctrine. Of the same kind is the doctrine of satisfactions; which supposes that penitents may truly satisfy, by the afflictions they endure under the dispensations of Providence, or by voluntary penances to which they submit, for the temporal penalties of sin, to which they are subject, even after the remission of their eternal punishment. Sess. 6. can. 30. and sess. 14. can. 8. and 9. In this connection we may mention the popish distinction of venial and mortal sins: the greatest evils arising from the former are the temporary pains of purgatory; but no man, it is said, can obtain the pardon of the latter without confession to a priest, and performing the penances which he imposes.

The council of Trent (sess. 14. can. 1.) has expressly decreed, that every one is accused, who shall affirm that penance is not truly and properly a sacrament instituted by Christ in the universal church, for reconciling those Christians to the divine majesty, who have fallen into sin after baptism: and this sacrament, it is declared, consists of two parts, the matter and the form; the matter is the act of the penitent, including contrition, confession, and satisfaction; the form of it is the act of absolution on the part of the priest. Accordingly it is enjoined, that it is the duty of every man,

Popery.

man, who hath fallen after baptism, to confess his sins once a year, at least, to a priest: that this confession is to be secret; for public confession is neither commanded nor expedient: and that it must be exact and particular, including every kind and act of sin, with all the circumstances attending it. When the penitent has so done, the priest pronounces an absolution; which is not conditional or declarative only, but absolute and judicial. This secret, or auricular confession, was first decreed and established in the fourth council of Lateran, under Innocent III. in 1215, (cap. 21.) And the decree of this council was afterwards confirmed and enlarged in the council of Florence, and in that of Trent, which ordains, that confession was instituted by Christ, that by the law of God it is necessary to salvation, and that it has been always practised in the Christian church. As for the penances imposed on the penitent by way of satisfaction, they have been commonly the repetition of certain forms of devotion, as pater-nosters, or ave-marias, the payment of stipulated sums, pilgrimages, fasts, or various species of corporal discipline. But the most formidable penance in the estimation of many, who have belonged to the Romish communion, has been the temporary pains of purgatory. But under all the penalties which are inflicted or threatened in the Romish church, it has provided relief by its indulgences, and by its prayers or masses for the dead, performed professedly for relieving and releasing the souls that are detained in purgatory.

Another article that has been long authoritatively enjoined and observed in the church of Rome, is the celibacy of her clergy. This was first enjoined at Rome by Gregory VII. about the year 1074, and established in England by Anselm archbishop of Canterbury about the year 1175; though his predecessor Lanfranc had imposed it upon the prebendaries and clergy that lived in towns. And though the council of Trent was repeatedly petitioned by several princes and states to abolish this restraint, the obligation of celibacy was rather established than relaxed by this council; for they decreed, that marriage contracted after a vow of continence is neither lawful nor valid; and thus deprived the church of the possibility of ever restoring marriage to the clergy. For if marriage, after a vow, be in itself unlawful, the greatest authority upon earth cannot dispense with it, nor permit marriage to the clergy, who have already vowed continence.

To the doctrines and practices above recited may be further added the worship of images; to justify which, the Papists often leave the second commandment out of their catechisms: the invocation of saints and angels, with respect to which the council of Trent decreed, that all bishops and pastors, who have the cure of souls, do diligently instruct their flocks, that it is good and profitable humbly to pray unto the saints, and to have recourse to their prayers, help, and aid; for which practice no scripture command or example, nor any testimony within the first 300 years after Christ, can be pleaded: the worship of sacred relics, by which they understand not only the bodies and parts of the bodies of the saints, but any of those things that appertained to them, and which they touched: and the celebration of divine service in an unknown tongue; to which purpose the council of

Trent hath denounced an anathema on any one who shall say that mass ought to be celebrated only in the vulgar tongue, sess. 25, and sess. 22, can. 9. Though the council of Lateran under Innocent III. in 1215 (can. 9.) had expressly decreed, that, because in many parts within the same city and diocese, there are many people of different manners and rites mixed together, but of one faith, the bishops of such cities or dioceses should provide fit men for celebrating divine offices, according to the diversity of tongues and rites, and for administering the sacraments.

We shall only add, that the church of Rome maintains, that unwritten traditions ought to be added to the holy Scriptures, in order to supply their defect, and regarded as of equal authority; that the books of the Apocrypha are canonical scripture; that the vulgar edition of the Bible is to be deemed as authentic; and that the Scriptures are to be received and interpreted according to that sense which the holy mother church, to whom it belongs to judge of the true sense, hath held, and doth hold, and according to the unanimous consent of the fathers.

Such are the principal and distinguishing doctrines of Popery, most of which have received the sanction of the council of Trent; and that of the creed of pope Pius IV. which is received, professed, and sworn to by every one who enters into holy orders in the church of Rome; and at the close of this creed, we are told, that the faith contained in it is so absolutely and indispensably necessary, that no man can be saved without it.

Many of the doctrines of Popery were relaxed, and very favourably interpreted by M. de Meaux, bishop of Condom, in his Exposition of the Doctrine of the Catholic Church, first printed in the year 1671: but this edition, which was charged with perverting, in endeavouring to palliate, the doctrine of the church, was censured by the doctors of the Sorbonne, and actually suppressed; nor does it appear that they ever testified their approbation in the usual form of subscription and altered editions.

PORELLA, in botany, the name of a genus of mosses, the characters of which are these: The capsules contain a powder like those of the other mosses; and they have neither operculum, calyptra, nor pedicel; and their manner of shedding their powder is not by separating into two parts, like those of the selago and lycopodium, but by opening into several holes on all sides.

Of this genus of mosses there is only one known species; this is called by Dillenius the *bluntly pinnated porella*, and grows in wet places in Virginia, Pennsylvania, Maryland, and other parts of North America.

PORPITES, the HAIR-BUTTON STONE, in Natural History, a name given by authors to a small species of fossil coral; which is usually of a rounded figure considerably flattened, and striated from the centre every way to the circumference. These are of different sizes, and of different colours, as greyish, whitish, brownish, or bluish, and are usually found immersed in stone. See Plate CCCXVII.

POTSDAM, or POSTDAM, a town of Germany in the circle of Upper Saxony, with a palace, belonging to the king of Prussia. It is seated in an island ten miles in circumference, formed by the rivers Sprae and Havel.

Popery.
Porella.

Predesti-
rian.

Havel. The palace is very curious, and finely built upon a delightful spot 10 miles west of Berlin. E. Long. 13. 42. N. Lat. 52. 34.

PREDESTINARIAN, a person who adheres to the doctrine of absolute predestination. See **PREDESTINATION**, (*Encycl.*)

St Augustin is looked on as the founder of the sect of Predestinarians, he being the first of the fathers that seems to have asserted the doctrine in such express terms; though the Janseists and Jesuits are still greatly divided about the real doctrine of St Augustin in this article, each interpreting him consistently with their own scheme.

Father Sirmond contends for an ancient sect of Predestinarians, or Predestinians, *Prædestinati*, contemporary with St Augustin himself, and who had their rise in Africa, in the monastery of Adrumetum, from a misunderstanding of St Augustin's doctrine. Hence they were led into a notion, that God not only predestinated the wicked to eternal punishment, but also to the guilt and transgression for which they are punished; and that thus both the good and bad actions of all men were determined from eternity by a divine decree, and fixed by an inevitable necessity.

It is added, that the opinion spread thence throughout the Gauls; where one of them, a priest, named *Lucidus*, was condemned by Faustus bishop of Rheggio, and his sentence was confirmed by two councils.

However, the existence of this Predestinarian sect has been denied by many learned men, particularly the president Mauguin, and considered as an invention of the Semi-pelagians, designed to decry the followers of Augustin, by attributing to him unjustly this dangerous and pernicious error. Nor does it appear, though there might have been persons who embraced the Predestinarian opinions, that the abettors of them ever formed themselves into a sect.

The doctrine was again broached in the ninth century by Godeschalvus, a Benedictine; who, as Hincmar, in a letter to pope Nicolas, says, maintained with the ancient Predestinarians, who had been already anathematized, that God predestinated some to eternal life, and others to eternal death; that God did not will all people to be saved; that Jesus Christ did not die for all, but only the elect, or those that are saved, &c.

This doctrine was again condemned in a synod held at Mentz, A. D. 848, and by a council at Quiercy, A. D. 849; in consequence of which Godeschalvus was treated with the utmost barbarity, and compelled to burn with his own hands the justification of his opinion, which he had presented to the council at Mentz. He was then cast into prison, where he died in the year 868 or 869, maintaining with his last breath the doctrine for which he had suffered.

The decrees of the former council were confirmed in a new council which met at Quiercy, A. D. 853, but they were declared null by a council assembled at Valence, A. D. 855; and the decrees of this council were confirmed by the council of Langres in the year 859, and in 860 by the council of Touli.

This controversy was revived in the 16th century by Calvin, who maintained, that the everlasting condition of mankind in a future world was determined from all eternity; and that God, in predestinating from all eternity one part of mankind to everlasting happiness, and another to endless misery, was led to make this

Predesti-
mination.

distinction by no other motive than his own good pleasure and free will. This opinion was, in a very short time, propagated through all the reformed churches, by the writings of Calvin, and by the ministry of his disciples; and in some places was inserted in the national creeds and confessions, and thus made a public article of faith.

The unhappy controversy, which took its rise from this doctrine, was opened at Straßburg, in the year 1560, by Jerome Zanchius, an Italian ecclesiastic, who was particularly attached to the sentiments of Calvin, and carried on in a manner that contributed very much to exasperate the passions and foment the discord of the contending parties.

The Predestinarian opinions have been maintained by considerable numbers, both in Popish and Protestant countries; and in our own country in particular, they have had many zealous advocates.

We shall here observe, that they have undergone a kind of relaxation by those who have been denominated *Baxterians*, from the famous nonconformist minister, Mr Richard Baxter, of the last century. The *Baxterians* have endeavoured to strike into a middle path between Calvinism and Arminianism, and to unite both these schemes. They profess to believe in the doctrines of election, effectual calling, and other tenets of Calvinism; and, consequently suppose, that a certain number, determined upon in the divine councils, will infallibly be saved. This they think necessary to secure the ends of Christ's interposition. But then, on the other hand, they reject the doctrine of reprobation, and admit, that our blessed Lord, in a certain sense, died for all; and that such a portion of grace is allotted to every man, as renders it his own fault if he doth not attain to eternal happiness. If he improves the common grace given to all mankind, this will be followed by that special grace which will end in his final acceptance and salvation. Whether the *Baxterians* are of opinion, that any, besides the elect, will actually make such a right use of common grace as to obtain the other and at length come to heaven, we cannot assuredly say. There may possibly be a difference of sentiment upon the subject, according as they approach nearer to Calvinism or Arminianism.

PREDETERMINATION, in philosophy and theology. The schoolmen call that concurrence of God, which makes men act, and determines them in all their actions both good and evil, *physical predetermination*, or *premotion*.

Divines hold, that God hath no part in sin, inasmuch as he only affords his concurrence to the physical part of human actions, not to the moral part.

Physical predetermination, or premotion, if there be any such thing, is that action of God, whereby he excites a second cause to act: or by which, antecedently to all operations of the creature, or before it could operate in consequence either of the order of nature or reason, he really and effectually moves and occasions it to produce all its actions: that is, whatever the creature does or acts, is really done and acted by the agency of God on the creature, who is all the time passive. So that, without such predetermination of God, all creatures must remain in an eternal state of inactivity; and, with such predetermination, it is impossible but that they should do what they are thus put upon doing.

Presbytery,
Pringle.

It is strongly controverted, whether or no such a physical predetermination be necessary to the action of natural causes: the Scottists maintain the negative; urging, that all natural causes are of their own nature determined to a certain action; whence it should seem needless to call in a new predetermination of God, *e. gr.* to fire, to make it warm the hand. For if an object be, by the course of divine providence, applied to fire; what need a second application of the fire, to make it warm the object applied thereto; since beings are not to be multiplied unnecessarily.

And such predetermination some philosophers hold still less requisite to produce the acts of the will; at least, say they, the human mind must be allowed the common power and privilege of a second cause, and therefore be intitled to produce its own acts, as well as other strictly natural agents.

The Thomists, on the other hand, stand up strenuously for the physical predetermination: one of their principal arguments is drawn from the subordination of second causes to the first. Where there are several subordinate agents, say they, the lower agents do not act, unless first moved and determined thereto by the first; this being the very essence of subordination.

Again, the like they argue from the dominion of God over all his creatures: It is of the essence of dominion, say they, to apply and direct things subject thereto, to its own operations; and this, if the dominion be only moral, morally; but if it be also physical, physically. And that this is the case in respect of God and his creatures, is confessed.

PRESBYTERY, an assembly of the order of presbyters, or priests, with lay-elders, for the exercise of church-discipline.

The kirk, or church, of Scotland, is divided into 69 presbyteries, each consisting of a number of parishes, not exceeding 24, nor less than 12. The ministers of these parishes, with one ruling elder chosen half-yearly out of every kirk-session, constitute a presbytery; who, meeting in their chief town, whence the presbytery is denominated, choose a moderator, or, more properly, a prolocutor, who must be a minister, half-yearly.—They determine all appeals from kirk-sessions, *i. e.* from the several parochial assemblies; but can try nothing at the first instance cognizable before a kirk-session.—They compose all differences between ministers and people; for which end, they hold presbyterial visitations in each parish, where they examine the registers of the kirk-sessions, &c.—They inquire into repairs of churches; see that the glebe, &c. suffer no dilapidations; appoint schools in the parishes; and see that the funds be not misapplied. They alone can exclude from the communion; license probationers; suspend, depose, and, in effect, determine all ecclesiastical matters within their district. From the presbytery there lies an appeal, in all cases, to provincial synods.

PRINGLE (Sir John), an eminent physician and philosopher, was a younger son of Sir John Pringle of Stitchel, in the shire of Roxburgh, baronet; took the degree of M. D. at Leyden, 1730; and published there "Dissertatio Inauguralis de Marcere Senili," 4to. After having been some years professor of moral philosophy at Edinburgh, he was in June 1745 appointed physician to the duke of Cumberland, and physician-general to the hospital of the forces in Flanders, where

the earl of Stair appears to have been his patron. In February 1746, Dr Pringle, Dr Armstrong, and Dr Barker, were nominated physicians to the hospital for lame, maimed, and sick soldiers, behind Buckingham-house; and in April 1749, Dr Pringle was appointed physician in ordinary to the king. In 1750 he published "Observations on the Nature and Cure of Hospital and Gual Fevers, in a Letter to Dr Mead," 8vo (reprinted in 1755); and in 1752 he favoured the public with the result of his long experience in an admirable treatise under the title of "Observations on the Disorders of the Army in Camp and Garrison," 8vo. On the 14th of April 1752, he married Charlotte, second daughter of Dr Oliver, an eminent physician at Bath. In 1756 he was appointed jointly with Dr Wintringham (now Sir Clifton Wintringham, bart.) physician to the hospital for the service of the forces of Great Britain. After the accession of his present majesty, Dr Pringle was appointed physician to the queen's household, 1761; physician in ordinary to the queen in 1763, in which year he was admitted of the college of physicians in London; and on the 5th of June 1766, he was advanced to the dignity of a baronet of Great Britain. In 1772 he was elected president of the Royal Society, where his speeches for five successive years, on delivering the prize-medal of Sir Godfrey Copley, gave the greatest satisfaction. Sir John Pringle in 1777 was appointed physician-extraordinary to the king. He was also a fellow of the College of Physicians at Edinburgh, and of the Royal Medical Society at Paris; member of the Royal Academies at Paris, Stockholm, Gottingen, and of the Philosophical Societies at Edinburgh and Haerlem; and continued president of the Royal Society till November 1778; after which period he gradually withdrew from the world, and in 1781 quitted his elegant house in Pall Mall (where he had long distinguished himself as the warm friend and patron of literary men of every nation and profession), and made an excursion to his native country. He returned to London in the latter end of that year; died greatly beloved and respected Jan. 18, 1782; and having no children, was succeeded in estate and also (agreeably to the limitation of the patent) in title, by his nephew, now Sir James Pringle, bart. Among this worthy physician's communications to the Royal Society, the following are the principal: 1. "Some Experiments on Substances resisting Putrefaction," Phil. Trans. N° 495, p. 580; and N° 496, p. 525, 550; reprinted, with additions, in Martin's Abridgment, vol. xi. p. 1365. 2. "Account of some Persons seized with the Gual Fever by working in Newgate, and of the manner by which the Infection was communicated to one entire Family," vol. xlviii. p. 42. At the request of Dr Hales, a copy of this useful paper was inserted in the Gentleman's Magazine, 1753, p. 71, before its appearance in the Transactions. 3. "A remarkable Case of Fragility, Flexibility, and Dissolution of the Bones," Ib. p. 297. 4. "Account of the Earthquakes felt at Brussels," vol. xlix. p. 546. 5. "Account of sinking of a River near Pontypool, in Monmouthshire," Ib. p. 547. 6. "Account of an Earthquake felt Feb. 18, 1756, along the coast of England, between Margate and Dover," Ib. p. 579. 7. "Account of the Earthquake felt at Glasgow and Dumbarton; also of a Shower of

Dust

Prophecy. Dust falling on a Ship between Shetland and Iceland," ib. p. 509. 8. "Several Accounts of the Fiery Meteor which appeared on Sunday, Nov. 26, 1758, between eight and nine at night," Vol. L. p. 218. 9. "Account of the Virtues of Soap in dissolving the Stone, in the Case of the Rev. Mr Matthew Simon," ib. p. 221. 10. "Account of the Effects of Electricity in Paralytic Cases," ib. p. 481. And see a letter to him on that subject from Professor Winthrop. "Some Account of the Success of the Vitrum Ceratum Antimonii" was printed in the "Edinburgh Medical Essays," Vol. V.

PROCELLARIA, (*Encyel*) See also Plate CCXLIII.

PROPHECY, a prediction made by divine inspiration.

One of the strongest evidences for the truth of revealed religion is that series of prophecies which is preserved in the Old and New Testaments; and a greater service, says an excellent writer, could not be done to Christianity than to lay together the several predictions of scripture with their completions, to show how particularly things have been foretold, and how exactly fulfilled. A work of this kind was desired by the lord Bacon, and he intitles it the "History of Prophecy;" in which he proposes, that every prophecy of the scripture be sorted with the event fulfilling the same throughout the ages of the world, both for the better confirmation of faith, and for the better illumination of the church touching those parts of prophecies which are yet unfulfilled; allowing, nevertheless, that latitude which is agreeable and familiar unto divine prophecies, being of the nature of the Author, with whom a thousand years are but as one day; and therefore they are not fulfilled punctually at once, but have springing and germinant accomplishment throughout many ages, though the height or fullness of them may refer to some one age. A work of this kind has been actually executed by the learned bishop Newton, in his *Dissertation on the Prophecies*.

With regard to the credibility of prophecy, it may be observed in general, that it is not at all incredible that God should upon special occasions foretell future events; and, if he affords an extraordinary revelation of his will to mankind, that he should attest its divine original by this kind of evidence; an evidence which, if the prophecies point to the events, and the events correspond with the prophecies, is in the highest degree conclusive and convincing. No previous conjecture nor accidental coincidence are sufficient to counteract and invalidate this kind of evidence.

As to most of the scripture-prophecies, they comprehend such a variety of particulars; they so minutely describe distant events, to be accomplished in circumstances which no human sagacity could foresee or conceive likely to occur; and they accord so exactly with the facts to which they refer; that there is no way of evading the conclusion, but by either denying the premises, that such prophecies were ever delivered and recorded, against which fact and history militate; or by pretending, that what we call predictions are only histories written after the events had happened, in a prophetic style and manner. But it is alleged in answer to this absurd plea, that there are all the proofs and authorities which can be had in cases of this na-

Prophecy. ture, that the prophets prophesied in one age, and that the events happened in another and subsequent age; and we have as much reason to believe these, as we have to believe any ancient matters of fact whatever; and by the same rule which leads us to deny these, we may as well controvert and contradict the credibility of all ancient history. But, besides, Christian writers undertake to prove the truth of prophecy, and consequently the truth of revelation, not by an induction of particulars long ago foretold and long ago fulfilled, the predictions of which may be supposed to have been written after the histories, but by instances of things which have confessedly many ages ago been foretold, and have in these later ages been fulfilled, or are fulfilling at this very time: so that there is no pretence for asserting such prophecies to have been written after the events; but it must be acknowledged, that the events many ages after, correspond exactly with the predictions many ages before. The evidence, therefore, which prophecy furnishes in favour of the truth of religion, is a growing evidence; and the more prophecies are fulfilled, the more testimonies there are and confirmations of the truth and certainty of divine revelation.

One of the greatest difficulties in Christianity turns upon the manner of completion of the scripture-prophecies. In the prophets of the Old Testament are frequent predictions of the Messiah, which the writers of the New frequently urge to the Jews and Heathens as fulfilled in Jesus Christ; and on this principle evince the truth of his mission. But these texts, thus urged from the Old, in the New Testament, are sometimes not to be now found in the Old; and at other times are not urged in the New in the literal and obvious sense which they seem to bear in the Old: whence most of the Christian commentators, divines, and critics, ancient and modern, judge them to be applied in a secondary, typical, allegorical, or mystical sense. Thus, *e. gr.* St Matthew, after an account of the conception of the Virgin and the birth of Jesus, says, "All this was done, that it might be fulfilled which was spoken by the prophet, saying, Behold, a virgin shall be with child, and shall bring forth a son, and they shall call his name Emmanuel." But the words, as they stand in Isaiah, whence they are supposed to be taken, do, in their obvious and literal sense, relate to a young woman who was to bring forth a child in the days of Ahaz; as appears from the context, and is owned by Grotius, Huetius, Cassio, Curcellæus, Episcopius, Hammond, Simon, Le Clerc, Lamy, &c.

This prophecy, then, not being fulfilled in Jesus in the primary, literal, or obvious sense of the words, is supposed, like the other prophecies cited by the apostles, to be fulfilled in a secondary, typical, or allegorical sense: *i. e.* this prophecy, which was first literally fulfilled by the birth of the prophet's son in the time of Ahaz, was again fulfilled by the birth of Jesus, as being an event of the same kind, and intended to be signified either by the prophet, or by God who directed the prophet's speech. Grotius observes this to be the case in most, if not all, the prophecies and citations quoted from the Old in the New Testament: and Dodwell, with Sir John Marsham, refer even the famous prophecy in Daniel, about the seventy weeks,

Prophecy. to the time of Antiochus Epiphanes; showing, that the expressions taken thence by Christ, and urged by him as predicting the destruction of Jerusalem by the Romans, have only, in a secondary sense, a respect to that destruction.

And even that famous prophecy in the Pentateuch, "A prophet will the Lord God raise up unto thee, like unto me; to him shall ye hearken;" which St Luke refers to as spoken of Jesus Christ, is by Simon, Grotius, Stillingsfleet, &c. understood to signify, in its immediate sense, a promise of a succession of prophets.

It is allowed, then, the apostles applied the prophecies which they quote from the Old Testament, in a typical sense; but, unhappily, the rules whereby they quoted them are lost. Dr Stanhope laments the loss of the Jewish traditions or rules for interpreting scripture received among the rabbins, and followed by the apostles. But this loss Surenhusius, Hebrew professor at Amsterdam, thinks he has retrieved from the Jewish Talmud and the ancient Jewish commentaries; and has accordingly published to the world the rules whereby the apostles quoted the Old Testament. But the truth is, these rules are too precarious, strained, and unnatural, to gain much credit.

Mr Whiston condemns all allegorical explanation of the prophecies of the Old Testament cited in the New, as weak, enthusiastic, &c. and adds, that if a double sense of the prophecies be allowed, and there be no other method of showing their completion than by applying them secondarily and typically to our Lord, after having been in the first and primary intention long ago fulfilled in the times of the Old Testament, we lose all the real advantages of the ancient prophecies as to the proofs of Christianity.

He therefore sets up a new scheme in opposition thereto: he owns, that taking the present text in the Old Testament for genuine, it is impossible to expound the apostles citations of the prophecies of the Old Testament on any other than the allegorical foundation; and therefore, to solve the difficulty, he is forced to have recourse to a supposition contrary to the sense of all Christian writers before him, viz. that the text of the Old Testament has been greatly corrupted since the apostolic age by the Jews. His hypothesis is, that the apostles made their quotations out of the Old Testament rightly and truly from the Septuagint version, which in their time was in vulgar use, and exactly agreed with the Hebrew original; and that as they made exact quotations, so they argued justly and logically from the obvious and literal sense of the said quotations, as they then stood in the Old Testament; but that, since their times, both the Hebrew and Septuagint copies of the Old Testament have been so greatly corrupted, and so many apparent disorders and dislocations introduced therein, as to occasion many remarkable differences and inconsistencies between the Old and New Testament in respect to the words and sense of those quotations.

As to the manner wherein these corruptions were introduced, he says, the Jews, in the second century, greatly corrupted and altered both the Hebrew and Septuagint, especially in the prophecies cited by the apostles, to make their reasoning appear inconclusive: that, in the third century, they put into Origen's hand one of these corrupted copies of the Septuagint;

which Origen mistaking for genuine, inserted in his Hexapla, and thus brought into the church a corrupted copy of the Septuagint; and that, in the end of the fourth century, the Jews put into the hands of the Christians, who till then had been almost universally ignorant of the Hebrew, a corrupted copy of the Hebrew Old Testament.

Prophecy.
Provençal.

The disagreement, then, between the Old and New Testament, in respect to the said quotations, he contends, has no place between the genuine text of the Old Testament (now nowhere existing), but only between the present corrupted text of the Old and New Testament: and therefore, to justify the reasonings of the apostles, he proposes to restore the text of the Old Testament, as it stood before the days of Origen, and as it stood in the days of the apostles; from which text, thus restored, he doubts not, it will evidently appear, that the apostles cited exactly, and argued justly and logically, from the Old Testament. But this scheme of accomplishing prophecies labours under difficulties at least as great as the allegorical scheme. Its foundation is incredible, and its superstructure, from first to last, precarious. In effect, it is inconceivable that the Old Testament should be so corrupted; and it may even be made appear, that the Hebrew and Septuagint disagreed in the times of the apostles: add to this, that the means whereby he proposes to restore the true text will never answer that end; nor has he himself, from all the means he is yet possessed of, been able to restore one prophetic citation, so as to make that seem literally which before only seemed allegorically applied.

Upon this head it may be observed, that the double sense of prophecies, for which some have zealously contended, and which others have as strenuously opposed, ought not to be understood as if a prophecy equally and indifferently referred to many persons or events; or as if, literally referring to a lower person, it was only figuratively and allegorically to be interpreted of the Messiah, (for a passage only capable of being accommodated to him is not by any means a prediction of him): but it is to be so explained, as that it may appear the Messiah was principally intended, and the prophecy literally referred to him, though it might in part be applied to some other person; and might have been understood as referring to that inferior person alone, if farther light had not been thrown upon it by comparing other prophecies, or by the testimony of those whom on other accounts we have reason to regard as authentic interpreters. Nevertheless it must be acknowledged, that though the tracing of the Messiah in such prophecies as these may serve to illustrate the unity of design, which is a considerable additional proof of the truth of a revelation; yet the main stress is to be laid upon such prophecies as evidently and solely relate to the Messiah and his kingdom, rather than on those which are capable of reference to other persons or events.

PROVENÇAL POETS, in the History of Literature, a name given to certain professions of men who sprang up in Provence about the end of the 10th century, comprehending those that were called *Troubadours*, or *Trouverres*, *Jongleurs*, *Cantadours*, *Viellars*, and *Musars*, in whom the faculties both of music and poetry seemed to be united. The first of these were

Provençal,
Prudence.

so denominated from the art which they professed of inventing or finding out as well subjects and sentiments as rhymes, constituting what at that time was deemed poetry. The jongleurs are supposed to have taken their name from some mystical instrument on which they played, probably of a name resembling in its sound that by which their profession was distinguished: whence spring the jugglers, *quasi jocolatores*, as Menage conjectures, who went about fingering their verses in courts and the houses of noblemen, with a viol or harp, or other instrument, and were dressed in a peculiar habit, for the sake of entertaining, in a burlesque manner, their protectors and patrons. The cantadours, called also *chanterres*, were singers of songs and ballads, as were also the musari; and the violars were players on the viol.

All these arts were comprehended, in the French language, under the general denomination of *menestradie, menestraudise, et jongleire*.

The Provençal poets were not only the inventors and composers of metrical romances, songs, ballads and rhymes, to so great a number, and of such a kind, as to raise an emulation in most countries of Europe to imitate them; but, if we may credit the Italian writers, the best poets of Italy, namely Petrarch and Dante, owed much of their excellence to their imitation of the Provençals; and it is also said that the greater part of the novels of Boccace are taken from Provençal or ancient French romances. The learned Dr Percy, in his Essay on the Ancient English Minstrels, has given a very curious and satisfactory account of these fathers of modern poetry and music; and although he agrees that the several professions above enumerated were included under the general name of *minstrel*, he has in the notes to that essay, p. 42. with great accuracy assigned to each its distinct and peculiar office. Of the ancient writers of romance, a history is extant in the lives of the Provençal poets, written in French by J. Nostradamus, compiled and published at Lyons in 1575; but a much more satisfactory account of them is contained in the translation of this work into Italian, with many additions, by Gio. Mario de Crescimbeni, and published, in 1710, under the title of *Commentari Interno all Istoria della Volgare Poesia*.

PRUDENCE, in ethics, may be defined an ability of judging what is best, in the choice both of ends and means. According to the definition of the Roman moralist, Dr Officiis, lib. i. cap. 43. prudence is the knowledge of what is to be desired or avoided. Accordingly he makes *prudentia* (De Legibus, lib. i.) to be a contraction of *prudentia*, or foresight. Plato (De Legibus, lib. iii.) calls this the leading virtue; and Juvenal, Sat. x. observes,

Nullum nomen adest si sit prudentia.

The idea of prudence includes *cubania*, or due consultation, that is, concerning such things as demand consultation, in a right manner, and for a competent time, that the resolution taken up may be neither too precipitate nor too slow; and *consilium*, or a faculty of discerning proper means when they occur: and to the perfection of prudence, these three things are farther required, viz. *discretio*, or a natural sagacity; *acumen*, presence of mind, or a ready turn of thought; and *experientia*, or experience. The extremes of prudence are

Pulex,
Pitinus.

craft or cunning on the one hand, which is the pursuit of an ill end by direct and proper, though not honest means; and folly on the other, which is either a mistake, both as to the end and means, or prosecuting a good end by foreign and improper means.

PULEX, the FLEA, (*Encycl.*) This bloodthirsty insect, which fattens at the expence of the human species, prefers the more delicate skin of women; but preys neither upon epileptic persons, nor upon the dead or dying. It loves to nestle in the fur of dogs, cats, and rats. The nests of river-swallows are sometimes plentifully stored with them.

Fleas are apterous; walk but little, but leap to a height equal to 200 times that of their own body. This amazing motion is performed by means of the elasticity of their feet, the articulations of which are so many springs. Thus it eludes, with surprising agility, the pursuit of the person on whom it riots.—Through the microscope its form appears monstrous; and from observations made on the generation of fleas, we know them to be oviparous. The eggs, which are exceeding smooth and slippery, are deposited at the base of the hairs of animals, and on blankets, &c. In four or five days time, the egg, being hatched, produces a little nimble larva that feeds on greasy down. When touched, it rolls itself up into a ball. After it has crept for some time with great swiftness, it spins a small downy cod, which it is careful to keep in concealment. A fortnight after, it issues from its tomb, but leaping, and under the form of a flea. Among the memorabilia of fleas, one, they say, has been seen to draw a small silver piece of ordnance to which it was fastened, the firing of the gun nowise daunting its intrepidity. The owner carried it about in a little box lined with velvet, every now and then placing it on her arm to let it feed; but winter put an end to the being of this martial flea. Another flea that became slave to an Englishman, had, for its daily and easy task, to drag its golden chain and padlock, of the weight of one grain. A third flea served as a thill-horse to an English artist, who had made an ivory coach and six, that carried a coachman with his dog between his legs, a postillion, two footmen, and four insidè riders.—Mercurial ointment, brimstone, a fumigation with the leaves of penny-royal, or fresh-gathered leaves of that plant sewed up in a bag, and laid in the bed, are remedies pointed out as destructive of fleas.

PITINUS, a genus of insects belonging to the order of coleoptera. The antennæ are filiform: The last or exterior articulations are longer than the others: The thorax is nearly round, without a margin into which the head is drawn back or received: The feet are made for leaping. The most remarkable species are,

1. The *pectinicornis*. This is produced from a worm that lodges in wood and the trunks of trees, such as the willow, where it makes deep round holes, turns to a winged insect, takes flight, and roosts upon flowers. It is distinguished by its antennæ pectinated on one side, whence it has the name of *feathered*. The elytra and thorax are of a deep clay-coloured brown, the antennæ and legs are of a pale brown.

2. The *pertinax*. The form of this insect resembles the preceding one, saving that its antennæ are filiform.

Pyrometer.

Pyramids. It is all over of a deep blackish brown colour resembling foot. It attacks household-furniture, clothes, furs, and especially animals dried and preserved in collections of natural history, where it makes great havoc. When caught, this insect bends its legs, draws back its head, and lies as if it was dead till it thinks itself out of danger. It cannot be forced out of this state of inaction either by pricking or tearing; nothing but a strong degree of heat can oblige it to resume its motion and run away. There are many beautiful varieties of this genus; but they in general escape our attention by their minuteness, and living among hay, dried leaves, and divers other dusty matters, where they undergo their metamorphoses. The larvæ of some are found in trunks of decayed trees, in old tables, chairs, &c. See Plate CCCXX.

PYRAMIDS, (*Encycl.*) Dr Bryant has lately maintained, with considerable force of argument, this opinion, that the pyramids were designed for high altars and temples, and were constructed in honour of the Deity. If the chief pyramid was designed for a place of burial, what occasion, says he, was there for a well, and for passages of communication which led to other buildings? The apartments near the pyramids he supposes to be designed for the reception of priests, and to be appendages, not to a tomb, but to a temple of the Deity. The stone coffin, he apprehends, was a trough or reservoir for water, which by means of the well they drew from the Nile. The priests of Egypt delighted in obscurity, and they probably came by the subterraneous passages of the building to the dark chambers within; where they performed their lustrations, and other nocturnal rites. Many, he adds, of the ancient temples in this country were caverns in the rock, enlarged by art, and cut out into numberless dreary apartments; for no nation upon the earth was so addicted to gloom and melancholy as the Egyptians. From the top of the pyramids they observed the heavens, and marked the constellations; and upon the same eminence it is probable that they offered up vows and oblations.

PYROMETER, (*Encycl.*) Muschenbroek, who was the original inventor of this machine, has given a table of the expansion of the different metals, in the same degree of heat. Having prepared cylindric rods of iron, steel, copper, brass, tin, and lead, he exposed them first to a pyrometer with one flame in the middle; then with two flames; and successively to one with three, four, and five flames. But previous to this trial, he took care to cool them equally, by exposing them some time upon the same stone, when it began to freeze, and Fahrenheit's thermometer was at 32 degrees. The effects of which experiment are digested in the following table, where the degrees of expansion are marked in parts equal to the $\frac{1}{11750}$ part of an inch.

Expansion of	Iron	Steel	Copper	Brass	Tin	Lead
By one flame	80	85	89	110	153	155
By two flames placed close together.	117	123	115	220	274	

1

Expansion of	Iron	Steel	Copper	Brass	Tin	Lead	Pyrometer.
By two flames 2½ inches distant.	109	94	92	141	219	263	
By three flames placed close together.	142	168	193	275			
By four flames placed close together.	211	270	270	361			
By five flames	230	310	310	377			

It is to be observed of tin, that it will easily melt when heated by two flames placed together. Lead commonly melts with three flames placed together, especially if they burn long.

From these experiments, it appears at first view, that iron is the least rarefied of any of these metals, whether it be heated by one more flames; and therefore is most proper for making machines or instruments which we would have free from any alterations by heat or cold, as the rods of pendulums for clocks, &c. So likewise the measures of yards or feet should be made of iron, that their length may be as nearly as possible the same, summer and winter.

The expansion of lead and tin, by only one flame, is nearly the same; that is, almost double of the expansion of iron. It is likewise observable, that the flames placed together, cause a greater rarefaction than when they have a sensible interval between them; iron, in the former case, being expanded 117 degrees, and only 109 in the latter; the reason of which difference is obvious.

By comparing the expansions of the same metal, produced by one, two, three, or more flames, it appears, that two flames do not cause double the expansion of one; nor three flames three times that expansion, but always less; and these expansions differ so much the more from the ratio of the number of flames as there are more flames acting at the same time.

It is also observable, that metals are not expanded equally at the time of their melting, but some more, some less. Thus tin began to run, when rarefied 219 degrees; whereas brass was expanded 377 degrees, and yet was far from melting.

Mr Ellicott found, upon a medium, that the expansion of bars of different metals, as nearly of the same dimensions as possible, by the same degree of heat, were as follows:

Gold, Silver, Brass, Copper, Iron, Steel, Lead,
73 103 95 89 60 56 149

The great difference between the expansions of iron and brass has been applied with good success to remedy the irregularities in pendulums arising from heat.

Mr Graham used to measure the minute alterations, in length, of metal bars, by advancing the point of a micrometer-screw, till it sensibly stopped against the end of the bar to be measured. This screw, being small and very lightly hung, was capable of agreement within the three or four-thousandth part of an inch. On this general principle Mr Smeaton contrived

46 D 2

his

Pyrometer. his pyrometer, in which the measures are determined by the contact of a piece of metal with the point of a micrometer-screw.

The following table shows how much a foot in length of each metal grows longer by an increase of heat corresponding to 180° of Fahrenheit's thermometer, or to the difference between freezing and boiling water, expressed in such parts of which the unit is equal to the thousandth part of an inch.

1. White-glass barometer-tube,	-	100
2. Martial regulus of antimony,	-	130
3. Blistered steel,	-	138
4. Hard steel,	-	147
5. Iron,	-	151
6. Bismuth,	-	167
7. Copper hammered,	-	204
8. Copper eight parts, mixed with tin one,	-	218
9. Cast brass,	-	225
10. Brass sixteen parts, with tin one,	-	229
11. Brass wire,	-	232
12. Speculum metal,	-	232
13. Spelter folder, viz. brass two parts, zinc one,	-	247
14. Fine pewter,	-	274
15. Grain tin,	-	298
16. Soft folder, viz. lead two, tin one,	-	301
17. Zinc eight parts, with tin one, a little hammered,	-	323
18. Lead,	-	344
19. Zinc or spelter,	-	353
20. Zinc hammered half an inch per foot,	-	373

We shall close this article with a brief description of a pyrometer lately invented by M. De Luc, in consequence of a hint suggested to him by Mr Ramsden. The basis of this instrument is a rectangular piece of deal board two feet and a half long, 15 inches broad, and one inch and a half thick, and to this all the other parts are fixed. This is mounted in the manner of a table, with four deal legs, each a foot long and an inch and a half square, well fitted near its four angles, and kept together at the other ends by four firm cross-pieces. This small table is suspended by a hook to a stand; the board being in a vertical situation in the direction of its grain, and bearing its legs forward in such a manner as that the cross pieces which join them may form a frame, placed vertically facing the observer. This frame sustains a microscope, which is firmly fixed in another frame that moves in the former by means of grooves, but with a very considerable degree of tightness; the friction of which may be increased by the pressure of four screws. The inner sliding frame, which is likewise of deal, keeps the tube of the microscope in a horizontal position, and in great part without the frame, inasmuch that the end which carries the lens is but little within the space between the frame and the board. This microscope is constructed in such a manner as that the object observed may be an inch distant from the lens; and it has a wire which is situated in the focus of the glasses, in which the objects appear reversed. At the top of the apparatus there is a piece of deal, an inch and a half thick, and two inches broad, laid in a horizontal direction from the board to the top of the frame. To this piece the rods of the different substances, whose expansion by heat is to be measured, are sus-

ended: one end of it slides into a socket, which is cut in the thickness of the board; and the other end, which rests upon the frame, meets there with a screw, which makes the piece move backwards and forwards, to bring the objects to the focus of the microscope. There is a cork very strongly driven through a hole bored vertically through this piece; and in another vertical hole made through the cork, the rods are fixed at the top; so that they hang only, and their dilatation is not counteracted by any pressure. In order to heat the rods, a cylindrical bottle of thin glass, about 21 inches high, and four inches in diameter, is placed in the inside of the machine, upon a stand independent of the rest of the apparatus. In this bottle the rods are suspended at a little less than an inch distance from one of the sides, in order to have them near the microscope. Into this bottle is poured water of different degrees of heat, which must be stirred about, by moving upwards and downwards, at one of the sides of the bottle, a little piece of wood, fastened horizontally at the end of a kick: in this water is hung a thermometer, the ball of which reaches to the middle of the height of the rods. During these operations the water rises to the cork, which thus determines the length of the heated part; the bottle is covered, to prevent the water from cooling too rapidly at the surface; and a thin case of brass prevents the vapour from fixing upon the piece of deal to which the rods are fixed.

PYROPHORUS, (*Encycl.*) Mr Bewly prepares his pyrophorus in the following manner. "I fill, (says he) half or three-fourths of the bowl of a tobacco-pipe with a mixture, consisting of two parts of alum, previously calcined in a red-heat, and of powdered charcoal and salt of tartar each one part; pressing the matter down slightly, and filling the remainder of the bowl with fine sand. As soon as the powder becomes hot, the sand lying over it is put into a state of ebullition, which generally continues several minutes. This appearance seems to proceed partly from the vitriolic acid in the alum leaving its earth, and expelling fixed air from the alkali; while another part of it is possibly converted into vitriolic acid air. This phenomenon is succeeded by the appearance of a blue sulphureous flame, proceeding from the combination of the same acid with the phlogiston of the coal, and which continues about ten minutes or a quarter of an hour. After it ceases, no other remarkable appearance presents itself. The matter is now to be kept in a red-heat 20 minutes or half an hour; or it may continue there two hours longer, if the operator pleases, without any injury to the pyrophorus. The pipe being taken out of the fire, the matter is knocked out of it as soon as it becomes cool, and generally pretty soon afterwards takes fire spontaneously."

In another experiment, having added successively various and increasing quantities of fixed alkali to the salt heated as above, till the vitriolic acid contained in the mixture might be considered merely as an evanescent quantity, a pyrophorus was still produced on calcining it with charcoal as before. He also mixed equal parts of salt of tartar and vegetable or animal coal, or sometimes three parts of the former with two of the latter, and calcined them in the usual manner: and this composition, on being exposed to the air, generally

Pyropho-
rus,
Quartz.

nerally kindled in half a minute or a minute; though, as it contained no sulphur, it did not burn with so much vivacity as the vitriolic pyrophori. This, which Mr Bewly calls the *alkaline pyrophorus*, differs in no circumstance from M. De Suigney's neutral pyrophori, except in its not containing that principle to which he ascribes their accention. However, lest it might be suspected that the salt of tartar which he employed might accidentally contain vitriolated tartar, or vitriolic acid, he repeated the experiment with tartar calcined by himself, as well as with nitre fixed or alkali by deflagration with charcoal, and with iron filings; and in all these cases with the same result. By diversifying in a like manner M. De Suigney's experiments on the metallic pyrophori, Mr Bewly found that none of the three vitriols, heated with charcoal alone, in his usual method, could produce a pyrophorus. And thus he found that the addition of an alkaline salt to the composition, which was a part of M. De Suigney's process, was essential to its success.

Treating in the usual manner equal parts of calcined green vitriol and charcoal, the powder, which contained no sulphur nor hepar sulphuris, did not acquire any of the properties of a pyrophorus. The vitriolic acid seemed to have been entirely dissipated; having no bale to detain it, when dislodged from the metallic earth. The charcoal and calx of iron left in this process were calcined again, together with some salt of tartar; and a pyrophorus was produced, which exhibited indications of its containing a scarce perceptible portion of hepar sulphuris. Thirty grains of crocus martis astringens were calcined with 15 grains of charcoal, and the same quantity of salt of tartar; and the mixture burnt spontaneously, though it contained no hepar sulphuris or vitriolic acid. Having by these experiments evinced that metallic pyrophori may be prepared without vitriolic acid, Mr Bewly proceeded to form an aluminous pyrophorus of the same kind. For this purpose, he procured the earth of alum by a long and violent calcination; and examining a part of it, he found, by the usual tests, that it neither contained any sulphur, hepar sulphuris, nor alum undecomposed. This he considered as perfectly pure, though he afterwards found that it contained a small quantity of vitriolated tartar; and yet it repeatedly furnished a pyrophorus, as active as when alum itself is employed. From these and similar experiments, he infers, that the several kinds of pyrophori are not kindled by moisture, attracted by the vitriolic acid, as M. De Suigney has maintained: and his conclusion is farther confirmed by some experiments of Dr Priestley, from which it appears, that they are kindled in dry nitrous and dephlogisticated air.

M. Proust, cited by Mr Bewly, describes a variety of new pyrophori, which neither contain vitriolic acid, nor seem likely to owe their accention to the at-

traction of humidity from the air. These principally consist of a coaly matter simply divided by metallic or other earths; such are the sediment left on the filter in preparing Goulard's extract, various combinations of tartar, or its acid, or the acetic acid, with metals, calcareous earth, &c.

Mr Bewly, having evinced the insufficiency of M. De Suigney's theory, and discovered that the pyrophori are not kindled by moisture, attracted (merely) by the vitriolic acid, directed his attention to the nitrous acid, which Dr Priestley has shown to be a constituent part of atmospheric air, as the probable agent in the production of this phenomenon. The strong affinity which this acid has with phlogiston, and the heat, and even flame, which it is known to produce with certain inflammable matters, manifested that it was equal to the effect; and having excluded the vitriolic acid from having any essential concern in this operation, he suggests, either that the pyrophorus is kindled by moisture attracted by some of the other ingredients which compose it; or that it has the power of decomposing atmospheric air, by suddenly attracting its nitrous acid, and thereby generating a heat sufficient to kindle the phlogistic matter contained in it. This idea appeared plausible, when he farther considered that Dr Priestley produced the purest respirable air with this same acid combined with other principles; and that this as well as common air is diminished, and probably in part decomposed, in a variety of phlogistic processes. This ingenious writer concludes, upon the whole, from the experiments he hath made, that the pyrophorus seems to owe its singular property to its being a combination of earth or alkali with phlogiston; the vitriolic acid, when present, only occasionally increasing or diminishing the effect, according to circumstances. In the process of calcination, the earth or alkaline principle is not merely mixed, but actually, though loosely, combined with the phlogistic principle of the coal; so that the pyrophorus, considering it in its most simple state, is only a perfectly dry phlogisticated alkali or earth. On these data, the phenomena may be explained in the two following methods; with respect particularly to the influence of moisture and heat upon the pyrophorus. Supposing either the alkaline or earthy principle to have a greater affinity to water than to the phlogiston with which either of them is united, they may, on being exposed to a moist atmosphere, attract the humidity, and thereby set the phlogistic principle at liberty; which may, in its turn, attract, and be ignited by, the supposed aerial acid, its strong affinity to which is well known:—or, if this hypothesis is rejected, the inflammable matter may be kindled, merely in consequence of the heat produced by the combination of the alkali, &c. with moisture.

Pyropho-
rus,
Quartz.

Q.

QUARTZ, is a hard vitrifiable stone, something intermediate betwixt rock-crystals and flints, or opaque vitrifiable stones. Quartz is a stone well known by metallurgists, mineralogists, and miners, as it is frequently and abundantly found with ores, of which it often forms the matrix. It is also frequently

found where no ores are.—The most common quartz is more or less of a milky-white colour, and consequently semi-transparent. Some of them have various colours. This stone, which is very hard and very compact, is nevertheless cracked throughout its substance; to which also the rock-crystal is very liable, but

Quasia,
Red.

but much less than quartz. The fragments of quartz are always angular, and its internal surface has but little gloss. Quartz is a little waved, and has a greasy appearance. It is found not only of various colours, but also of various forms. It is frequently found crystallized in caverns and slits of rocks. Its crystallization is the same as that of rock-crystal. Quartz may be employed in vitrification, as all other vitrifiable stones are.

QUASIA, in botany, a genus of the monogynia order, belonging to the decandria class of plants. There is but one species, viz. the amara, or bitter-

ash, as it is called in the West Indies. It has of late come into great repute as a medicine, and the root is the part made use of. Its virtues were first revealed by a negro at Surinam, whose name was *Quassi*. This root appears to be the most pure and intense of all the bitters. At Surinam it has acquired a high character in curing intermittents, even in cases where the Peruvian bark has failed. It may be given in any form; but the most usual is an aqueous infusion, in the proportion of one drachm to a pint, the dose of which is one ounce.

Red.
Reproduction.

R.

RAGUSA, a city of Dalmatia, and capital of Ragusan. It is about two miles in circumference, and is pretty well built. It is strong by situation, having an inaccessible mountain on the land-side, and on the side of the sea a strong fort. It has an archbishop's see and a republic; and has a doge like that of Venice, but he continues only a month in office. It carries on a considerable trade with the Turks. E. Long. 18. 25. N. Lat. 42. 30.

RAPHIDIA, in zoology, a genus of insects, of the neuroptera order; the characters of which are these: The head is of a horny substance, and depressed or flattened: the mouth is armed with two teeth, and furnished with four palpi: the stemmata are three in number: the wings are deflected: the antennæ are filiform, as long as the thorax; the anterior part of which is lengthened out, and of a cylindrical form: the tail of the female is terminated by an appendix, resembling a flexible crooked bristle.—There are three species. The most remarkable is the ophiopsis; which for its shape is one of the most singular that can be seen †. It has an oblong head, shaped like a heart,

† See Plate
CCCXXI.

with its point joined to the thorax, and the broad part before. It is smooth, black, flattened, continually shaking, with short antennæ, yellowish maxillæ, and four palpi. Towards the middle of the upper part of the head, between the eyes, are the three stemmata, placed in a triangle. The thorax, to which this head is fastened, is narrow, long, and cylindrical. The abdomen, broader, is black like the rest of the body, with the segments margined yellow. The feet are of a yellowish cast. The wings, which are fatiguated, are white, diaphanous, veined, and as it were covered with a very fine net-work of black. This insect, for the figure of its head, resembles a snake. It is found but seldom, and in woods only. Its larva, chrysalis, and habitation, are absolutely unknown.

RED-BREAST, in ornithology, a species of MOTACILLA, under which article it was omitted. The bill is dusky; the forehead, chin, throat, and breast, are of a deep orange-colour; the head, hind part of the neck, the back, and tail, are of a deep ash-colour tinged with green; the wings rather darker, the edges inclining to yellow; the legs and feet dusky. This bird, though so very petulant as to be at constant war with its own tribe, yet is remarkably sociable with mankind: in the winter it frequently makes one of the family, and takes refuge from the inclemency of the season even by our fire-sides. Thomson has prettily described the annual visits of this guest; vide his *Winter*, l. 246. In the

spring this bird retires to breed in the thickest coverts, or the most concealed holes of walls and other buildings. The eggs are of a dull white, sprinkled with reddish spots. Its song is remarkably fine and soft; and the more to be valued, as we enjoy it the greatest part of the winter and early in the spring, and even through great part of the summer; but its notes are part of that time drowned in the general warble of the season. Many of the autumnal songsters seem to be the young cock red-breasts of that year.

RED-START, (*Motacilla phœniceus*), in ornithology, was omitted to be described under the article MOTACILLA, of which it is a species. This bird appears among us only in the spring and summer, and is observed to come over nearly at the same time with the nightingale. It makes its nest in hollow trees, and holes in walls and other buildings; which it forms with moss on the outside, and lines with hair and feathers. It lays four or five eggs, very like those of the hedge-sparrow, but rather paler, and more taper at the less end. This bird is so remarkably shy, that it will forsake its nest if the eggs are only touched. It has a very fine soft note; but, being a fullen bird, is with difficulty kept alive in confinement. It is remarkable in shaking its tail; it moves it horizontally, as a dog does when fawning.—The bill and legs of the male are black; the forehead white; the crown of the head, hind part of the neck, and the back, are of a deep blue-grey; the cheeks and throat black; the breast, rump, and sides are red; the two middle feathers of the tail brown, the others red; the wings brown. In the female, the top of the head and back are of a deep ash-colour; the rump and tail of a duller red than those of the male; the chin white; the lower side of the neck cinereous; the breast of a paler red.

REPRODUCTION, (*Encecl.*) By reproduction is usually understood the restoration of a thing before existing, and since destroyed. It is very well known that trees and plants may be raised from slips and cuttings; and some late observations have shown, that there are some animals which have the same property. The polype was the first instance we had of this; but we had scarce time to wonder at the discovery Mr Trembley had made, when Mr Bonett discovered the same property in a species of water-worm. Amongst the plants which may be raised from cuttings, there are some which seem to possess this quality in so eminent a degree, that the smallest portion of them will become a complete tree again.

It deserves inquiry, whether or not the great Author

Reproduction. thor of nature, when he ordained that certain insects, as these polypes and worms, should resemble those plants in that particular, allowed them this power of being reproduced in the same degree; or, which is the same thing, whether this reproduction will or will not take place in whatever part the worm is cut. In order to try this, Mr Bonett entered on a course of many experiments on the water-worms which have this property. These are, at their common growth, from two or three inches long, and of a brownish colour, with a cast of reddish. From one of these worms he cut off the head and tail, taking from each extremity only a small piece of a twelfth of an inch in length; but neither of these pieces were able to reproduce what was wanting. They both perished in about 24 hours; the tail first, and afterwards the head. As to the body of the worm from which these pieces were separated, it lived as well as before, and seemed indeed to suffer nothing by the loss, the head-part being immediately used as if the head was thereon, boring the creature's way into the mud. There are, besides this, two other points in which the reproduction will not take place; the one of these is about the fifth or sixth ring from the head, and the other at the same distance from the tail; and in all probability the condition of the great artery in these parts is the cause of this.

What is said of the want of the reproductive power of these parts relates only to the head and tail ends; for as to the body, it feels very little inconvenience from the loss of what is taken off, and very speedily reproduces those parts. Where, then, does the principle of life reside in such worms, which, after having their heads cut off, will have not only the same motions, but even the inclinations, that they had before? and yet this difficulty is very small, compared to several others which at the same time offer themselves to our reason. Is this wonderful reproduction of parts only a natural consequence of the laws of motion? or is there lodged in the body of the creature a chain of minute buds or shoots, a sort of little embryos, already formed and placed in such parts where the reproductions are to begin? Are these worms only mere machines? or are they, like more perfect animals, a sort of compound, the springs of whose motions are actuated or regulated by a sort of soul? And if they have themselves such a principle, how is it that this principle is multiplied, and is found in every separate piece? Is it to be granted, that there are in these worms, not a single soul (if it is to be so called) in each, but that each contains as many souls as there are pieces capable of reproducing perfect animals? Are we to believe with Malpighi, that these sorts of worms are all heart and brain from one end to the other! This may be; but yet if we knew that it was so, we should know in reality but very little the more for knowing it: and it seems, after all, that in cases of this kind we are only to admire the works of the great Creator, and sit down in silence.

The nice sense of feeling in spiders has been much talked of by naturalists; but it appears that these worms have yet somewhat more surprising in them in regard to this particular. If a piece of flick, or any other substance, be brought near them, they do not stay for its touching them, but begin to leap and frisk about as soon as it comes towards them. There want, however, some farther experiments to ascertain whe-

ther this be really owing to feeling or to sight; for though we can discover no distinct organs of sight in these creatures, yet they seem affected by the light of the sun or a candle, and always frisk about it in the same manner at the approach of either; nay, even the moon-light has some effect upon them.

A twig of willow, poplar, or many other trees, being planted in the earth, takes root, and becomes a tree, every piece of which will in the same manner produce other trees. The case is the same with these worms: they are cut to pieces, and these several pieces become perfect animals; and each of these may be again cut into a number of pieces, each of which will in the same manner produce an animal. It had been supposed by some that these worms were oviparous: but Mr Bonett, on cutting one of them to pieces, having observed a slender substance, resembling a small filament, to move at the end of one of the pieces, separated it; and on examining it with glasses, found it to be a perfect worm, of the same form with its parent, which lived and grew larger in a vessel of water into which he put it. These small bodies are easily divided, and very readily complete themselves again, a day usually serving for the production of a head to the part that wants one; and, in general, the smaller and slenderer the worms are, the sooner they complete themselves after this operation. When the bodies of the large worms are examined by the microscope, it is very easy to see the appearance of the young worms alive, and moving about within them: but it requires great precision and exactness to be certain of this; since the ramifications of the great artery have very much the appearance of young worms, and they are kept in a sort of continual motion by the systoles and diastoles of the several portions of the artery, which serve as so many hearts. It is very certain, that what we force in regard to these animals by our operations, is done also naturally every day in the brooks and ditches where they live. A curious observer will find in these places many of them without heads or tails, and some without either; as also other fragments of various kinds, all which are then in the act of completing themselves: but whether accidents have reduced them to this state, or they thus purposely throw off parts of their own body for the reproduction of more animals, is not easy to determine. They are plainly liable to many accidents, by which they lose the several parts of their body, and must perish very early if they had not a power of reproducing what was lost: they often are broken into two pieces, by the resistance of some hard piece of mud, which they enter; and they are subject to a disease, a kind of gangrene, rotting off the several parts of their bodies, and must inevitably perish by it, had they not this surprising property.

This worm was a second instance, after the polype, of the surprising power in an animal of recovering its most essential parts when lost. But nature does not seem to have limited her beneficence in this respect to these two creatures. Mr Bonett tried the same experiments on another species of water-worm, differing from the former in being much thicker. This kind of worm, when divided in the summer-season, very often shows the same property: for if it be cut into three or four pieces, the pieces will lie like dead for a long time, but afterwards will move about again; and will be found in this state of rest to have recovered a head,

or a tail, or both. After recovering their parts, they move very little; and, according to this gentleman's experiments, seldom live more than a month.

It should seem, that the more difficult success of this last kind of worm, after cutting, and the long time it takes to recover the lost parts, if it do recover them at all, is owing to its thickness; since we always find in that species of worms which succeeds best of all, that those which are thinnest always recover their parts much sooner than the others.

The water-insects also are not the only creatures which have this power of recovering their lost parts. The earth affords us some already discovered to grow in this manner from their cuttings, and these not less deserving our admiration than those of the water: the common earth-worms are of this kind. Some of these worms have been divided into two, others into three or four pieces; and some of these pieces, after having passed two or three months without any appearance of life or motion, have then begun to reproduce a head or tail, or both. The reproduction of the anus, after such a state of rest, is no long work; a few days do it: but it is otherwise with the head, that does not seem to perform its functions in the divided pieces till about seven months after the separation. It is to be observed, that in all these operations both on earth and water-worms, that the hinder part suffers greatly more than the fore part in the cutting; for it always twists itself about a long time, as if actuated by strong convulsions; whereas the head usually crawls away without the appearance of any great uneasiness.

The reproduction of several parts of lobsters, crabs, &c. makes also one of the great curiosities in natural history. That, in lieu of an organical part of an animal broken off, another shall rise perfectly like it, may seem inconsistent with the modern system of generation, where the animal is supposed to be wholly formed in the egg. Yet has the matter of fact been well attested by the fishermen, and even by several virtuosos who have taken the point into examination, particularly M. de Reaumur and M. Perrault, whose skill and exactness in things of this nature will hardly be questioned. The legs of lobsters, &c. consist each of five articulations: now, when any of the legs happen to break by any accident, as in walking, &c. which frequently happens, the fracture is always found to be in a part near the fourth articulation; and what they thus lose is precisely reproduced in some time afterwards; that is, a part of a leg shoots out, consisting of four articulations, the first whereof has two claws as before; so that the loss is entirely repaired.

If a lobster's leg be broken off by design at the fourth or fifth articulation, what is thus broken off always comes again; but it is not so if the fracture be made in the first, second, or third articulation. In those cases, the reproduction is very rare if things continue as they are. But what is exceedingly surprising is, that they do not; for, upon visiting the lobster maimed in these barren and unhappy articulations, at the end of two or three days, all the other articulations are found broken off to the fourth; and it is suspected they have performed the operation on themselves, to make the reproduction of a leg certain.

The part reproduced is not only perfectly like that retrenched, but also, in a certain space of time, grows

equal to it. Hence it is that we frequently see lobsters, which have their two big legs unequal, and that in all proportions. This shows the smaller leg to be a new one.

A part thus reproduced being broken, there is a second reproduction. The summer, which is the only season of the year when the lobsters eat, is the most favourable time for the reproduction. It is then performed in four or five weeks; whereas it takes up eight or nine months in any other season.

The small legs are sometimes reproduced, but more rarely, as well as more slowly, than the great ones: the horns do the same. The experiment is most easily tried on the common crab.

REST-HARROW, or CAMMOCK, the *Ononis Arvensis*. A decoction of this plant has been much recommended to horses labouring under a stoppage of urine. It is the pest of some corn-fields; but in its younger state, before the plant has acquired its thorns, it is a most acceptable food to sheep.

ROSYCRUCIANS, ROSICRUCIANS, or *Brothers of the Rosy Cross*, a name assumed by a sect or cabal of hermetical philosophers, who appeared, or at least were first taken notice of, in Germany, in the beginning of the 16th century. They pretended to be masters of all sciences, and to have many important secrets, particularly that of the philosopher's stone.—Their society is frequently denoted by the abbreviations F. R. C.

ROUSSEAU (John James), a celebrated philosopher, was the son of a watchmaker at Geneva, and was born in 1712. In the early part of his life he embraced the Roman Catholic religion, and travelled into Italy. Some time after, he went into France; and was secretary to M. de Montaigu ambassador at Venice in 1743. Till he was 40 years of age he remained entirely unknown in the literary world. His Discourse against the Sciences, which in 1750 was honoured with the prize by the academy of Dijon, first drew him from this obscurity. Though the subject had formerly been treated by the famous Henry Cornelius Agrippa, Rousseau gave his subject all the charms of novelty; displaying the most uncommon resources of genius and knowledge. A variety of writers attacked his opinion; dispute on dispute ensued, and he found himself engaged in the most formidable lists of literary controversy. His discourse on the Inequality among Men and of the Origin of Society, tho' it supports a false system, is yet done with admirable art; and this performance, especially its dedication to the Republic of Geneva, are among those master-pieces of eloquence, of which the ancients alone have given us any idea. His Letter to M. d'Alembert on the Project of establishing a Theatre at Geneva, published in 1757, contains, amidst many paradoxes, some of the most important truths. This letter, in which he decries the stage, was the source of an irreconcilable enmity between him and the celebrated Voltaire. However, it is remarkable, that even Rousseau, this enemy of plays, wrote a comedy, and presented a Pastoral to the theatre; the poetry and music of which he composed with the most pleasing attention to the simplicity of rural sentiment and manners. The author, who had an excellent talent for music, had cultivated it from his infancy with equal taste; and his Dictionary of Music is one of the best works of the kind. His Epistolary Romance, to which

which the English translator had given the name of *Eloïsa*, is universally known; but of all the works of this celebrated writer, his *Emilius*, or *Treatise on Education*, made the greatest noise. The most exceptionable part of this work is the third volume; which is almost full of objections to Christianity. This proved fatal to his repose. He had lived from the year 1754 in a country house near Montmorenci; a retreat which he owed to the generosity of a farmer-general of the revenues. The parliament of Paris condemned the last-mentioned work in 1762, and commenced a criminal process against the author, which obliged him to fly from that city. Being proscribed also in his native place, he at length found an asylum in Switzerland in the sovereignty of Neuchâtel. His first care was to defend his *Emilius* against the anathemas of the archbishop of Paris. His "Letters from the Mountains" were published soon after; but this book, less eloquent than his "Letter to the archbishop of Paris," and filled with uninteresting invectives against the magistrates and ecclesiastics of Geneva, irritated the Protestant ministers without reconciling him to the Romish clergy.

In the year 1753, Rousseau had solemnly abandoned the Romish religion; and, what is remarkable, at the very time that he had determined to reside in a Catholic country. This conversion, however, could not regain the esteem of the Protestant teachers; nor could the protection of the king of Prussia secure him against the vengeance of the minister of the village where he resided. He therefore took the resolution of visiting England; but here he soon embroiled himself with the celebrated Mr Hume, by whose means he had been placed in an agreeable retreat in Derbyshire, and who had obtained for him a pension from the king. He again returned to France, where his patrons obtained leave for him to reside in Paris, but on condition that he should not write any thing on the subjects of religion or government. He obeyed this injunction inviolably, and wrote nothing on any subject, but contented himself with the peaceful life of a philosopher. In May 1776 he accepted the invitation of the marquis and marchioness de Girardin, who had prepared a neat little house for him at a small distance from their delightful castle of Ermenonville, about 30 miles from Paris. This retreat was perfectly conformable to the wishes of Rousseau. Every day he amused himself in a neighbouring wood in collecting plants for his herbar. The marquis, who was himself a philosopher, indulged his passion for rural life, and was enamoured with the writings of the singular Rousseau. They had musical parties frequently, at which he assisted; and he composed several airs in all that simple style of nature for which he had ever been remarked. Among others he set several passages of our Shakespeare to music, and played them himself on the forte piano in the most enchanting manner.—In this sweet retirement he lived two years in the most agreeable manner; and died on the 2d of July 1778, in the 66th year of his age. The marquis has since erected a sepulchral monument, to cover the remains of his departed friend. This mausoleum is constructed of white marble, with the bust of the deceased by Houdon; and its decorations are in the best taste. One of its sides exhibits two doves, for *Eloïsa*; another, a mother sucking her child, for *Emilius*; a third, children sacrificing on the

altar of nature; and the fourth, a lyre, with other symbols of poetry and music. The inscription on the monument is long; and contains a pompous encomium on the genius, sentiments, and moral character of Mr Rousseau.

We shall conclude the life of this singular man with the character of himself and of his writings, as delivered by the masterly pen of Dr Beattie. "I consider Rousseau," says the Doctor, "as a moral writer of true genius. Sensibility of heart; a talent for extensive and accurate observation; liveliness and ardour of fancy; and a style, copious, nervous, and elegant, beyond that of any other French writer; are his distinguishing characteristics. In argument he is not always equally successful; for he often mistakes declamation for proof, and hypothesis for fact; but his eloquence, when addressed to the heart, overpowers with force irresistible. A greater number of important facts relating to the human mind are recorded in his works, than in all the books of all the sceptical philosophers ancient and modern. And he appears in general to be a friend to virtue, to mankind, to natural religion, and sometimes to Christianity. Yet none even of his best works are free from absurdity. His reasonings, on the effects of the sciences, and on the origin and progress of human society, are diffuse, inaccurate, and often weak; much perverted by theories of his own, as well as by too implicit an admittance of the vague assertions of travellers, and of the systems and doctrines of some favourite French philosophers. And he seems, in these, and frequently too in his own writings, to consider animal pleasure, and bodily accomplishments, as the happiness and perfection of man. His plan of education, though admirable in many parts, is in some injudicious and dangerous, and impracticable as a whole. The character of Julia's lover is drawn with a masterly hand indeed, and well conducted throughout; but the lady has two characters, and those incompatible. The wife of Wolmar is quite a different person from the mistress of St Prieux. Wolmar himself is an impossible character; destitute of principle, yet of rigid virtue; destitute of feeling, yet capable of tenderness and attachment; delicate in his notions of honour, yet not ashamed to marry a woman whom he knew to be to all intents and purposes devoted to another. Some of this author's remarks on the spirit of Christianity, and on the character of its Divine Founder, are not only excellent, but transcendently so; and I believe no Christian can read them without feeling his heart warmed, and his faith confirmed. But what he says of the absurdities which he fancies to be contained in the Sacred History, of the impropriety of the evidence of miracles, of the analogy between those of Jesus Christ and the tricks of jugglers, of the insignificance and impertinence of prayer, of the sufficiency of human reason for discovering a complete and comfortable scheme of natural religion, of the discouraging nature of the terms of salvation offered in the Gospel, of the measure of evidence that ought to accompany Divine Revelation (which, as he states it, would be incompatible with man's free agency and moral probation); what he says of these, and several other theological points of great importance, betrays a degree of ignorance and prejudice, of which, as a philosopher, as a scholar, and as a man,

man, he should have been utterly ashamed. He appears to be distressed with his doubts; and yet, without having ever examined whether they be well or ill founded, scruples not to exert all his eloquence on purpose to infuse them into others: a conduct which I must ever condemn as illiberal, unjust, and cruel. Had Rousseau studied the Scripture, and the writings of rational divines, with as much care as he seems to have employed in reading the books, and listening to the conversation of French infidels, and in attending to the unchristian practices and doctrines warranted by some ecclesiastical establishments; I may venture to assure him, that his mind would have been much more at ease, his works much more valuable, and his memory much dearer to all good men. Rousseau is, in my opinion, a great philosophical genius, but wild, irregular, and often self-contradictory; disposed, from

the fashion of the times, and from his desire of being reputed a bold speaker and free-thinker, to adopt the doctrines of infidelity; but of a heart too tender, and an imagination too lively, to permit him to become a thorough-paced infidel. Had he lived in an age less addicted to hypothesis, he might have distinguished himself as a moral philosopher of the first rank.—To conclude, the writings of this author, with all their imperfections, may be read by the philosopher with advantage, as they often direct to the right observation and interpretation of nature; and by the Christian, without detriment, as the cavils they contain against religion are too slight and too paradoxical to weaken the faith of any one who is tolerably instructed in the principles and evidences of Christianity. To the man of taste they can never fail to recommend themselves, by the irresistible charms of the composition.²⁶

S.

SAINTS, (*Encycl.*) Cardinal Bellarmine, and other

Papish writers, have pleaded, that by praying to the saints, they only intend to express a desire of their intercession, and that their invocation of the saints terminates ultimately in God. Accordingly they have distinguished two sorts of worship; one called *latría*, appropriate to God; and another *dulia*, which, being of an inferior nature, is paid to angels and saints. However, many of their own writers have exploded this distinction, and others have owned that it is unscriptural. There is another sort of worship, which is of a higher degree than that paid to saints in common, and which is peculiar to the Virgin Mary: this they call *hyperdulia*.

After all, those who read their books of devotion, their Hours, their Offices, their Rosaries, their Breviaries, and their Missals, will find many direct addresses to the saints, which are very different from those prayers whose object is merely to supplicate their intercession. Besides, the council of Trent, sess. 25. directs to apply to the saints for their help and assistance, as well as their prayers; and condemns all who think that it is not good and profitable to offer prayers to saints, as chargeable with impious sentiments. And the creed of pope Pius IV. expressly insists upon it as an article of faith, that the saints reigning together with Christ are to be invoked. As to the antiquity of this practice, the council of Trent, sess. 25. speaks of it as the usage of the apostolic and catholic church from the beginning of Christianity. As to the doctrine of the intercession of saints and angels, there is not the least intimation of it in the writings of the two first centuries; though it must be allowed to have been introduced in the next century, and that Origen and Cyprian expressly favour this superstition. The worship of saints and angels is of a much later date, especially as a standing generally-received doctrine of the church. For though Athanasius was for worshipping the saints, yet Cyril, who lived in the next century, says, We neither call the holy martyrs gods, nor are we used to worship them. St Austin affirms, that neither saints nor angels will be worshipped. Archbishop Usher says, that as to the first 400 years after Christ, for nine parts of that time, not one true testimony can be produced out of any father in favour of this doctrine; and cardinal Perron,

Richlieu, and other learned writers among the Romanists, own, that the invocation of saints was not practised for the three first centuries. The first symptoms of this worship did not appear till towards the end of the fourth century, and it seems to have sprung out of the regard which the Christians at that time manifested to the memory of the martyrs. They frequented their tombs, and erected altars there, praying to God, and engaging themselves to a strict imitation of the virtues and piety of the departed martyrs: by degrees this veneration degenerated into praises and eulogiums of the saints themselves, in which they used some apotrophes and rhetorical addresses; whence proceeded a superstitious regard to them, and at length a direct invocation and worship of them. Nor does it appear, that any public prayers to saints were established till A. D. 788, by the second council of Nice; and this council was condemned by another held at Francfort, A. D. 794; and the invocation of saints was likewise condemned by a former council held at Constantinople, A. D. 755, consisting of 388 bishops. In the seventh century, Gregory expressly says, that angels refused to be worshipped since the appearance of Christ.

In order to convey some idea of the extravagance to which veneration for reputed saints hath arrived in the Romish church, we shall only mention one instance out of many that might be alleged. It is well known that there were three altars in the cathedral church of Canterbury, one erected to the honour of Christ, another to the Virgin Mary, and a third to St Thomas a Becket; and the offerings at his shrine amounted to 1000*l.* when those to the Virgin did not amount to 5*l.* and those to Christ were nothing; and Rapin informs us, that in one year, viz. A. D. 1420, there were no less than 50,000 foreigners who came in pilgrimages to pay their homage at this tomb.

SALT, (*Encycl.*) See also **ACIDS** and **ALKALIES** in this **APPENDIX**.—Acids and alkalies, and combinations of both, when in a concrete form, are salts, and of the purest sort. The bodies, therefore, to which the name of *salts* more properly belongs, are the concretions of those substances; which are accordingly called *acid salts*, *alkaline salts*, and *neutral salts*. These last are combinations of acid and alkaline salts, in such proportion

proportion as to render the compounds neither four nor alkaline to the taste. This proportionate combination is called *saturation*: thus the common kitchen-salt is a neutral salt, composed of marine acid and mineral alkali combined together to the point of saturation. The appellation of *neutral salts* is also extended to denote all those combinations of acids, and any other substance with which they can unite, so as to lose, wholly or in great measure, their acid properties.

Notwithstanding that the general definition of salts given above is commonly received, yet there are many writers, especially mineralogists, who confine the denomination of *salts* to those substances only which, besides the general properties of salts, have the power of crystallizing, that is, of arranging their particles so as to form regularly-shaped bodies, called *crystals*; when the water superfluous to their concrete existence has been evaporated.

Salts of various sorts are found already formed in nature, but a great many others are made by art, and even several of the natural ones may be imitated. We shall only consider those salts, either natural or artificial, which are mostly used.

The vitriolic acid, when combined with other substances, forms vitriolic salts, which vary both in specific names and properties, according to the various substances with which the acid is combined. Thus the vitriolic acid, combined with mineral alkali, forms the salt called *Glauber's salt*, or *sal mirabile*. When it is combined with calcareous earths, it forms vitriolic salts with bases of calcareous earth, which are commonly called *salenites*. When combined with argillaceous earths, it forms alum. When combined with metals, it forms vitriolic salts with metallic bases, to which the general name *vitriols* is given; and in commerce are commonly called *copperas*. The vitriols principally used are, 1. The martial vitriol; called also *English vitriol*, *green vitriol*, or *green copperas*, which is a combination of vitriolic acid with iron. 2. The vitriol of copper, called also *blue vitriol*, *Cyprian vitriol*, or *blue copperas*; which is a combination of vitriolic acid and copper. 3. The vitriol of zinc, called also *white copperas*, and *Goslar vitriol*; which is a combination of the same acid with a semi-metal called *zinc*. It is a property peculiar to the vitriolic acid, that all the combinations of it, with those substances with which it can form neutral salts, are susceptible of crystallization.

The nitrous acid, combined with all the substances with which it can mix, forms saline substances, in general called *nitrous salts*; specifying each particular salt by the name of the substance united to the acid. Thus nitrous acid, with fixed vegetable alkali, forms a saline substance called *nitre*, or *saltpetre*. With mineral alkali, forms cubic or quadrangular nitre. When mixed with metallic substances, forms metallic nitrates, which are specified *nitre of gold*; *nitre of silver*, or *lunar nitre*, *lunar crystals*, and *crystals of silver*, *nitrous crystals of mercury*; *nitre of copper*, &c.

The marine acid, combined with various matters, forms marine salts, or simply salts, specified by the names of their particular bases. The sea-salt, or kitchen salt, and sal gem, are combinations of marine acid and mineral alkali. When this acid is combined with

volatile alkali, it forms sal ammoniac (A). With metals it forms metallic salts, called *salt of gold*, *salt of copper*, &c. according to the various metals combined with the acid. The salt of silver is also called *luna cornea*; the salt of lead is often called *plumbum corneum*; and the salts of antimony, and of arsenic, are known by the names of *butter of antimony*, and *butter of arsenic*.

The acid of tartar (the purest part of which, or that saline substance which first crystallizes, by evaporation, in the vessels in which it is purified, is called *cream of tartar*), and also all other concrete vegetable acids analogous to it, when mixed with various other substances, form compounds, generally called *tartareous salts*, or *soluble tartars*, because they are dissolved by water more easily than the acid of tartar itself.

Acetous salts, that is, all salts containing the acid of vinegar, are also combined with various bases, and form saline substances of different names; the principal of which are, the acetous salt of copper, called *crystals of Venus*, or of *verdigrise*, by the chemists, and *distilled or crystallized verdigrise* in commerce; the acetous salt of lead, commonly called *salt or sugar of lead*; and the acetous mercurial salts.

Sugar is an essential vegetable salt, of a pleasant sweet taste, containing a vegetable acid combined with earth and oil.

Potash is a fixed vegetable alkali, extracted from the ashes of wood. Concrete volatile alkalies are generally called *volatile salts*; although this name is sometimes also given to the volatile salt of amber, which is not an alkaline, but an acid salt.

Borax is a neutral saline matter, whose origin, whether animal or vegetable, is as yet unknown, its components being not sufficiently examined. It is soluble in water, and very nearly as crystallizable as alum. When borax is exposed to the fire, it first bubbles and foams very much, but afterwards it melts into a clear glass. When acids are combined with the alkaline part of borax, a substance of a singular nature is separated from it, commonly called *sedative salt*. Altho' this substance acts as an acid in borax, by saturating its alkali, yet it has no acid taste, nor doth it turn the tincture of heliotropium to a red, as other acids do. It is the property of borax to facilitate considerably the fusion of metals, of earths, and other minerals. Some species of stones and earths cannot be vitrified at all, except they are mixed with borax. For this property borax is commonly used as a flux (that is, a substance which facilitates the fusion of other bodies) in various manufactories; but especially in soldering metals, and in assaying ores.

Phosphoric salts are combinations of alkaline, earthy, and metallic substances with the acid obtained from the phosphorus of urine.

Besides the above-mentioned salts, there are several others to be met with in the writings of the chemical and medical authors; but, as they are of little consequence, we shall omit any account of them.

SANDEMANIANS, in ecclesiastical history, a modern sect that originated in Scotland about the year 1728; where it is at this time distinguished by the name of *Glassites*, after its founder Mr John Glass, who was a minister of the established church in that

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(A) Ammoniacal salts is also a general name given to all neutral salts composed of an acid saturated with a volatile alkali.

Sandema-
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kingdom; but being charged with a design of subverting the national covenant, and sapping the foundation of all national establishments by the kirk judicatory, was expelled by the synod from the church of Scotland. His sentiments are fully explained in a tract published at that time, intitled, "The Testimony of the King of Martyrs," and preserved in the first volume of his works. In consequence of Mr Glas's expulsion, his adherents formed themselves into churches conformable in their institution and discipline to what they apprehended to be the plan of the first churches recorded in the New Testament. Soon after the year 1755, Mr Robert Sandeman, an elder in one of these churches in Scotland, published a series of letters addressed to Mr Hervey, occasioned by his Theron and Asaph; in which he endeavours to show, that his notion of faith is contradictory to the scripture account of it, and could only serve to lead men, professedly holding the doctrines commonly called *Calvinistic*, to establish their own righteousness upon their frames, inward feelings, and various acts of faith. In these letters Mr Sandeman attempts to prove, that faith is neither more nor less than a simple assent to the divine testimony concerning Jesus Christ, recorded in the New Testament; and he maintains, that the word *faith*, or *belief*, is constantly used by the apostles to signify what is denoted by it in common discourse, viz. a persuasion of the truth of any proposition, and that there is no difference between believing any common testimony, and believing the apostolic testimony, except that which results from the nature of the testimony itself. This led the way to a controversy, among those who were called *Calvinists*, concerning the nature of justifying faith; and those who adopted Mr Sandeman's notion of it, and who took the denomination of *Sandemanians*, formed themselves into church order, in strict fellowship with the churches in Scotland, but holding no kind of communion with other churches. The chief opinions and practices in which this sect differs from other Christians, are, their weekly administration of the Lord's Supper; their love-feasts, of which every member is not only allowed but required to partake, and which consist of their dining together at each other's houses in the interval between the morning and afternoon service; their kiss of charity used on this occasion, at the admission of a new member, and at other times, when they deem it to be necessary or proper; their weekly collection before the Lord's Supper, for the support of the poor, and defraying other expenses; mutual exhortation; abstinence from blood and things strangled; washing each other's feet, the precept concerning which, as well as other precepts, they understand literally; community of goods, so far as that every one is to consider all that he has in his possession and power as liable to the calls of the poor and church, and the unlawfulness of laying up treasures on earth, by setting them apart for any distant, future, and uncertain use. They allow of public and private diversions, so far as they are not connected with circumstances really sinful; but apprehending a lot to be sacred, disapprove of playing at cards, dice, &c. They maintain a plurality of elders, pastors, or bishops, in each church; and the necessity of the presence of two elders in every act of discipline, and at the administration of the Lord's Supper. In the choice of these el-

ders, want of learning, and engagements in trade, &c. are no sufficient objection; but second marriages disqualify for the office; and they are ordained by prayer and fasting, imposition of hands, and giving the right hand of fellowship. In their discipline they are strict and severe; and think themselves obliged to separate from the communion and worship of all such religious societies as appear to them not to profess the simple truth for their only ground of hope, and who do not walk in obedience to it. We shall only add, that in every church transaction, they esteem unanimity to be absolutely necessary. From this abstract of the account which they have published of their tenets and practices, it does not seem to be probable that their number should be very considerable.

SAPOTA, in botany. See *ACHRA* in this APPENDIX.

SARPLAR of WOOL, a quantity of wool, otherwise called a *pocket*, or *half-jack*; a sack containing 80 tod; a tod two stone; and a stone 14 pounds.—In Scotland it is called *farpliath*, and contains 80 stone.

SASSAFRAS, a species of LAURUS; see LAURUS, (*Encycl.*). In Pennsylvania and other parts of North America, it grows in a dry loose ground, of a pale brick colour, which consists for the most part of sand mixed with clay. This tree spreads its roots very much, and new shoots come up from them in some places; but these shoots are not good for transplanting, because they have so few fibres besides the root which connects them to the main stem, that they cannot well strike into the ground. If, therefore, any one would plant sassafras trees, he must endeavour to get their berries; which, however, is difficult, since the birds eat them before they are half ripe. The cows are very greedy after the tender new shoots, and look for them every where.

The bark of this tree is used by the women here in dying worsted a fine lasting orange-colour, which does not fade in the sun. They use urine instead of alum in dying; and boil the dye in a brass boiler, because in an iron vessel it does not yield so fine a colour.

The wood is made use of for posts belonging to the enclosures, for it is said to last a long time in the ground: but it is likewise said, that there is hardly any kind of wood which is more attacked by worms than this, when it is exposed to the air without cover; and that in a short time it is quite worm-eaten through and through. On cutting some part of the sassafras tree, or its shoots, and holding it to the nose, it has a strong but pleasant smell. Some people peel the root, and boil the peel with the beer which they are brewing, because they believe it wholesome. For the same reason, the peel is put into brandy, either whilst it is distilling, or after it is made. Professor Kalm informs us, that a decoction of the root of sassafras in water, drank every morning, is used with success in the dropsy.

When part of a wood is destined for cultivation, the sassafras trees are commonly left upon it, because they have a very thick foliage, and afford a cool shade to the cattle during the great heats. Some people get their bed-posts made of sassafras wood, in order to expel the bugs; for its strong scent, it is said, prevents those vermin

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Kalm's
Travels in
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from settling in them. For two or three years together this has the desired effect; or about as long as the wood keeps its strong aromatic smell; but after that time it has been observed to lose its effect. In Pennsylvania some people put chips of sassafras into their chells, where they keep all sorts of woollen stuffs, in order to expel the moths (or larvae or caterpillars of moths or tinies) which commonly settle in them in summer. The root keeps its smell for a long while: our author saw one which had lain five or six years in the drawer of a table, and still preserved the strength of its scent. The people here also gather its flowers, and use it as tea.

The sassafras-tree generally stands single in the woods, and along the fences round the fields. It flowers in May before the leaves come out; and being entirely covered with them, it is distinguished at a great distance by their beautiful yellow colour.

SCALDS, in the history of literature, a name given by the ancient inhabitants of the northern countries to their poets; in whose writings their history is recorded.

SCARBOROUGH, (*Encycl.*) The waters of Scarborough are chalybeate and purging. Of these there are two wells, both impregnated with the same principles, in different proportions; though the purging well is the most celebrated, and the water of this is usually called the *Scarborough water*. When these waters are poured out of one glass into another, they throw up a number of air-bubbles; and if they are shook for some time in a phial close stopped, and the phial be suddenly opened before the commotion ceases, they disengage an elastic vapour, with an audible noise, which flows that they abound in fixed air. At the fountain they have a brisk, pungent, chalybeate taste; but the purging water tastes bitterish, which is not usually the case with the chalybeate one. They lose their chalybeate virtues by exposure and by keeping; but the purging water the soonest. They both putrefy by keeping; but in time recover their sweetness. Four or five half pints of the purging water drank within an hour, give two or three easy motions, and raise the spirits. The like quantity of the chalybeate purges less, but exhilarates more, and passes off chiefly by urine. These waters have been found beneficial in hectic fevers, weaknesses of the stomach, and indigestion; in relaxations of the system; in nervous, hysterical, and hypochondriacal disorders; in the green sickness, scurvy, rheumatism, and asthmatic complaints; in gleets, the fluor albus, and other preternatural evacuations; and in habitual costiveness.

SCHOONER, in sea-language, a small vessel with two masts, whose main-sail and fore-sail are suspended from gaffs, reaching from the mast towards the stern, and stretched out below by booms, whose fore-most ends are hooked to an iron, which clasps the mast, so as to turn therein as upon an axis, when the after-ends are swung from one side of the vessel to the other.

SENSE, MORAL, is a determination of the mind to be pleased with the contemplation of those affections, actions, or characters, of rational agents, which we call good or virtuous.

This moral sense of beauty in actions and affections, may appear strange at first view: some of our moralists themselves are offended at it in lord Shaftes-

bury, as being accustomed to deduce every approbation, or aversion, from rational views of interest. Our gentlemen of good taste can tell us of a great many senses, tastes, and relishes, for beauty, harmony, imitation in painting and poetry; and may we not find too, in mankind, a relish for a beauty in characters, in manners? The truth is, human nature does not seem to have been left quite indifferent in the affair of virtue, to form to itself observations concerning the advantage or disadvantage of actions, and accordingly to regulate its conduct. The weakness of our reason, and the avocations arising from the infirmities and necessities of our nature, are so great, that very few of mankind could have framed those long deductions of reason, which may show some actions to be, in the whole, advantageous, and their contraries pernicious. The Author of Nature has much better furnished us for a virtuous conduct than our moralists seem to imagine, by almost as quick and powerful instructions as we have for the preservation of our bodies: he has made virtue a lovely form, to excite our pursuit of it; and has given us strong affections, to be the springs of each virtuous action. See *MORAL Philosophy*, (*Encycl.*)

SENSE, Public, is defined to be our determination to be pleased with the happiness of others, and to be uneasy at their misery. This, he says, is found in some degree in all men, and was sometimes called *κοινωνικητις*, or *sensus communis*, by some of the ancients.

SENSE, Common, is a term that has been variously used both by ancient and modern writers. With others it has been synonymous with public sense; with others it has denoted prudence: in certain instances, it has been confounded with some of the powers of taste; and, accordingly, those who commit egregious blunders with regard to decorum, saying and doing what is offensive to their company, and inconsistent with their own character, have been charged with a defect in common sense. Some men are distinguished by an uncommon acuteness in discovering the characters of others; and this talent has been sometimes called *common sense*: similar to which is that use of the term, which makes it to signify that experience and knowledge of life which is acquired by living in society. To this meaning Quintilian refers, speaking of the advantages of a public education: *Sensum ipsum qui communis dicitur, ubi discit. cum se a congressu, qui non hominibus solum, sed multis quoque animalibus naturalis est, segregavit?* Lib. i. cap. 2.

But the term *common sense* hath in modern times been used to signify that power of the mind which perceives truth, or commands belief, not by progressive argumentation, but by an instantaneous, instinctive, and irresistible impulse; derived neither from education nor from habit, but from nature; acting independently of our will, whenever its object is presented, according to an established law, and therefore called *sense*; and acting in a similar manner upon all, or at least upon a great majority of mankind, and therefore called *common sense*. The first among the moderns, who took notice of this principle as one of the springs of our knowledge, was Buffier, a French philosopher of the present century, in a book entitled *Traité des premières verités*; and this doctrine hath lately, in

our own country, been illustrated and maintained by Drs Reid, Beattie, Oswald, and Campbell.

In order to evince, that there is a real and essential difference between this faculty and that of reason, it is observed, that we are conscious, from internal feeling, that the energy of understanding, which perceives intuitive truth, is different from that other energy which unites a conclusion with a first principle, by a gradual chain of intermediate relations: that we cannot discern any necessary connection between reason and common sense: that the one is more in our power than the other; the faculty of reasoning being improvable by culture; whereas common sense, like other instincts, arrives at maturity with almost no care of ours, and it is impossible to teach common sense to one who wants it; though this, like other instincts, may languish for want of exercise: and that a distinction, similar to that which is here maintained, is acknowledged by the vulgar, who speak of mother-wit, as something different from the deductions of reason, and the refinements of science. All sound reasoning, it is said, must ultimately rest on the principles of common sense; that is, on principles intuitively certain, or intuitively probable; and, consequently, common sense is the ultimate judge of truth, to which reason must continually act in subordination. Thus the advocates for this faculty, as an original and distinct power of the human mind, assign to it a very extensive empire, and an authority that is supreme and absolute. And they have proceeded so far, as to substitute in the room of Mr Locke's *abstraction*, this faculty, as the characteristic of rationality. To this they refer the evidence of mathematical truth, of external and internal sense, of memory, of reasoning from the effect to the cause, of probable or experimental reasoning, of analogical reasoning, of faith in testimony, and, indeed, of all primary truths. To common sense, therefore, all truth must be conformable; this, they say, is its fixed and invariable standard. And whatever contradicts common sense, or is inconsistent with that standard, though supported by arguments that are deemed unanswerable, and by names that are celebrated by all the critics, academies, and potentates on earth, is not truth, but falsehood. In a word, the dictates of common sense are, in respect to human knowledge, in general, what the axioms of geometry are in respect to mathematics: on the supposition that these axioms are false or dubious, all mathematical reasoning falls to the ground; and on the supposition that the dictates of common sense are erroneous or deceitful, all truth, virtue, and science, are vain. And hence it appears, that according to this system, common sense is not only the test of truth, but the standard of moral obligation. See Reid's *Enquiry into the Human Mind*, on the Principles of *Common Sense*, 8vo, ed. 2. 1765. Beattie's *Essay on the Nature and Immutability of Truth*, 8vo, ed. 2. 1771. Oswald's *Appeal to Common Sense* in behalf of Religion, 8vo, ed. 2. 1768. Campbell's *Philosophy of Rhetoric*, 8vo, 1776, vol. i. p. 109, &c.

This system has been attacked by Dr Priestley; who has again been replied to (by Dr Blacklock, if we are not misinformed) in a late periodical publication at Edinburgh. See Priestley's *Examination of Reid*,

Beattie, and Oswald; also *Edinburgh Magazin and Review* for the year 1775.

SERPENTS, (*Encycl.*) Serpents strike mankind, and other animals, with such terror upon account of their poison and some singular properties which elude all the distinction of our judgment, that their unexpected approach alarms even the most determined courage. Among the amphibia serpentes we find some genera endued with a very singular quality, whereby they differ from all others: the greater part of them live indifferently by land or water, many of them for one half the year sleep in their winter-quarters to all appearance dead: their respiration differs very much from that of birds and the Mammalia; they draw in air without any reciprocal expiration, at least a sensible one: their bodies are of a very rigid nature, abounding with blood, which possesses a very small degree of heat: the organs of generation in the male are double; a singularity occurring in no other animal, unless perhaps a few insects: their natural sounds are hoarse, their aspects ugly, their smell fetid. Some of them are oviparous, others viviparous; and by their having cartilaginous bones, every spring they shake off their old age in the manner of the crab; so that there is no definitive bound to their increase and magnitude. Their singular mode of taking their prey also deserves to be mentioned: being destitute of feet, and consequently not able to pursue it, they lie hidden under the cover of large stones and the roots of trees, and darting forward with a sudden spring upon any animal which passes by, seize and devour it. Travellers into India inform us, that the *Boa constrictor*, the greatest of all serpents, lies in ambush among shrubs, and seizing hares, stags, and other animals, suffocates them by rolling himself round them, and then covering them with his saliva, swallows them. These animals, as they very seldom happen of capture, and beside are not furnished with real and proper grinding teeth, have not their jaw-bones jointed with the same articulation as other animals, but only connected at the base with a ligament; so that by expanding them they are able to devour the body of an animal of twice their thickness, or even more: Thus Cleijer relates, that the *boa* of Java will devour a whole buffalo, and other travellers affirm that he is able to swallow a stag. Our own vipers are frequently seen with their bellies greatly swelled out; and being dissected, they will be found to contain a frog or a mouse. A writer in the *Amenitates Academicæ*, informs us, that he once discovered seven young birds in the stomach of a viper.

The American rattlesnake is the most indolent of all the serpents: As he lies under the shade of a tree, opening his jaws a little, he fixes his eyes, which glitter very brightly upon any bird or squirrel which is in it: they are endued with a wonderful power of fascination; the squirrel utters a mournful and feeble cry, and, as if foreseeing his fate, leaps from bough to bough on every side, seemingly to attempt a sudden escape; but struck with an unknown species of fascination, he comes down from the tree, and flings himself with a spring into the very jaws of his enemy. A mouse, having been shut up with one of these fascinating rattlesnakes in an iron box, the mouse sat in one corner, and the rattlesnake was opposite to it; and fixing

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his eyes continually upon it, by his look alone it was at last forced to fling itself into the mouth of the serpent. The same experiment was repeated in Italy with a pregnant female viper with the same success; and do we not see in the summer a parallel instance at home in the toad, a most indolent animal, into whose mouth, as it lies in the shade or under a shrub, butterflies and other insects fly?

Weapons. No subject has excited more philosophical controversy than the poison of serpents, with regard to its nature and mode of operating. Antiquity has not been sparing in conjecture and fiction upon this subject, and its errors have been retained with the most reverential obliquity by the vulgar: among these we are to reckon the fictitious sting fixed in the tail of the serpent, as the painters sometimes have groundlessly enough represented it; some have invented a similar fiction of a black forked tongue, which the serpent vibrates on both sides, and have ascribed its power of producing such noxious effect to this; while others, affixing an air of superior discernment, have, upon equally good reasons, ascribed it to the teeth in general: these are all errors of a magnitude that the most desultory attention to the subject would have been sufficient to have removed. There is a very small bone closely fixed to the upper jaw, in the inside of the lip of a poisonous serpent, which has a power of moving backward or forward; to this two or three fangs are annexed larger than the teeth, which the serpent, by its assistance, when enraged, darts forward, or withdraws and conceals at his pleasure, in a similar manner to the claws of a cat: these fangs, which the common people name the large teeth of the serpent, are excellently described by Tyson, in the anatomy of the rattlesnake, which he has given in the Philosophical Transactions. "In these (the fangs) we observed a considerable cavity near the base; and near the point a very discernible fissure of some length like the slit of a pen: the part of the tooth from the fissure to the root was manifestly channelled, which we first discovered by lightly pressing the gums; we then saw the poison ascend through the cavity of the fang and flow out of the fissure; and as these fangs are so very acute, so firm and solid toward the point (the fissure being on the external and convex, not the internal side), nothing could be conceived more convenient either for inflicting a wound, or to insure the infusion of the poison." Each of the fangs is surrounded with a vesicle furnished with glands secreting a certain fluid; which, upon the vesicle being pressed, seems to flow out of the point of the fang. The serpent when incensed, raising his head, extends the small bone armed with the fangs mentioned above; and attacking his enemy with a force combined of the weight of his body and the action of the muscles, he wounds him with the expanded fangs, and the vesicle being compressed the poison immediately flows into the wound: this is clear from the experience of those who, having broken off their fangs with a pair of forceps, handled the serpent thus disarmed without any hurt. And as the North Americans, after carefully extracting these venomous fangs, suffer the rattlesnake to bite and gnaw them with his teeth till the blood flows freely, with total impunity; it is certain those people are deceived who attribute the fatal effects of his bite to those hurtless weapons.

Poison. Antiquity amused itself with a fable destitute of all appearance of truth, that anger was excited by black bile: they applied this fiction without hesitation to the present subject, and founded an hypothesis upon it to account for the effects of the bite of an incensed serpent; pretending to have discovered an ideal canal which conducted the bile from its vesicle to the mouth of the serpent, whence it flowed into the part bitten, and produced the most fatal symptoms. But toward the end of the last century, this subject was greatly illustrated under the auspices of Ferdinand the Second, Great Duke of Tuscany: This prince, desirous of inquiring into that mysterious question, the nature of serpents, invited Sreno, Rhedi, and some other philosophers of the first eminence, to his court; and a multitude of the most poisonous serpents being collected, Rhedi made several experiments upon them, which discovered to him a number of particulars before unknown; of which the following seem to have the best claim to our attention. When he either caused a living viper to bite a dog, or wounded him with the teeth of one newly dead (the poisonous vesicle remaining unbroken), the event was the same. If the bite was repeated, its effect became weaker, and at last was lost, the poison contained in the vesicle being totally exhausted. That the teeth of serpents, when extended to bite, were moistened over with a certain liquor; and when the vesicle at the base was pressed, a drop of poison flowed to the point of the fang. When the poison thus flowing from the vesicle was received in soft bread or a sponge, an animal bitten by the serpent received no more harm from the wound than from being pricked by a needle, till after a few days, when the venom was restored afresh: but when an animal was wounded with the point of a needle dipped in the poison, it was tormented with the same pains as if it had been bitten by the viper itself. Preserving some of this poison in a glass, and totally evaporating the moisture in the sun, when the residuum was diluted again with water, and the point of a needle dipped in the solution, Rhedi found to his great surprise that it had the same effect as when recent. But the boldness of Tozzi, one who charmed vipers, slung all these men who were deeply versed in natural philosophy into the utmost astonishment; they happening to fall into discourse (while the prince was present) upon the certain death which would attend any person's swallowing this poison of the viper by mistake, instead of spirit of wine or water; Tozzi, confiding in his art, drank a considerable portion of it without hesitation: they were all astonished at his apparent rashness, and predicted instant death to the man; however, he escaped as safely as if he had drunk only so much water. This event, which struck the prince and his illustrious associates in these philosophical inquiries by its novelty, was well known to the ancients. Lucan, in the 9th book of the Pharsalia, speaking of the serpent, says,

*Nosia serpentum est admisso sanguine pessis
Morsu virus habent, et salum dente minantur.
Pocula morte carent.* Phar. l. 9, v. 614.

Mixed with the blood that venom slays alone,
His bite is poison, death is in his fang;
Yet is the draught innoxious.

Nor must we omit observing, that barbarous nations are perfectly acquainted with the property of the poi-

son of serpents by which it retains its deadly power after it has been long kept : they have been possessed of this fatal secret for ages past ; it being their custom to tinge the points of their arrows with the juice of spurge, putrid flesh, or oil of tobacco, but more particularly with the poison of vipers. Some modern Indians continue the practice to this day ; and we have the testimony of Pliny, in his Natural History, that the Scythians had long ago the same custom : " The Scythians (says that author) dip their arrows in the poison of vipers and human blood ; a horrid practice, as the slightest wound inflicted by one of them defies all the art of medicine."

While Rhedi and his associates were thus busied in Tuscany in tracing the footsteps of nature closely and successfully under the guidance of experiment, the philosophers of other countries amused themselves with forming new conjectures and fictions. In France, Moses Charas, first surgeon to the king, a man of considerable reputation, writing upon the theory of serpents, endeavoured with all his weight to prove their poison " to consist in heated animal-spirits, and therefore that it is impossible for a viper to give a deadly wound unless it had been before incensed." We shall not go about to deny, that the mental affections can generate something similar to a poison. The face of a man in anger, changed to a sublivid colour, indicates something like it : men struck with a sudden terror frequently turn pale, and the humours lodged in the intestinal canal are evacuated by a diarrhœa. But this is evidently discovered in nurses, whose milk becomes poisonous when they are greatly irritated ; and if it be then taken by a child, provokes a diarrhœa, which frequently terminates fatally. But however this may be, the hypothesis of Charas can receive but little support from it ; as that vague doctrine of animal spirits and their irritation, however it might afford a commodious and decent retreat to ignorance formerly, is now suffered to subside in a very undisturbed oblivion.

Bite. The symptoms that attend the bite of the viper are a smarting in the part wounded, as if it were continually pricked with needles ; swelling, paleness, snapping of the eyes, tears, horror with coldness ; a weak pulse, afterwards becoming unequal ; thirst, cold sweat, pain in the reins, diarrhœa with griping and vomiting, difficulty of breathing, drowsiness, and convulsions which terminate in death.

We are ignorant of what species the hemorrhoids was, which is described by Lucan as causing by its bite a flux of blood from every part of the body. But the bite of an American serpent named *de la cruz* kills in the same manner.

The diptasis is at present likewise unknown. Lucan informs us, that the person wounded by it was attacked by an unquenchable thirst. This is finely painted by him ; where A. Tuscus, standard-bearer of Cato, is described as bitten by that serpent :

*Non decus imperii, non missi jura Catonis
Ardentem tenere virum, quin spargere signa
Auderet, totisque furens exquireret agris
Quas poscebat aquas sitiens in corde venenum.*

Phaësa. l. 9.

His wild impatience, not his honoured state,
Nor forrowing Cato's high command, restrain ;
Furious, dishonoured in the dust, he flings

His sacred eagle, and o'er all the fields
Rapid he bursts to seek the cooling stream,
To quench the thirsty poison in his breast.

And a few verses after :

*Scrutatur venas penitus squalentis arena
Nunc redit ad Syrtis, et fluctus accipit ore,
Aqueoræque placet, sed non sibi sufficit humor,
Nec sentit satique genus, martemque veneni,
Sed putat esse sitim ; ferroque aperire tumentes
Sustulnit venas, atque os implere cruore.*

Now tearing up the sands, some latent vein
Frustrate he seeks ; now to the Syrtis shore
Return'd, he swallows down the briny flood
Mixed with its rolling sands ; nor knows his fate
And the sad poison's death, but calls it thirst ;
Then with his sword opens his spouting veins,
And drinks the bursting blood.—

In the monuments of antiquity we find three species of asps.

1. The phytas, with a callous caruncle on its forehead : its colour is cinereous, with a shining green.

2. The chersea, is very long, cinereous, inclining to green ; its eyes red.

3. The chelidonia is black, with a white belly : its bite is said to produce two or three hiccoughs, change of colour, stupor, cold, and sleep with palpitation. Upon a comparison of what these authors have written upon these asps, it seems probable that the phytas, which kills by bringing on a lethargic sleepiness, is the same serpent which obtained the specific name of the *aspis* among the ancients, and that it is the nintipolonga Zeylanica of Bellonius and Ray, and the Amodytes of Linnæus. The phytas seems to have been the serpent made use of by Cleopatra to destroy herself. This woman, to terminate a dissipated life with an easy death, ordered her physicians to prepare a poison for her which might best effect this purpose. They having tried a number of different experiments upon condemned criminals, at last discovered this species of asp, which brings on death without any previous appearance of distemper or hiccough : the face seems in a slight perspiration, an easy insensibility and lethargy creeps upon the whole frame, and the person bitten seems almost totally ignorant of his approaching dissolution. Having acquainted the queen with their discovery, he applied the asp either to her bosom or her arms ; or, according to some authors, dipping the point of a needle in the poison, and pricking herself with it, she expired in an easy sleep. Most of the **COLORATI** are poisonous, and perhaps all the **CROTALI** : among these are reckoned

Vipera,	Myæterizans,
Berus,	Leberia,
Lebetinus,	Prestor, or black viper,
Naja,	Stolatus,
Dipfas,	Niveus,
Atropos,	Amodytes,
Chersea,	Apis,
Severus,	Laëdus,
Atrox,	Corallinus.

The bite of the naja is so fatal, that a man dies by it in the space of an hour, his flesh entirely falling off his bones in a semi-dissolved putrid state : this makes it probable that it is the same serpent which the ancients named the *sepe*. It is not necessary to enume-

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rate any more, though a number of different species might be mentioned whose poisons all produced different effects: yet with this diversity, according to Rhedi, they all agree in one particular circumstance, that their venom is not fatal unless introduced into the blood externally.

The experiments of Rhedi have not, however, in the opinion of some celebrated philosophers, so far cleared the theory of the operation of the poison of the viper, as to leave nothing further to be desired upon that subject. Fontana and Carminati have endeavoured to investigate its operations more clearly. Carminati, from eleven experiments, deduces the following conclusions. 1. That if poison be infused into a nerve, the animal wounded dies almost instantly; and the whole nervous system, to which it is rapidly conveyed, is deprived of its quality called *sensibility*. 2. If a muscle be wounded, it is deprived of its irritability. This is confirmed by the experiments of Fontana. 3. The poison injected into a wounded muscle or tendon is considerably longer in killing an animal than that introduced into a nerve. 4. The symptoms which precede the death of the animal bitten are, a stupor, lethargy, tremors, convulsions, paralysis of the legs (part wounded), entire dissolution of the limbs. The blood is not always coagulated, nor its crasis dissolved. Marks of inflammation are sometimes discovered in certain parts of the animal after death, sometimes not: these are the effects of spasms and convulsions, not of the poison. 5. Not the least sign of the jaundice was discoverable in the eyes of any of the animals upon which Carminati made his experiments. 6. The stomach in every one of them was very much inflated; a symptom remarked only by Fallopius and Albertini. 7. A ligature applied instantly above the part bitten, if it be so placed as to admit one, was found by some experiments a good preventative against the diffusion of the poison: its compression should be considerable, but not excessive.

Cure. It would be endless to attempt to relate all those antidotes which men, compelled by so fatal a necessity, have employed against the bite of serpents. We shall confine ourselves only to such as are recommended by the probability of use. The first in point of antiquity, and which recommends itself also to us by its certainty, is to draw the venom out of the wounded part as quickly as possible. This has been attempted by different methods. The most ancient is sucking it out by the mouth: yet the utmost precaution is necessary in the person who performs this operation, that his mouth be perfectly free from the scurvy, and that the skin of the fauces be entirely unbroken; lest he should incur an equal hazard, or perhaps a greater, as the poison must attack a nobler part. Therefore, as the operation is nauseous and full of danger, it will be better to scarify the part with the knife, that the infected blood may have a freer exit from the opened mouths of the vessels, and to apply a large cupping-glass, by means of which the remaining venom may be extracted; then to foment the part with warm emollient applications, joined with some spirit, as the spirit of sal ammoniac or theriacum; if these be not at hand, apply soap and vinegar to the wound: the patient may take sudorific and exciting medicines internally, by which is meant emetics or ipecacuanha; and

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the stronger sudorifics are exhibited with great success. But the present age has added antidotes of three different species to counteract the most vehement effects of this poison, of which *Europe, America, and Asia*, has each furnished us with one.

1. Among the *Europeans*, there has been a strong predilection in favour of the oil of olives, or any other expressed oil: this is directed to be drunk plentifully by the patient, to the quantity of half a pound or more, while the wounded part is copiously bathed by it. Very full accounts of the happy effects of this treatment are inserted in the Philosophical Transactions of London, and the Memoirs of the Academy of Paris. We are so far from detracting from the merits of this medicine, that we think it specific against the bite of the common and black viper; yet we must add, that the nature of this antidote is not yet thoroughly investigated and understood, and that we dare not pronounce sentence upon its efficacy and use in every single and particular case. Linnæus, being in Scania, was applied to by a woman who was bitten by the chersia; and notwithstanding he caused her to drink this oil according to the prescribed forms, she nevertheless expired in the greatest agonies. May not this oil fail when applied against the bite of some of the European species of serpents? or is there not some necessary observations omitted in the formula delivered, either respecting the medicine or the patient? This we leave and strongly recommend to the experience of others to determine.

2. Let us now proceed to the *American* antidotes; of which the powder of the senega root deservedly claims the first place. The use of this root has been known to the natives of the woods of North America for many ages past. Its effects against the bite of the rattlesnake almost exceed all belief; but the invidious prejudices of those barbarians preserved this secret with so obstinate a silence, that no bribe could purchase it from them, until Tennent happily discovered and published it for the benefit of mankind. He tells us, that the root of the polygala senega never fails of success unless, where some large vessel is wounded, when the medicine has not time to counteract the rapid progress of the violence of the poison. Upon this subject the reader may consult the Dissertation upon this plant in the second volume of the *Amœnitates Academicæ*. A maid-servant at Upsal was bitten by a serpent upon a very dangerous place. The most dreadful symptoms followed the bite, and such as demanded the application of the most decisive remedies. Two doses of the powder of this root was attended with so good an effect, that in two days she was almost completely recovered. Beside this root, the Americans have many other plants which they apply upon the same occasion; as the eryngium foetidum, or American fetid eryngo; aquaticum, or Virginian aquatic ditto; veratrum luteum, or Virginian yellow-flowered veratrum; alctris farinosa, or floridan alctris; uvularia perfoliata, or Virginian perfoliate uvula; fanicula canadensis, or Canadian fanicle; and the aristolochia serpentaria, or Virginian snake-root: but we shall dismiss these, with a long catalogue of others whose virtues are not yet well known to us.

3. We come now to another antidote of equal celebrity, that made use of by the *Asiatics*, which is of

the greatest antiquity among the Indians, the ophiorrhiza mungos, or Indian ophiorrhiza. Kæmpfer has given us the history of this plant and its unequalled virtues against the bite of the coluber najas, or cobra di capello. We shall only hint, that as the efficacy of this medicine is so great, it would be much safer to introduce that, or the true lignum colubrinum, instead of the strychnos colubrina, or Indian strychnos, into general practice, whose use, if it have any, is extremely ambiguous.

The snake-stone, called the *pedra de cobras di capello* (as if it were a stone extracted from the head of the coluber naja) is very famous throughout all India, and is extolled by Garzia, Kircher, and others, as a specific against the bite of serpents. It is pretended, that if it be applied to a poisoned wound, and suffered to remain upon it until it fall off of itself, that it will extract all the venom. But its use has been suspected by many; nor did it succeed with Rhedi, who tried a variety of experiments with it. Many have been of opinion that the stone is artificial, and nothing more than the calcined horn of a hart. See PSYLLI, (*Encycl.*)

SHAKE, (*Encycl.*) See TRILL, below.

SHELLS, POLISHING OF. This is an art of no long standing in the world in its present perfection; and as the love of sea-shells is become so common among us, it may not be disagreeable to the reader to find some instructions in executing so pleasing a method of adding to their natural beauty, the rules for which are at present so little known, though the effect of them be so much esteemed.

Among the immense variety of shells which we are acquainted with, some are taken up out of the sea, or found on its shores in all their perfection and beauty; their colours being all spread by nature upon the surface, and their natural polish superior to any thing that art could give. Where nature is in herself thus perfect, it were madness to attempt to add any thing to her charms: but in others, where the beauties are latent and covered with a coarser outer skin, art is to be called in; and the outer veil being taken off, all the internal beauties appear.

Among the shells which are found naturally polished are, the porcelains, or cowries; the caissons; the dolia, or conchæ globosæ, or tuns; some buccina, the volute, and the cylinders, or olives, or, as they are generally though improperly called, the *rhombi*; excepting only two or three, as the tiara, the plumb, and the butter-tub rhombus, where there is an unpromising film on the surface, hiding a very great share of beauty within. Though the generality of the shells of these genera are taken out of the sea in all their beauty, and in their utmost natural polish, there are several other genera, in which all or most of the species are taken up naturally rough and foul, and covered with an epidermis, or coarse outer skin, which is in many rough and downy or hairy. The tellinæ, the muscels, the cochleæ, and many others, are of this kind. The more nice collectors, as naturalists, insist upon having all their shells in their native and genuine appearance, as they are found when living at sea; but the ladies, who make collections, hate the disagreeable outdoes, and will have all such polished. It would be very advisable, however, for both kinds of

collectors to have the same shells in different specimens, both rough and polished: the naturalist would by this means, besides knowing the outside of the shell, be better acquainted with its internal characters than he otherwise could be, and the lady would have a pleasure in comparing the beauties of the shell, in its wrought state, to its coarse appearance as nature gives it. How many elegancies in this part of the creation must be wholly lost to us, if it were not for the assistance of an art of this kind! Many shells in their native state are like rough diamonds, and we can form no just idea of their beauties till they have been polished and wrought into form.

Though the art of polishing shells is a very valuable one, yet it is very dangerous to the shells; for without the utmost care, the means used to polish and beautify a shell often wholly destroy it. When a shell is to be polished, the first thing to be examined is whether it have naturally a smooth surface, or be covered with tubercles or prominences.

A shell which has a smooth surface, and a natural dull polish, need only be rubbed with the hand, or with a piece of chamoy leather, with some tripoli, or fine rotten stone, and will become of a perfectly bright and fine polish. Emery is not to be used on this occasion, because it wears away too much of the shell. This operation requires the hand of an experienced person, that knows how superficial the work must be, and where he is to stop; for in many of these shells the lines are only on the surface, and the wearing away ever so little of the shell defaces them. A shell that is rough, foul, and crusty, or covered with a tartareous coat, must be left a whole day sleeping in hot water: when it has imbibed a large quantity of this, it is to be rubbed with rough emery on a stick, or with the blade of a knife, in order to get off the coat. After this, it may be dipped in diluted aquafortis, spirit of salt, or any other acid; and after remaining a few moments in it, be again plunged into common water. This will add greatly to the speed of the work. After this it is to be well rubbed with linen cloths, impregnated with common soap; and when by these several means it is made perfectly clean, the polishing is to be finished with fine emery and a hair-brush. If after this the shell when dry appears not to have so good a polish as was desired, it must be rubbed over with a solution of gum arabic; and this will add greatly to its gloss, without doing it any sort of injury. The gum-water must not be too thick, and then it gives no sensible coat, only heightening the colours. The white of an egg answers this purpose also very well; but it is subject to turn yellow. If the shell has an epidermis, which will by no means admit the polishing of it, it is to be dipped several times in diluted aquafortis, that this may be eaten off; and then the shell is to be polished in the usual way with putty, fine emery, or tripoli, on the hair of a fine brush. When it is only a pellicle that hides the colours, the shells must be steeped in hot water, and after that the skin worked off by degrees with an old file. This is the case with several of the cylinders, which have not the natural polish of the rest.

When a shell is covered with a thick and fatty epidermis, as is the case with several of the muscels and tellinæ; in this case aquafortis will do no service, as it

it will not touch the skin: then a rough brush and coarse emery are to be used; and if this does not succeed, pumice-stone, or, as the workmen call it, *fijfcr/kin* and *pumice-stone*, are to be employed.

When a shell has a thick crust, which will not give way to any of these means, the only way left is to plunge it several times into strong aquafortis, till the stubborn crust is wholly eroded. The limpets, *auris marina*, the helmet-shells, and several other species of this kind, must have this sort of management; but as the design is to show the hidden beauties under the crust, and not to destroy the natural beauty and polish of the inside of the shell, the method of using the aquafortis must be this: A long piece of wax must be provided, and one end of it made perfectly to cover the whole mouth of the shell; the other end will then serve as a handle, and the mouth being stopped by the wax, the liquor cannot get in to the inside to spoil it; then there must be placed on a table a vessel full of aquafortis, and another full of common water.

The shell is to be plunged into the aquafortis; and after remaining a few minutes in it, is to be taken out, and plunged into the common water. The progress the aquafortis makes in eroding the surface is thus to be carefully observed every time it is taken out: the point of the shell, and any other tender parts, are to be covered with wax, to prevent the aquafortis from eating them away; and if there be any worm-holes, they also must be stopped up with wax, otherwise the aquafortis would soon eat through in those places. When the repeated dippings into the aquafortis show that the coat is sufficiently eaten away, then the shell is to be wrought carefully with fine emery and a brush; and when it is polished as high as can be by this means, it must be wiped clean, and rubbed over with gum-water or the white of an egg. In this sort of work the operator must always have the caution to wear gloves; otherwise the least touch of the aquafortis will burn the fingers, and turn them yellow; and often, if it be not regarded, will eat off the skin and the nails.

These are the methods to be used with shells which require but a moderate quantity of the surface to be taken off; but there are others which require to have a larger quantity taken off, and to be uncovered deeper: this is called entirely scaling a shell. This is done by means of an horizontal wheel of lead or tin, impregnated with rough emery; and the shell is wrought down in the same manner in which stones are wrought by the lapidary. Nothing is more difficult, however, than the performing this work with nicety: very often shells are cut down too far by it, and wholly spoiled; and to avoid this, a coarse vein must be often left standing in some place, and taken down afterwards with the file, when the cutting it down at the wheel would have spoiled the adjacent parts.

After the shell is thus cut down to a proper degree, it is to be polished with fine emery, tripoli, or rotten stone, with a wooden wheel turned by the same machine as the leaden one, or by the common method of working with the hand with the same ingredients. When a shell is full of tubercles, or protuberances, which must be preserved, it is then impossible to use the wheel; and if the common way of dipping into aquafortis be attempted, the tubercles being harder than

the rest of the shell, will be eat through before the rest is sufficiently scaled, and the shell will be spoiled: in this case industry and patience are the only means of effecting a polish. A camel's-hair pencil must be dipped in aquafortis; and with this the intermediate parts of the shell must be wetted, leaving the protuberances dry: this is to be often repeated; and after a few moments the shell is always to be plunged into water to stop the erosion of the acid, which would otherwise eat too deep, and destroy the beauty of the shell. When this has sufficiently taken off the foulness of the shell, it is to be polished with emery of the finest kind, or with tripoli, by means of a small stick, or the common polishing stone used by the goldsmiths may be used.

This is a very tedious and troublesome thing, especially when the echinated oysters and murexes, and some other such shells, are to be wrought: and what is worst of all is, that when all this labour has been employed, the business is not well done; for there still remains several places which could not be reached by any instrument, so that the shell must necessarily be rubbed over with gum-water or the white of an egg afterwards in order to bring out the colours and give a gloss; in some cases it is even necessary to give a coat of varnish.

These are the means used by artists to brighten the colours, and add to the beauty of shells; and the changes produced by polishing in this manner are so great, that the shell is often not to be known afterwards for the same it was; and hence we hear of new shells in the cabinets of collectors, which have no real existence as separate species, but are the polished appearance of others well known. To caution the reader against errors of this kind, it may be proper to add the most remarkable species thus usually altered.

The onyx-shell or volute, called by us the *purple* or *violet-tip*, which in its natural state is of a simple pale brown, when it is wrought slightly, or polished with just the superficies taken off, is of a fine bright yellow; and when it is eat away deeper, it appears of a fine milk-white, with the lower part bluish: it is in this state that it is called the *onyx-shell*; and it is preserved in many cabinets in its rough state, and in its yellow appearance, as different species of shells.

The violet shells, so common among the curious, is a species of porcelain, or common cowry, which does not appear in that elegance till it has been polished; and the common *auris marina* shows itself in two or three different forms, as it is more or less deeply wrought. In its rough state it is dusky and coarse, of a pale brown on the outside, and pearly within; when it is eaten down a little way below the surface, it shows variegations of black and green; and when still farther eroded, it appears of a fine pearly hue within and without.

The nautilus, when it is polished down, appears all over of a fine pearly colour; but when it is eaten away but to a small depth, it appears of a fine yellowish colour with dusky hairs. The burgau, when entirely cleared of its coat, is of the most beautiful pearl-colour: but when once slightly eroded, it appears of a variegated mixture of green and red; whence it has been called the *parroquet shell*. The common helmet-shell, when wrought, is of the colour of the finest a-

gate;

Shells.

gate; and the mufcles, in general, though very plain fhells in their common appearance, become very beautiful when polished, and fhew large veins of the moft elegant colours. The Perfian fhell, in its natural ftate, is all over white, and covered with tubercles; but when it has been ground down on a wheel, and polished, it appears of a grey colour, with fpoats and veins of a very bright and highly polished white. The limpets in general become very different when polished, moft of them fhewing very elegant colours; among thefe the tortoise-shell limpet is the principal; it does not appear at all of that colour or tranfparency till it has been wrought.

That elegant fpecies of fhell called the *junquilha*, which has deceived fo many judges of thefe things into an opinion of its being a new fpecies, is only a white chama with a reticulated furface; but when this is polished, it lofes at once its reticular work and its colour, and becomes perfectly fmooth, and of a fine bright yellow; and the violet-coloured chama of New England, when worked down and polished, is of a fine milk-white, with a great number of blue veins, difpofed like the variegations in agates.

The afles-ear fhell, when polished after working it down with the file, becomes extremely glosfy, and obtains a fine rofe-colour all about the mouth. Thefe are fome of the moft frequent among an endlefs variety of changes wrought on fhells by polishing; and we find there are many of the very greateft beauties of this part of the creation, which muft have been loft but for this method of fearching deep in the fubftance of the fhell for them.

The Dutch are very fond of fhells, and are very nice in their manner of working them: they are under no reftRAINT, however, in their works; but ufe the moft violent methods, fo as often to deftroy all the beauty of the fhell. They file them down on all fides, and often take them to the wheel, when it muft deftroy the very characters of the fpecies. Nor do they ftop at this; but, determined to have beauty at any rate, they are for improving upon nature, and frequently add fome lines and colours with a pencil, afterwards covering them with a fine coat of varnifh; fo that they feem the natural lineations of the fhell: the Dutch cabinets are by this means made very beautiful, but they are by no means to be regarded as inftstructors in natural hiftory. There are fome artificers of this nation who have a way of covering fhells all over with a different tinge from that which nature gives them; and the curious are often deceived by thefe tricks: into the purfuing them as new fpecies.

There is another kind of work beftowed on certain fpecies of fhells, particularly the nautilus; namely, the engraving on it lines and circles, and figures of ftars, and other things: this is too obvious a work of art to fuffer any one to fuppofe it natural. Buonani has figured feveral of thefe wrought fhells at the end of his work; but it is miferably throwing away labour to do them; the fhells are fpoiled as objects of natural hiftory by it, and the engraving is feldom worth any thing. They are principally done in the Eaft Indies.

Shells are fubject to feveral imperfections; fome of which are natural, and others accidental. The natural ones are the effect of age, or ficknefs in the fift. The

greateft mischief happens to fhells by the fift dying in them. The curious in thefe things pretend to be always able to diftinguifh a fhell taken up with the fift alive, from one found on the fhores: they call the fift a *living*, the fecond a *dead* fhell; and fay that the colours are always much the fainteft in the dead fhells. When the fhells have lain long dead on the fhores, they are fubject to many injuries, of which the being eaten by fea worms is not the leaft: age renders the fineft fhells livid or dead in their colours.

The fineft fhells are thofe which are fifted up at fea, not found on the fhores. The other natural defects of fhells are their having morbid cavities, or protuberances, in parts where there fhould be none. When the fhell is valuable, thefe faults may be hid, and much added to the beauty of the fpecimen without at all injuring it as an object of natural hiftory, which fhould always be the great end of collecting thefe things. The cavities may be filled up with mafic, difolved in fpirit of wine, or with ifinglafs: thefe fubftances muft be either coloured to the tinge of the fhell, or elfe a pencil dipped in water-colours muft finifh them up to the reftemblance of the reft; and then the whole fhell being rubbed over with gum-water, or with the white of an egg, fcarce any eye can perceive the artifice: the fame fubftances may alfo be ufed to repair the battered edge of a fhell, provided the pieces chipped off be not too large. And when the excrefcences of a fhell are faulty, they are to be taken down with a fine file. If the lip of a fhell be fo battered that it will not admit of repairing by any cement, the whole muft be filed down to an evennefs, or ground on the wheel.

SHERIDAN (Mrs Frances), wife to Thomas Sheridan, M. A. was born in Ireland about the year 1724, but defcended from a good Englifh family which had removed thither. Her maiden name was Chamberlaine, and fhe was grand-daughter of Sir Oliver Chamberlaine. The firft literary performance by which fhe diftinguifhed herfelf was a little pamphlet at the time of a violent party-difpute relative to the theatre, in which Mr Sheridan had newly embarked his fortune. So well-timed a work exciting the attention of Mr Sheridan, he by an accident difcovered his fair patronnefs, to whom he was foon afterwards married. She was a perfon of the moft amiable character in every relation of life, with the moft engaging manners. After lingering fome years in a very weak ftate of health, fhe died at Blois, in the fourth of France, in the year 1767. Her "Sydney Biddulph" may be ranked with the firft productions of that clafs in ours or in any other language. She alfo wrote a little romance in one volume, called *Nou-jahad*, in which there is a great deal of imagination productive of an admirable moral. And fhe was the authorefs of two comedies, "The Difcovery" and "The Dupe."

SIDUS, or GEORGIVM, in aftronomy, a new primary planet, difcovered by William Herfchel, Efq; of Bath, in the year 1781, for which he obtained from the Royal Society the honorary recompence of Sir Godfrey Copley's medal; and fo called in honour of his majefty king George III. who has taken Mr Herfchel under his patronage, and granted to him an annual falary. "From many calculations of our beft

Sheridan,
Sidus.

astronomers and mathematicians, says Mr Herichel, I have collected the following particulars, as most to be depended upon.

Place of the node	-	2 ^s 11 ^d 49' 30"
Inclination of the orbit	-	43' 35"
Place of the perihelion	-	172 ^d 13' 17"
Time of the perihelion passage	-	Sep. 7, 1799
Eccentricity of the orbit	-	.82034
Half the greater axis	-	19,97904
Revolution	-	83,3364 sidereal years.

From my own observations on this planet's apparent diameter, which I have found cannot well be less than 4", nor indeed much greater, we infer that its real diameter is to that of the earth as 4,454 to 1; and hence it appears to be of very considerable bulk, and, except Saturn and Jupiter, by far the largest of the remaining planets. Its light is of a bluish-white colour, and in brilliancy between that of the Moon and of Venus. With a telescope which magnifies about 300 times, it appears to have a very well defined visible disk; but with instruments of a small power, it can hardly be distinguished from a fixed star of between the sixth and seventh magnitude. In a very fine clear night, when the moon is absent, it may also be seen by the naked eye."

SIGHING, an effort of nature, by which the lungs are put into greater motion, and more dilated, so that the blood passes more freely, and in greater quantity, to the left auricle, and thence to the ventricle. Hence we learn, says Dr Hales, how sighing increases the force of the blood, and consequently proportionably cheers and relieves nature, when oppressed by its too slow motion, which is the case of those who are dejected and sad.

SILK, SERICUM, a very soft, fine, bright, delicate thread; the work of an insect, called *bombyx* or the *silk-worm*. See **SILK**, (*Encycl.*)

The ancients were but little acquainted with the use and manufacture of silk; they took it for the work of a sort of spider, or beetle, who spun it out of its entrails, and wound it with its feet about the little branches of trees. This insect they called *ser*, from *Seres*, a people in Scythia, whom we now call the *Chinese*, who, as they thought, bred it; whence the silk itself they called *sericum*. But this *ser* of theirs has very little affinity with our silk-worm, *bombyx*; the former living five years; but the latter dying annually, enveloped in a yellowish bag, or ball, which, wound out into little threads, makes what we call *silk*.

It was in the isle of Cos that the art of manufacturing silk was first invented; and Pamphila, daughter of Platis, is honoured as the inventress. The discovery was not long unknown to the Romans. Silk was brought them from *Serica*, where the worm was a native. But so far were they from profiting by the discovery, that they could not be induced to believe so fine a thread should be the work of a worm, and thereupon formed a thousand chimerical conjectures of their own.

Silk was a very scarce commodity among them for many ages; it was even sold weight for weight with gold, inasmuch that Vopiscus tells us, the emperor Aurelian, who died A. D. 275, refused the empress, his wife a suit of silk, which she solicited of him with much earnestness, merely on account of its dearth.

Others, however, with greater probability, assert that it was known at Rome so early as the reign of Tiberius, about A. D. 17.

Galen, who lived about the year of our Lord 173, speaks of the rarity of silk; being nowhere but at Rome, and only among the rich.

Heliogabalus, the emperor, who died A. D. 220, is said by some to be the first person who wore a holosericum, i. e. a garment of all silk.

The Greeks of Alexander the Great's army are said to have been the first who brought wrought silk from Persia into Greece, about 323 years before Christ; but the manufacture of it was confined to Berytus and Tyre, in Phœnicia, whence it was dispersed over the West.

At length, two monks, coming from the Indies to Constantinople, in 555, under the encouragement of the emperor Justinian, brought with them great quantities of silk-worms, with instructions for the hatching of their eggs, rearing and feeding the worms, and drawing out the silk, and spinning and working it. Upon this, manufactures were set up at Athens, Thebes, and Corinth. The Venetians, soon after this time, commencing a commerce with the Greek empire, supplied all the western parts of Europe with silks for many centuries; though sundry kinds of modern silk manufactures were unknown in those times, such as damasks, velvets, fattins, &c.—About 1130, Roger II. king of Sicily established a silk-manufactory at Palermo, and another in Calabria; managed by workmen, who were a part of the plunder brought from Athens, Corinth, &c. where that prince made a conquest in his expedition to the Holy Land. By degrees, Mezeray adds, the rest of Italy and Spain learned, from the Sicilians and Calabrians, the management of the silk-worms, and the working of silk; and at length the French got it by right of neighbourhood, a little before the reign of Francis I. and began to imitate them. Thuanus, indeed, in contradiction to most other writers, makes this manufacture of silk to be introduced into Sicily 200 years later, by Robert the Wise, king of Sicily, and count of Provence.

It appears, by 33 Henry VI. cap. 5. that there was a company of silk-women in England so early as the year 1455. But these were probably employed in needle-works of silk and thread; and we find that various sorts of small haberdashery of silk were manufactured here in 1482: but Italy supplied England, and all other parts, with the broad manufacture, till the year 1489. In Spain, indeed, the culture and manufacture of silk seem to have been introduced in an early period by the Moors, particularly in Murcia, Cordova, and Granada. The silk manufactures of this last town were very flourishing, when it was taken by Ferdinand, &c. at the close of the 15th century.

In 1521, the French, being supplied with workmen from Milan, commenced a silk manufacture; but it was long after this time before they could obtain raw silk from the worms; and, even in the year 1547, silk was scarce and dear in France; and Henry II. is said to have been the first who wore a pair of silk knit stockings, though the first invention originally came from Spain, whence silk stockings were brought over to Henry VIII. and Edward VI. After the civil wars.

in France, the plantations of mulberry-trees were greatly encouraged by Henry IV. and his successors; and the produce of silk is at this day very considerable.

The great advantage which the new manufacture afforded, made our king James I. very earnest for its being introduced into England: accordingly, it was recommended several times from the throne, and in the most earnest terms, particularly in the year 1608, to plant mulberry-trees, &c. for the propagation of silk-worms, but unhappily without effect; though, from the various experiments we meet with in the Philosophical Transactions, and other places, it appears that the silk-worm thrives and works as well, in all respects, in England as in any other part of Europe.

However, towards the latter end of this king's reign, i. e. about the year 1620, the broad-silk manufacture was introduced into this country, and profecuted with great vigour and advantage. In 1629, the silk manufacture was become so considerable in London, that the silk-throwsters of the city and parts adjacent were incorporated under the name of *masters, wardens, &c. of the silk-throwsters*; and in 1661, this company of silk-throwsters employed about 40,000 persons. The revocation of the edict of Nantes, in 1685, contributed in a great degree to promote the silk manufacture in this kingdom; as did also the invention of the silk-throwing machine at Derby, in 1719.—So high in reputation was the English silk manufacture, that even in Italy, as Keyser informs us, in 1730, the English silks bore a higher price than the Italian.

SILK, Raw, is that taken from the ball, without fire, and wound without any coction: such as is most, if not all, that is brought into England from the Levant; i. e. from Persia by the way of Turkey, from Bengal in India, and from China. The raw silk is commonly worked up into two sorts, called *organzine* and *tram*. The former is made by giving a throw or twist to each thread of raw silk singly, and then doubling two of these twisted threads together, and twisting them smartly together: this forms the length or warp of a piece when manufactured. The tram, or shoot, which makes the breadth of the piece, is formed by twisting two or more threads of raw silk slack. The wasted silk, or refuse in reeling, &c. is collected, carded, and spun, and called *flysilk*; this is doubled and thrown, and often made into a cheap sort of silk stockings, which are very strong and durable.

In the French silk-works, the greatest part of this raw silk passes for little better than a kind of fine florretta; yet, when spun, it makes a bright thread, and serves for the manufacture of stuffs of moderate value and lustre. But the raw silks of the Levant, whence most of ours come, are exceeding fine and beautiful. The difference arises hence, that, in France, the best balls are spun and wound in boiling water, and only the refuse made into raw silk; whereas, in the Levant, there is no such thing as spinning or winding on the fire, but the silks are all sent in bales, or packs, as they are drawn from off the balls; so that they are only distinguished by their quality of fine, middling, and coarse.

SILK, Boiled, is that which has been boiled in water,

to facilitate the spinning and winding. This is the finest of all the sorts of silk manufactured in France, and is seldom used but in the richest stuffs, as velvets, taffaties, damasks, brocades, &c.

There is also another kind of boiled silk, which is prepared by boiling, to be milled, and which cannot receive that preparation without being first passed through hot water. By the laws of France, it is prohibited to mix raw with boiled silk; both as such a practice spoils the dyeing, and as the raw silk corrupts and cuts the boiled.

SILKS, Thrown or Twisted, are such as, beside their spinning and winding, have received their milling or throwing.

This they receive in a different degree, as they are passed oftener or seldomer over the mill; properly, however, thrown silks are those wherein the threads are pretty thick thrown, and twisted several times.

The thrown silk comes to us chiefly from Leghorn, Genoa, Naples, and Messina.

SILKS, Slack, are such as are not twisted, but are prepared, and dyed, for tapestry, and other works with the needle.

SILK, Eastern or East Indian. That popularly thus called is not the work of the silk-worms, but comes from a plant that produces it, in pods, much like those of the cotton-tree. The matter this pod contains is extremely white, fine, and moderately glossy: it spins easily, and is made into a kind of silk that enters the manufacture of several Indian and Chinese stuffs.

SILKS, French. It is only in the most southern provinces of France that silk is cultivated, mulberry-trees planted, and worms bred. The principal places are Languedoc, Dauphiné, Provence, Avignon, Savoy, and Lyons. This last place, indeed, furnishes very few silks of its own growth; but it is the great staple whence the merchants of Paris, and the other cities, are to fetch them. At least, they are obliged to have them pass through Lyons, if they bring them from other places, either by land or sea. There have been computed to enter Lyons, *communibus annis*, 6000 bales, the bale valued at 160 pounds weight; of which 6000 bales there are 1400 from the Levant, 1600 from Sicily, 1500 from Italy, 300 from Spain, and 1200 from Languedoc, Provence, and Dauphiné.

At the time when the manufactures of Lyons were in their prosperity, there were reckoned to be 18000 looms employed in the silk manufacture; but in 1698 there were not reckoned 4000. However, this manufacture has revived of late, and a great part of Europe has been supplied from thence with brocade and rich silks. The decay has not been less notable at Tours: they had formerly there 800 mills for winding and preparing the silks, 8000 looms to weave them, and 40,000 persons employed in the preparation and manufacturing thereof; but these have been reduced to 70 mills, 1200 looms, and about 4000 persons.

SILKS, Sicilian. The commerce of the silks of Sicily is very considerable: and the Florentines, Genoese, and Luccese, are the people who chiefly make it. Great quantities are yearly brought thence, especially from Messina: part whereof they use in their own manufactures, and sell the rest to their neighbours, the French, &c. with profit. The Italians have this advantage, especially the Genoese, over other people, that,

that, having larger establishments in the island, they are reputed as natives, and pay no duty for the export.

Part of the Sicilian silks are raw, the rest are spun and milled; of which last kind, those of St Lucia and Messina are the most valued. The raw unwrought silks are always sold for ready money: the others, sometimes, in exchange for other goods.

SILKS, Italian. The silks brought from Italy are partly wrought, and partly raw and unwrought. Milan, Parma, Lucca, and Modena, furnish none but the latter kind; Genoa most of the former; Bologna affords both kinds. The finest Italian wrought silk comes from Piedmont, Novi, Bergamo, and Bologna: and is imported into England from the ports of Nice, Genoa, and Leghorn.

The silk we have from Italy is generally thrown, and serves for warp for our manufactures: and the greater part we import from Piedmont, at an annual expence of no less than 200,000*l.* and in general at the price of 20*s.* for every pound. And the king of Sardinia, it is said, hath prohibited the exportation of raw silk out of his dominions; though the markets are open in other parts of Italy.

SILKS, Spanish, are all raw; and are spun, milled, &c. in England, according to the several works they are to be used in.

SILKS, Turkey, are all raw. One advantage we have in the commerce of the Levant, in silks, wanting in those of Sicily, is, that the latter are confined to a particular season of the year; whereas the former are bought at all times. They are brought from Aleppo, Tripoli, Sayda, and from the isle of Cyprus, Candia, &c. But the principal place of commerce, especially for the silks of Persia, is Smyrna. The silks are brought hither in caravans, from the month of January to September. The caravans in January are laden with the finest silks; those of February and March bring indifferent ones; the rest, the coarsest. They all come from the several provinces of Persia, chiefly those of Ghilan and Shirvan, and the city of Schamachia, situate near the edge of the Caspian sea; from which three places, a Dutch author assures us, there have not come less than 30,000 bales of silk in a year. Ghilan produces the best and greatest quantities of silk; next to this comes Shirvan and Erivan, then Mazanderan, and lastly Astrabad; but the latter is much inferior, serving only for a manufacture mixed with cotton; that of Mazanderan and Astrabad is seldom or never exported.

Ardeuil, or Ardabil, another city of Persia, not far distant from these silk countries, is the place where silks are laid up, and whence the caravans set out for Smyrna, Aleppo, Scanderoun, and Constantinople; and it is this city, with Schamachia, that have always been esteemed the centre of the silk trade; which has been several times attempted to be removed from Smyrna and the Mediterranean, in favour of Archangel, and the White-sea, by carrying them across Muscovy, by the Volga and Dwina, two rivers that traverse the principal provinces of that vast empire.

This new course of the Persian silks into Europe was first proposed by Paolo Centurio, a Genoese, to the czar Basil, under the pontificate of Leo X. The French had the same design in 1628. The duke of Holstein, in 1633, sent ambassadors to the court of Persia, purely with the same view: and, in 1668, the

czar Alexis Michael attempted the thing himself; but he was disappointed by the rebellion of the Cossacks, and the furprise of Astracan.

In 1688, the commerce of Persian silks had like to have been removed from Smyrna, by an earthquake, which almost overturned the whole city; and doubtless, the removal had been effected, but for the vigorous means used by the Turks to prevent it. Smyrna, however, still remains in her ancient possession; and the several nations of Europe continue every year to send their fleets to fetch away the silks; and matters are like to remain so, unless the conquests made by the late czar, along the Caspian sea, enable his successors, as it is certain he himself had such a thing in view, to put this trade into another channel.

SILKS, China, Japan, and Indian. Several provinces of China are so fertile in mulberry-trees, and their climate is so agreeable to the nature of silk-worms, that the quantity of silk there produced is incredible: the single province of Tcheliang might supply all China, and even a great part of Europe, with this commodity. The silks of this province are the most esteemed, though those of Nankin and Canton be excellent.

The silk-trade is the principal in China, and that which employs the most hands: but the European merchants, who deal in it, especially in wrought silks, are to be careful of the spinning, &c. the waste being usually very great, as the French East India company have found to their cost.

In the year 1750, an act of parliament was passed for repealing the duties payable on China raw silk, imported into this kingdom by the East India Company, and intitling such silk, upon exportation, to the same drawbacks and allowances with the raw silk of the produce of Italy. And another act was passed in 1753, for the farther encouragement of the British silk manufacture. Japan would not afford fewer silks than China; but that the Japanese, a barbarous and distrustful people, have interdicted all commerce with strangers, especially with Europeans, excepting with the Dutch; who are said to be admitted on certain impious terms, related by Tavernier, but which we must own we cannot credit. The Dutch have endeavoured to vindicate themselves from these by the pens of several famous writers.

The silks of the states of the Great Mogul are brought in great quantities from Cassim-bazaar, a midland place, whence they are conveyed by a canal of 15 leagues into the Ganges, by which they are forwarded 15 leagues farther, to the mouth of the famous river of Indostan. The silk of Cassim-bazaar is yellowish; as are also those of Persia and Sicily; there being none, that we know of, naturally white, but that of Palestine. The Indians, however, whiten this with a ley, made of the ashes of a tree called *Adam's fig-tree*; but as this tree is pretty scarce, and they have not yet found any other that will serve in its place, the Europeans are forced to take the greatest part of their silks in their native yellow. Cassim-bazaar alone is computed to furnish every year 22,000 bales of silk, each bale weighing 100 pounds; of which the Dutch are said to export 7000 bales annually.

Great quantities of both raw and wrought silk are
fur-

Skating.

furnished by other parts of Bengal, and by several provinces of Indostan, which partly supply the natives, and afford a very considerable exportation to Europe. Several thousand bales of raw silk are annually imported from Bengal and China; some of which is, in this state, used for making princely-stuffs, but the greater part is prepared for the manufacturers by the silk-throwers. The duty on thrown silk imported is 5s. 1d. $\frac{1}{2}$; and the duty on raw silk, whether of the growth of Italy, Turkey, or India, is 1s. 4d. $\frac{1}{2}$ per pound.

The quantity of Bengal and China raw silk imported in 1783, was 3636 Bengal bales, each bale weighing about 150 great pounds, and 1390 China bales, at about 145 small pounds per bale.

SKATING, an exercise on ice, both graceful and healthy. Although the ancients were remarkable for their dexterity in most of the athletic sports, yet skating seems to have been unknown to them. It may be looked on, therefore, as a modern invention; and probably it derived its origin in Holland, where it naturally became habitual and necessary, not only as a graceful and elegant amusement, but as an expeditious mode of travelling when the lakes and canals were frozen up during winter. In Holland long journeys are made upon skates with ease and expedition; but in general less attention is there paid to graceful and elegant movements, than to the expedition and celerity of what is called *journey skating*. It is in those countries alone where it is considered as an amusement, that graceful attitudes and movements can be found; and there is no exercise whatever better calculated to set off the human figure to advantage. The acquirement of most exercises may be attained at an advanced period of life; but to become an expert skater, it is necessary to begin the practice of the art at a very early age. It is difficult to reduce the art of skating to a system. It is principally by the imitation of a good skater, that a young practitioner can form his own practice. The English, though often remarkable for feats of agility upon skates, are very deficient in the article of grace; which is partly owing to the construction of the skates, which are too much curved in the surface which embraces the ice, consequently they involuntarily bring the users of them round on the outside upon a quick and small circle; whereas the skater, by using skates of a different construction, less curved, has the command of his stroke, and can enlarge or diminish the circle according to his own wish and desire. The metropolis of Scotland has produced more instances of elegant skaters, than perhaps any other country whatever; and the institution of a Skating Club about 40 years ago, has contributed not a little to the improvement of this elegant amusement. We are indebted for this article to a gentleman of that Club, who has made the practice and improvement of skating his particular study; and as the nature of our work will not permit the insertion of a full treatise on skating, we shall give a few instructions which may be of use towards the attainment of the art.—Those who wish to be proficient should begin at an early period of life; and should first endeavour to throw off the fear which always attends the commencement of an apparently hazardous amusement. They will soon acquire a facility of moving on the inside: and when they do so,

they must endeavour to acquire the movement on the outside of the skates; which is nothing more than throwing themselves upon the outer edge of the skate, and making the balance of their body tend towards that side, which will necessarily enable them to form a semicircle. In this, much assistance may be derived from placing a bag of lead-shot in the pocket next to the foot employed in making the outside stroke, which will produce an artificial poise of the body, which afterwards will become natural by practice. At the commencement of the outside stroke, the knee of the employed limb should be a little bended, and gradually brought to a rectilinear position when the stroke is completed. When the practitioner becomes expert in forming the semicircle with both feet, he is then to join them together and proceed progressively and alternately with both feet, which will carry him forward with a graceful movement. Care should be taken to use very little muscular exertion, but that the impelling motion should proceed from the mechanical impulse of the body thrown into such a position as to regulate the stroke. At taking the outside stroke, the body ought to be easily thrown forward, the unemployed limb kept in a direct line with the body, and the face and eyes directly looking forward: the unemployed foot ought to be stretched towards the ice, with the toes in a direct line with the leg. In the time of making the curve, the body must be gradually, and almost imperceptibly, raised, and the unemployed limb brought in the same manner forward; so that, at finishing the curve, the body will bend a small degree backward, and the unemployed foot will be about two inches before the other, ready to embrace the ice and form a correspondent curve. The muscular movement of the whole body must correspond with the movement of the skate, and should be regulated so as to be almost imperceptible to the spectators. Particular attention should be paid in carrying round the head and eyes with a regular and imperceptible motion; for nothing so much diminishes the grace and elegance of skating as sudden jerks and exertions, which are too frequently used by the generality of skaters. The management of the arms likewise deserves attention. There is no mode of disposing of them more gracefully in skating outside, than folding the hands into each other, or using a muff.

There are various feats of activity and manœuvres used upon skates; but they are so various as to render their insertion too tedious. Moving on the outside is the primary object for a skater to attain; and when he becomes an adept in that, he will easily acquire a facility in executing other branches of the art. There are few exercises but will afford him hints of elegant and graceful attitudes. For example, nothing can be more beautiful than the attitude of drawing the bow and arrow whilst the skater is making a large circle on the outside: the manual exercise and military salutes have likewise a pretty effect when used by an expert skater.

SOLANDER (Dr Daniel Charles), was a native of Sweden, and educated at the university of Upsal, where he obtained the degree of Doctor of Medicine. That of Doctor of Laws was afterwards conferred upon him by the university of Oxford. Dr Solander's strong propensity for the pursuit of natural knowledge was probably

Skating.

Solander.

probably not a little increased by the patronage and encouragement of his preceptor the celebrated Sir Charles Linnaeus; while the zeal which he showed for these branches of literature, particularly for botany, conciliated the esteem and affection of that eminent professor. When Dr Solander went from Upsal to London in the prosecution of his studies, Linnaeus furnished him with introductory letters to those learned men who were his principal correspondents in the metropolis of Britain. In these letters, among other strong expressions of regard, he is said to have employed the following sentence: *Omnium discipulorum, quos unquam habui, dilectissimus*. The footing thus obtained, Dr Solander soon improved by agreeable manners and extensive knowledge. In no long time he contracted intimacies with the most eminent philosophers in London, particularly with Sir Joseph Banks, the president of the Royal Society and one of the first literary characters in Europe. He was the companion of Sir Joseph in those different voyages which he made for the sole purpose of extending natural knowledge, and which will do immortal honour to the memory of both. When he was not thus engaged, his time was principally spent in the British Museum, where he had obtained an appointment in every respect suited to his philosophical disposition: and in discharging that part of the duties of his office which led him to show that most valuable collection to different visitors, it was hardly possible to conceive a more agreeable union of the manners of the gentleman with the knowledge of the philosopher. While he was engaged in conversation with his usual cheerfulness at the house of his friend Sir Joseph Banks, he was suddenly attacked with a fit of apoplexy, which in a few days, notwithstanding the best medical assistance, terminated in his death; an event sincerely regretted by all who had the honour of his acquaintance, and by which the literature and philosophy of London sustained a real loss.

SPHEX, the **ICHNEUMON WASP** or **SAVAGE**; a genus of insects belonging to the order of hymenoptera. The mouth is armed with jaws, but without any tongue. The wings of both sexes are extended without folds, and laid horizontally on the back. The sting is sharp, and concealed within the abdomen. The genus is divided into two families. 1. Those in which the abdomen is petiolated, or joined to the thorax by a stalk. 2. Those in which the abdomen is subfissile, or nearly of an equal size through its whole length. The manner of living is different in the various species, and so is the general form of the body and their haunts: but though the method of life be utterly different, yet the same manners appear innate and inherent in all. They agree in being the fiercest of all flies: they will attack insects much larger than themselves, and this whether they be defenceless or armed, as they are provided with a sting. The strength in all this savage kind is great; their jaws are hard and sharp, and in their sting lies a poison suddenly fatal to the creatures with whom they engage. The savage seizes hardily on the animal he attacks, and gives a stroke of amazing force; after which he falls down, as if himself were killed, but it is to rest from his fatigue and enjoy his victory. He keeps a steady eye on the creature he has struck till it dies, which happens in a few minutes, and then drags it to the nest to

feed the young. The number of other insects they destroy is scarce to be conceived; the mouth of their cave is like that of a giant in the days of yore, fraught with the remains of prey. The eyes, the filament that serves as a brain, and a small part of the contents of the body, are all the savage eats, and will kill fifty for a meal.

SPHINX, in zoology, a genus of insects belonging to the order of lepidoptera. There are seven species, all of them commonly called *moths* of different kinds. The name of *sphinx* is given them on account of the singular attitude of their caterpillars, who apply the hinder part of their body to a branch of a tree, holding the rest of it erect, like the fabulous sphinx. Most of them spin their cod under ground, making them up with small parcels of earth and grains of corn interwoven with threads. The sphinges fly either early in the morning or after sunset in the evening. They fly heavily and sluggishly, often emitting a kind of sound. One species, the atropos, or jessamine hawk-moth, has the thorax marked somewhat like a death's head. It has a shrill voice, more dismal than the squeaking of a mouse. All the species suck the nectar of flowers, though they seldom settle upon them.

SPIRIT OF WINE, the same with rectified spirit or alcohol. See **DISTILLATION**.

SPLACHNUM, in botany, a genus of the cryptogamia musci. There are two species.

1. The **ampullaceum**, or **crowet splachnum**, is found in bogs and marshes, and often upon cow-dung. It grows in thick tufts, and is about two inches high. The leaves are oval-lanceolate, terminated with a long point or beard. The top of the filament or peduncle swells into the form of an inverted cone, which Linnaeus terms an *apophysis* or *unbraculum*; upon the top of which is placed a cylindrical anthera, like the neck of a crowet. The calyptra is conical, and resembles a small extinguisher.

2. The **vasculosum**, or **acorn-shaped splachnum**, is found upon bogs and cow-dung, and upon the points of rocks on the tops of the Highland mountains, as on Ben-Lomond, and in the Isle of Sky, and elsewhere. This differs little from the preceding, and perhaps is no more than a variety. The filaments are about an inch high. The leaves oval-acute, not so lanceolate and bearded as the other. The *apophysis*, and the anthera at the top of it, form together nearly an oval figure, not unlike an acorn in its cup, the *apophysis* being transversely femioval and of a blood-red colour, the anthera short and conical. The calyptra is the same as that of the other. The operculum is short and obtuse, and the rim of the anthera has eight large horizontal cilia. The anthera of the other is also ciliated, but not so distinctly. It is an elegant moss, and very distinguishable on account of its orange-coloured filaments and dark-red capsules.

SQUATT, among miners, a small bed of ore, less valuable than a vein or load, as reaching only a little way.

STANHOPE (Dr George), an eminent divine, was born at Hertlihorn in Derbyshire, in the year 1660. His father was rector of that place, vicar of St Margaret's church in Leicester, and chaplain to the earls of Chesterfield and Clare. His grandfather Dr George Stanhope was chaplain to James I. and

Sphinx
||
Stanhope.

Stanhope. Charles I.; had the chancellorship of York, where he was also a canon-residentiary, held a prebend, and was rector of Weldrake in that county. He was for his loyalty driven to doors with eleven children; and died in 1644. Our author was sent to school, first at Uppingham in Rutland, then at Leicester; afterwards removed to Eaton; and thence chosen to King's college in Cambridge, in the place of W. Cleaver. He took the degree of B. A. in 1681; M. A. 1685; was elected one of the fyndics for the university of Cambridge, in the business of Alban Francis, 1687; minister of Quoi near Cambridge, and vice-proctor 1688; was that year preferred to the rectory of Tring in Hertfordshire, which after some time he quitted. He was in 1689 presented to the vicarage of Lewisham in Kent by lord Dartmouth, to whom he had been chaplain, and tutor to his son. He was also appointed chaplain to king William and queen Mary, and continued to enjoy that honour under queen Anne. He commenced D.D. July 5. 1697, performing all the offices required to that degree publicly and with great applause. He was made vicar of Deptford in 1703; succeeded Dr Hooper as dean of Canterbury the same year; and was thrice chosen prolocutor of the lower house of convocation. His uncommon diligence and industry, assisted by his excellent parts, enriched him with a large stock of polite, solid, and most useful learning. His discourses from the pulpit were equally pleasing and profitable; a beautiful intermixture of the clearest reasoning with the purest diction, attended with all the graces of a just elocution. The good Christian, the solid divine, and the fine gentleman, in him were happily united. His conversation was polite and delicate, grave without preciseness, facetious without levity. His piety was real and rational, his charity great and universal, fruitful in acts of mercy, and in all good works. He died March 18. 1728, aged 68 years; and was buried in the chancel of the church at Lewisham. The dean was twice married: 1. to Olivia Cotton, by whom he had one son and four daughters. His second lady, who was sister to Sir Charles Wager, survived him, dying October 1. 1730, aged about 54. One of the dean's daughters was married to a son of bishop Burnet. Bishop Moore of Ely died the day before queen Anne; who, it has been said, designed our dean for that see when it should have become vacant. Dr Felton says, "The late dean of Canterbury is excellent in the whole. His thoughts and reasoning are bright and solid. His style is just, both for the purity of the language, and for the strength and beauty of expression; but the periods are formed in so peculiar an order of the words, that it was an observation, nobody could pronounce them with the same grace and advantage as himself." His writings, which are an inestimable treasure of piety and devotion are, "A Paraphrase and Comment upon the Epistles and Gospels," 4 vols, 1705, 8vo. "Sermons at Boyle's Lectures," 1706, 4to. "Fifteen Sermons," 1700, 8vo. "Twelve Sermons on several occasions," 1727, 8vo. "Thomas à Kempis," 1696, 8vo. "Epictetus's Morals, with Simplicius's Comment, and the Life of Epictetus," 1700, 8vo. "Parson's Christian Directory," 1716, 8vo. "Rochevoucault's Maxims," 1706, 8vo. "A Funeral Sermon on Mr Richard Sare Bookseller," 1724; two editions 4to. "Twenty Sermons," pub-

lished singly between the years 1692 and 1724. "Private Prayers for every Day in the Week, and for the several Parts of each Day: translated from the Greek Devotions of Bishop Andrews, with Additions, 1730." In his translations, it is well known, Dr Stanhope did not confine himself to a strict and literal version: he took the liberty of paraphrasing, explaining, and improving upon his author; as will evidently appear (not to mention any other work) by the slightest perusal of St Augustine's Meditations, and the Devotions of Bishop Andrews.

STEPHENS'S MEDICINES for the STONE, were only a more imperfect method of using soap-ley in that distemper. See **CHITTRICK**.

STERNWAY, is when a ship, instead of advancing, retreats in the water, either through the violence of a current or any other means.

STONE-CHATTERER, (*Motacilla Rubicola*), in ornithology, a species omitted to be described under **MOTACILLA**. It is common among us during summer in garly grounds. In the winter they disperse into marshes and other places, but do not quit the island. It is a restless and noisy bird, and perches frequently on some bush, chattering incessantly. The head, neck, and throat, are black; but on both sides of the latter is a white bar, so that it appears on first sight to be encircled with white; the feathers on the back are black, edged with tawny; the lower part of the back just above the rump is white: the end and exterior side of the two outmost feathers of the tail are of a pale rust-colour, the rest are black: the breast is of a deep reddish yellow; the belly of a lighter hue: the quill-feathers are dusky edged with dull red; those next the body are marked with a white spot near their bottoms; the coverts of the wings are adorned with another. The head of the female is ferruginous spotted with black; and the colours in general are less vivid. In both sexes the legs are black.

SULZER (M.), a celebrated philosopher, was born at Winterthur, in the canton of Zurich, October 16. 1720. He was the youngest of 25 children. His early education did not promise much, though it was by no means neglected. He had little inclination for what is called in the schools the study of humanity, and made but a small progress in the learned languages, which were to prepare him for the study of theology, for which profession his parents designed him. At the age of 16, when he went to the academical school of Zurich, he had not the smallest notion of the sciences, or of elegant literature, and consequently no taste for study. The first incident that developed a hidden germ of philosophical genius, was his meeting with Wolfe's metaphysics: this was the birth of his taste for science; but he wanted a guide. The clergyman with whom he lodged was an ignorant man; and the academical prelections were, as yet, above the reach of his comprehension. On the other hand, a sedentary life was not the thing he liked, nor to which he had been accustomed; and, moreover, a sociable turn of mind led him often into company, where he lost much time in frivolous amusements, yet without corrupting his morals. Who, that observed him at this period, says Mr Formey in his *Eulogium*, would have thought that Sulzer would one day be numbered among the most knowing and wisest men of his time? The learned

Gesner

Gesner was the instrument of Providence that rendered Sulzer's inclination to study triumphant over his passion for amusement and company. Animated by the counsels and example of this worthy and learned man, he applied himself to philosophy and mathematics with great ardour, and resumed the pursuit of Grecian literature and the Oriental languages. The contemplation of nature became his noble and favourite passion. An ecclesiastical settlement in a rural scene, that exhibited happy objects and occasions for this delightful study, began to render his days happy and useful; and he published, in 1741, *Moral Contemplations of the works of Nature*; and, the year following, an *Account of a voyage* he had made through the Alps; which showed, at the same time, his knowledge of natural history, and the taste and sensibility with which he surveyed the beauties of nature, and the grandeur and goodness of its author. He afterwards became private tutor to a young gentleman at Magdeburg. This procured him the acquaintance of Messrs Maupertuis, Euler, and Sack, which opened to his merit the path of preferment, and advanced him successively to the place of mathematical professor in the King's College at Berlin in 1747, and to that of member of the Royal Academy in 1750.

In this last quality he distinguished himself in a very eminent manner, enriched the class of speculative philosophy with a great number of excellent memoirs, and was justly considered as one of the first-rate metaphysicians in Germany. But his genius was not confined to this branch of science. His *Universal Theory of the Fine Arts*, is a capital production. A profound knowledge of the arts and sciences, and a perfect acquaintance with true taste, are eminently displayed in this work, and will secure to its author a permanent and distinguished rank in the republic of letters. The first volume of this excellent work was published in 1771, and the second in 1774. We shall not here give a catalogue of the writings of M. Sulzer; but we cannot help mentioning his *Remarks on the Philosophical Essays* of the late Mr Hume, as a work of real merit, which does justice to the acuteness, while it often detects the sophistry, of the British Bayle. The moral character of M. Sulzer was amiable and virtu-

ous: sociability and beneficence were its characteristic lines; and his virtues were animated by that sacred philosophy that forms the Christian, ennobles man, and is the only source of that heart-felt serenity and sedate fortitude which support humanity, when every other object of confidence fails. His dying moments were calm, humble, and sublime; and when he expired, the placid and composed air of his countenance made his mourning friends doubt, for some time, whether it was death or sleep that had suspended his conversation. He had no enemy; and his friends were numerous, affectionate, and worthy of the tender returns he made them.

The king of Prussia distinguished him by repeated marks of munificence and favour. We learn, however, that his royal protector had never seen him before the end of the year 1777, tho' he had been member of the academy from the year 1750. The audience, indeed, though late vouchsafed, was honourable to M. Sulzer, with whom the monarch conversed for a long time with the greatest affability and condescension.

SYNCOPE, in music, denotes a striking or beating of time, whereby the distinction of the several times or parts of the measure is interrupted.

However, it is more properly used for the connecting the last note of any measure, or bar, with the first of the following measure; so as only to make one note of both.

A syncope is sometimes also made in the middle of a measure.

Syncopeation is also used when a note of one part ends or terminates on the middle of a note of the other part. This is otherwise denominated *binding*.

It is likewise used for a driving note; that is, when some shorter note at the beginning of a measure, or half measure, is followed by two, three, or more longer notes before another short note occurs, equal to that which occasioned the driving, to make the number even, *e. gr.* when an odd crotchet comes before two or three minims, or an odd quaver before two, three, or more crotchets.

In syncopeated or driving notes, the hand or foot is taken up, or put down, while the note is sounding.

T.

TAGETES, FRENCH MARGOLD; a genus of the polygamia superflua order, belonging to the syngenesia class of plants. There are three species; the most remarkable are,

1. The erecta, grows naturally in Mexico, but has been long cultivated in the British gardens, where it is commonly titled *African margold*. Of this there are the following varieties: 1. Pale yellow, or brimstone colour, with single, double, and fistulous flowers.
2. Deep yellow, with single, double, and fistulous flowers.
3. Orange-coloured, with single, double, and fistulous flowers.
4. Middling African, with orange-coloured flowers.
5. Sweet-scented African. These are all very subject to vary; so that unless the seeds are very carefully saved from the finest flowers, they are apt to degenerate: nor should their seeds be too long sown in the same garden without changing

for the same reason; therefore, those who are desirous to have these flowers in perfection, should exchange their seeds with some person of integrity at a distance where the soil is of a different nature, at least every other year. If this is done, the varieties may be continued in perfection. This plant is so well known as to need no description. It flowers from the beginning of July till the frost puts a stop to it.

2. The patula, grows naturally in Mexico, but has been long in the British gardens, where it is distinguished from the first by the title of *French margold*. Of this there are several varieties, some of which have much larger flowers than others, and their colour varies greatly: there are some which are beautifully variegated, and others quite plain; but as these are accidents arising from culture, so

Tavira,
Tea.

so they do not merit farther distinction; for we have always found that seeds sowed from the most beautiful flowers will degenerate, especially if they are sown in the same garden for two or three years together, without changing the seed.

These plants are annual, so must be propagated from seeds every spring, which may be sown upon a moderate hot-bed the beginning of April: and when the plants are come up, they should have plenty of fresh air; for if they are drawn too much, they will not afterward become handsome, notwithstanding they have all possible care taken of them. When they are about three inches high, they should be transplanted on a very moderate hot-bed, which may be arched over with hoops and covered with mats, for these plants are hardy enough to be brought up without glasses: in this bed they should be planted about six inches asunder each way, observing to water and shade them until they have taken root; but as the plants acquire strength, they should be inured to bear the open air by degrees; and about the end of May they should be taken up with a ball of earth to the root of each plant, and planted into the borders of the parterre-garden, or into pots, for furnishing the courts, &c. shading them carefully from the sun till they have taken new root, and also supplying them duly with water. When their flowers appear, if any should prove single, the plants should be destroyed, and then those in pots may be removed to the court, where the several varieties, being intermixed with other annual plants, afford an agreeable variety.

These plants have a strong disagreeable scent, especially when handled; for which reason they are not so greatly esteemed for planting near habitations: but the flowers of the sweet-scented sort being more agreeable, are generally preferred, especially for planting in small gardens.

TAVIRA, or TAVILA, a considerable town of Portugal, and capital of the province of Algarve, with a handsome castle, and one of the best harbours in the kingdom, defended by a fort. It is seated in a pleasant fertile country, at the mouth of the river Gilaon, between Cape Vincent and the Strait of Gibraltar, 100 miles west by north of Cadiz. W. Long. 7. 46. N. Lat. 37. 18.

TEA, (*Encycl.*) Tea, in the Chinese language, is called *tia*, in Fokien it is called *te*; and as the Europeans landed first in that province, that dialect has been preferred.

The Europeans learned to drink this infusion in the 15th century; and since that time have vied with each other in giving the Chinese the most money for this and other goods which are become fashionable: it grows both in China and in Japan. It likewise grows in Tonkin; but the best tea, according to Du Halde, comes from Fokien.

It was universally believed that all teas come from the same shrub, and are only distinguished by the different age, gathering, and preparation, till Doctor Hill lately supposed that he had discovered that the brown tea comes from the tea-shrub with six petals or flower-leaves which Kempfer has described and represented, but that the green tea is taken from the tea-shrub with nine-leaved flowers. Linnæus distin-

guishes it, besides the flowers, by the longer and narrower leaves.

The difference of petals may, however, be considered as dubious, at least as not invariable. See Plate CCCXXIII. where a figure of each is given; that of the bohea being taken from the *Amœn. Acad.* vol. 7.; that of the viridis from a print by Miller after a drawing of a plant, in the duke of Northumberland's garden at Sion, which was the first that flowered in England, and he flower consisted of only six petals, like the bohea. [This last figure is rather upon too small a scale comparatively with the other.]

After all, there are many sorts and varieties of tea differing one from another in the shape and quality of the leaves; and differently denominated, from these circumstances, from the places where they grow, or from the various ways of preparing.

The general distinction of these, however, is into brown and green, according as they tinge the water.

1. Brown Teas.

Brown tea is *bonam té*, or *kuli-té*, which grows in some places about Canton, and is drunk by the Chinese, but not by the Europeans: its taste being the least agreeable of any. The dried leaves are either yellow or brownish. The tea-shrubs, which are sold in flower-pots here, scarce grow to the height of an ell. The flower consists of six white petals, of which the three lowest are the smallest.

An-kay is a coarse sort of tea, from a place of this name.

Té-bohé, which we usually call *bohea-tea*, is called *moji* by the Chinese. This sort is brought to Europe in greater quantities than any of the others. The best sort smells agreeably, and in a short time gives a brown colour to the water, and consists of leaves of one colour; if any black ones are among them, it is a bad sort.

Tao-yonn is the name of the best sort of bohea tea. *Kongo*, or as the Chinese call it *kong-so*, has an agreeable scent: its leaves are finer than those of *té-bohé*; though it is scarce distinguishable from the best bohea, except in price; for *kongo* is somewhat dearer.

Sutchong, or *sootchuen*, which the Chinese call *saatyang*, or *su-tyann*, is the dearest of all brown teas. It gives a fine yellow green colour to the water, and has an agreeable taste, unless you put too much into the pot, which spoils both taste and colour.

Padre sutchong is the best tea that can be drunk. The leaves of this tea are large, yellowish, not rolled up, but expanded; and packed up in papers of half a pound each, like tobacco. If it is not taken great care of at sea, it is much altered for the worse.

Lin-kifan is a sort of tea which hath narrow rough leaves and footstalks. It is seldom used by itself, but mixed with other sorts.

Back-ho, or *pack ho*, is that which we call *pecks*, which has leaves with dots. It is a mild tea, has a good taste, and is said to be the least heating of any.

2. Of Green Teas, there are

Hysen, called by *tiann*, or *hi-kiong* by the Chinese. *Single*, or *sangle*, is so called from the place whence it comes. The Chinese likewise call it *sing-tia*.

Bing, or imperial tea.

Tia té is rolled up like pease. This sort is rolled up

*Obbeck's
Voyage to
China, &c.*

HYPNÆ.



LYCOPHORA.



BOYA.



POLYTRICHUM.



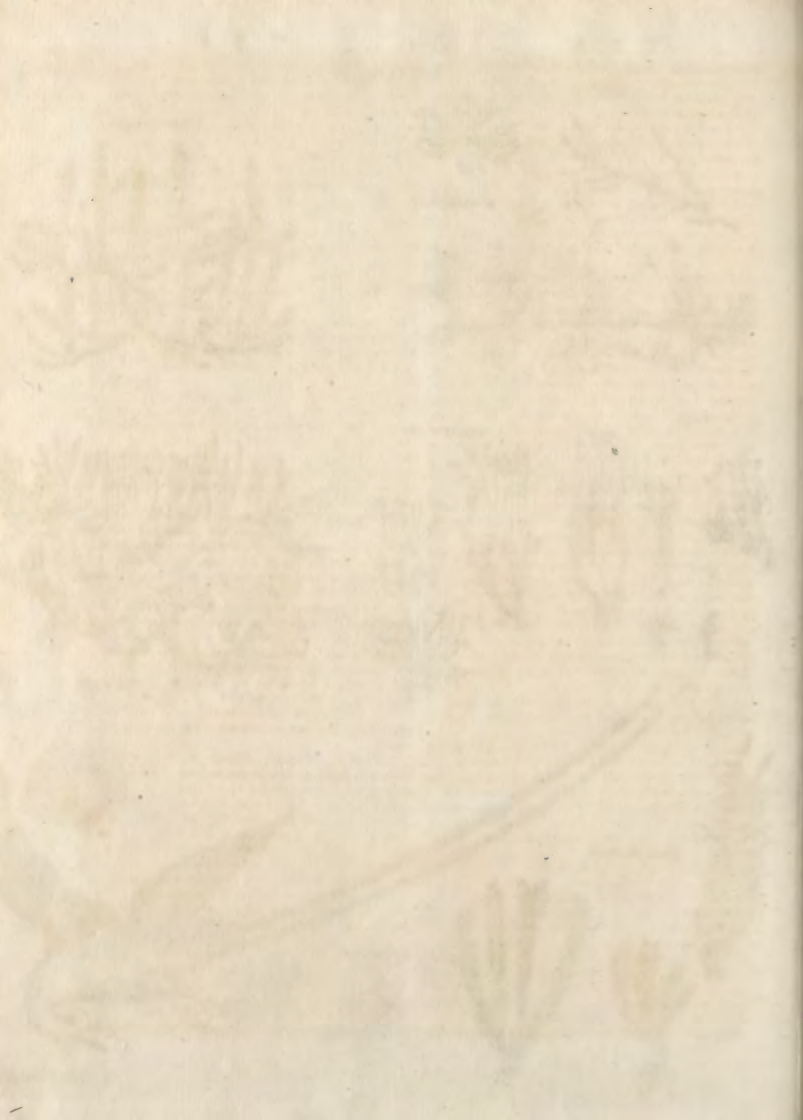
PHAEOTON ETHEREA *ex Tupper & Lind.*

SELAGINES.



RAPHIDIA.





up between the hands in a rounder shape than the others. A smaller kind is called *gunpowder-tea*.

Hyson utchin, is distinguishable from the *hyson skin* by its narrow and short leaves.

Go-bé hath long narrow leaves.

The Chinese likewise make tea-cakes, which they sell very dear.

It is almost incredible what quantities of tea are annually exported into Europe and other parts; and what innumerable hands are employed in so unnecessary an article. The countryman must with great care plant and nurse the tea-shrubs; pluck every leaf in due time; separate the new leaves from the old, and dry them with extreme accuracy. When the merchant has got the baskets of tea, at a low rate, from the country people, he must often take care of it for years together; and is always uncertain when, or at what price, he shall sell it. When the Europeans have fixed upon a place where they will make their bargains, they empty the baskets (but let it be noted we are now speaking of bohea tea, for the finer sorts are sold in chests); and if any bad tea is found in these baskets, it is separated from the rest. The good tea is then packed up in new chests, the weight of which is deducted; and these chests are marked, and lined with lead in the inside. A Chinese gets into these chests, and treads down the tea as it is emptied out of the baskets: this is very hard labour, and throws the treader, who is almost naked, into a profuse perspiration. Though great care is taken to prevent any thing from coming into the tea, yet it is hardly to be avoided: and sometimes their feet are wounded and bleed. But the tea has already passed thro' so many dirty hands, that those who use that drug have no reason to be disgusted with this last mark of indelicacy in the package. As soon as some of the chests are packed by a number of kuleers, or Chinese servants, they are pasted over with paper, and carried out of the warehouse to the factories, where they are weighed by the Chinese custom-house officers, in the presence of the interpreter, and marked red with a stiff brush, or with a wooden stamp.

Some poor people are satisfied with the leaves of rhamnus tea, which they put into their clayey water, instead of tea, to make it more palatable. In the account of the Dutch embassy to China, it is related that the Chinese make use of a species of moss instead of tea.

The high price of tea, at its first introduction, induced many physicians to think of a substitute; and it is well known that Simon Pauli thought the *myrica gale* to be the shrub itself. Other succedanea are mentioned by authors; such as the leaves of the

Prunus spinosa, sloe-tree.

Origanum vulgare, wild marjoram.

Rubus arcticus, arctic bramble.

Veronica officinalis, male speedwell.

Veronica chamaedrys, wild germander.

Chenopodium ambrosioides, Mexican sweet blite.

Capraria biflora, sweet-weed or goat-weed.

The sophistication of tea practised by the smugglers in some of the southern parts of this kingdom is well known. In particular, they have reduced to a regular process the management of the leaves of the ash and elder; which, when prepared, is called *smouch*, and mixed, as is said, in the proportion of one-third,

with the ordinary teas. To what an extent the trade in this sophisticated tea had been carried, to the detriment of the trees, may be imagined, when the reader is informed, that an act of parliament has lately been obtained to prohibit it, under very severe penalties.

THELIGONUM, DOG'S CABBAGE; a genus of the polyandria order, belonging to the monœcia class of plants. There is only one species; viz. the cynocrambe or dog's cabbage of Dioscorides. This plant grows plentifully in the south of France, in Italy and Tartary. It is annual. The stalks trail on the ground like those of chickweed; they grow about a foot long; their joints are pretty close, garnished with oval acute-pointed leaves, standing on pretty long footstalks, which are bordered. At each joint is placed one of these leaves; and from the same point come out several smaller, of the same shape, on shorter footstalks. The flowers are produced from the wings of the stalks in clusters, fitting very close; they are small, of an herbaceous white colour, so make no great appearance. The male and female flowers grow from the same joint. The female flowers are succeeded by a single roundish seed, which ripens in autumn.

It is preserved in botanic gardens for the sake of variety. The seeds of this must be sown in autumn, in the place where the plants are to remain; for when they are sown in the spring, the plants rarely come up the same year. They require no other culture but to keep them clean from weeds, and thin them where they are too close.

THEOBROMA, in botany, a genus of the polydelfia order, belonging to the pentandria class of plants. There are two species, both natives of the Indies.

1. The first, which is the cacao, or chocolate-nut tree, is but of very moderate growth. See **CACAO**, (*Encycl.*) and Plate LXVI.

2. The guazuma, or baltard cedar of Jamaica, rises with an upright large trunk, branching numerously, and spreading 30 or 40 feet high; with oblong, heart-shaped, serrated, alternate leaves, four inches long; and numerous small yellowish flowers at the sides of the branches; succeeded by roundish, tuberculated rough fruit, containing the seed.

TIBERIUS, the third emperor of Rome, under whose reign our Saviour suffered. See **ROME**, n° 268. —281.

TIMBER, (*Encycl.*) Of all the different kinds known in Europe, oak is the best for building; and even when it lies exposed to air and water, there is none equal to it. Fir-timber is the next in degree of goodness for building, especially in England, where they build upon leaves. It differs from oak in this, that it requires not much seasoning, and therefore no great stock is required before-hand. Fir is used for flooring, wainscoting, and the ornamental parts of building within doors. Elm is the next in use, especially in England and France: it is very tough and pliable, and therefore easily worked: it does not readily split: and it bears driving of bolts and nails better than any other wood; for which reason it is chiefly used by wheel-wrights, and coach-makers, for shafts, naves, &c. Beech is also used for many purposes: it is very tough and white when young, and of great strength; but liable to warp very much when exposed to the weather, and to be worm-eaten when used with-

Timber.

in doors; its greatest use is for planks, bedsteads, chairs, and other household goods. Ash is likewise a very useful wood, but very scarce in most parts of Europe; it serves in buildings, or for any other use, when screened from the weather; handspikes and oars are chiefly made of it. Wild chestnut timber is by many esteemed to be as good as oak, and seems to have been much used in old buildings; but whether these trees are more scarce at present than formerly, or have been found not to answer so well as was imagined, it is certain this timber is now but little used. Walnut-tree is excellent for the joiner's use, it being of a more curious brown colour than beech, and not so subject to the worms. The poplar, alder, and aspen trees, which are very little different from each other, are much used instead of fir, they look well, and are tougher and harder.

The goodness of timber not only depends on the soil and situation in which it stands, but likewise on the season wherein it is felled. In this people disagree very much; some are for having it felled as soon as its fruit is ripe, others in the spring, and many in the autumn. But as the sap and moisture of timber is certainly the cause that it perishes much sooner than it otherwise would do, it seems evident that timber should be felled when there is the least sap in it, viz. from the time that the leaves begin to fall till the trees begin to bud. This work usually commences about the end of April in England, because the bark then rises most freely; for where a quantity of timber is to be felled, the statute requires it to be done then, for the advantage of tanning.

The ancients chiefly regarded the age of the moon in felling their timber; their rule was to fell it in the wain, or four days after the new moon, or sometimes in the last quarter. Pliny advises it to be in the very article of the change, which happening to be in the last day of the winter solstice, the timber, says he, will be incorruptible. Timber should likewise be cut when of a proper age; for when it is either too young or too old, it will not be so durable as when cut at a proper age. It is said that oak should not be cut under 60 years old, nor above 200. Timber, however, should be cut in their prime, when almost fully grown, and before they begin to decay; and this will be sooner or later, according to the dryness and moistness of the soil where the timber grows, as also according to the bigness of the trees; for there are no fixed rules in felling of timber, experience and judgment must direct here as in most other cases.

After timber has been felled and sawed, it must be seasoned: for which purpose some advise it to be laid up in a very dry airy place, yet out of the wind and sun, or at least free from the extremities of either; and that it may not decay, but dry evenly, they recommend it to be daubed over with cow-dung. It must not stand upright, but lie all along, one piece over another, only kept apart by short blocks interposed, to prevent a certain mouldiness which they are otherwise apt to contract in sweating on one another; from which arises frequently a kind of fungus, especially if there be any sappy parts remaining. Others advise the planks of timber to be laid for a few days in some pool or running stream, in order to extract the sap, and afterwards to dry them in the sun or air. By this

means, it is said, they will be prevented from either chopping, casting, or cleaving, but against shrinking there is no remedy. Some again are for burying them in the earth, others in a heat; and some for scorching and seasoning them in fire, especially piles, posts, &c. which are to stand in water or earth. The Venetians first found out the method of seasoning by fire; which is done after this manner: They put the piece to be seasoned into a strong and violent flame; in this they continually turn it round by means of an engine, and take it out when it is everywhere covered with a black coaly crust; the internal part of the wood is thereby so hardened, that neither earth nor water can damage it for a long time afterwards.

After the planks of timber have been well seasoned and fixed in their places, care is to be taken to defend or preserve them; to which the smearing them with linseed oil, tar, or the like oleaginous matter, contributes much. The ancients, particularly Hesiod and Virgil, advise the smoke-drying of all instruments made of wood, by hanging them up in the chimneys where wood-fires are used. The Dutch preserve their gates, portcullices, drawbridges, sluices, &c. by coating them over with a mixture of pitch and tar, whereon they strew small pieces of cockle and other shells, beaten almost to powder, and mixed with sea-sand, which incrusts and arms them wonderfully against all assaults of wind and weather. When timber is felled before the sap is perfectly at rest, it is very subject to the worms; but to prevent and cure this, Mr Evelyn recommends the following remedy as the most approved: Put common sulphur into a cucurbit, with as much aquafortis as will cover it three fingers deep; distil it to dregs, which is performed by two or three rectifications. Lay the sulphur that remains at bottom, being of a blackish or sand-red colour, on a marble, or put it in a glass, and it will dissolve into an oil; with this oil anoint the timber which is infected with worms. This, he says, will not only prevent worms, but preserve all kinds of woods, and many other things, as ropes, nets, and masts, from putrefaction, either in water, air, or snow.

TRIBULUS, CALTROPS; a genus of the monogynia order, belonging to the decandria class of plants. There are three species; the most remarkable is the terrestris, with six pair of lobes to each leaf. It is a very common weed in the south of France, in Spain, and Italy, where it grows among corn, and on most of the arable land, and is very troublesome to the feet of cattle; for the fruit being armed with strong prickles, run into the feet of the cattle which walk over the land. This is certainly the plant which is mentioned in Virgil's Georgics under the name of *tribulus*, tho' most of his commentators have applied it to other plants. It is called in English *caltrops*, from the form of the fruit, which resembles those instruments of war that were cast in the enemies way to annoy their horses.— This hath a slender fibrous root, from which spring out four or five slender hairy stalks, which spread flat on the ground, garnished at each joint with winged leaves, composed of six pair of narrow hairy lobes, almost of equal size; those on the lower part of the stalk stand alternately, but toward the top they are placed opposite. The flowers come out from the wings of the stalk, standing upon short footstalks; they are composed

Timber,
Tribulus.

Trill.
tropaeolum.

composed of five broad, obtuse, yellow petals, which spread open. In the centre is situated an oblong germe, crowned by a headed stigma, attended by ten short stamina, terminated by single summits, and are succeeded by roundish, five-cornered, prickly fruit, which, when ripe, divides into five parts, each having a transverse cell containing one or two seeds.—This plant is preferred in botanic gardens for variety. It is propagated by seeds, which should be sown in autumn; for those which are kept out of the ground till spring commonly remain in the ground a whole year before the plants come up. These seeds should be sown on an open bed of light earth, where they are designed to remain; for as it is an annual plant, it doth not bear transplanting very well, unless it be done when the plants are very young. In the spring, when the plants come up, they should be carefully cleared from weeds; and where they come up too close, some of the plants should be pulled out to give room for the remaining plants to grow; after this they will require no other culture but to keep them clear from weeds. If the seeds are permitted to scatter, the plants will come up the following spring, and maintain their place if they are not overborne with weeds.

TRILL, or **PLAIN SHAKE** and **GRUPPO**, in music. The first is defined to be a shake upon one note only, in the making whereof the scholar is directed to sing the first of the examples, (Plate CCCXIII. fig. 2.) beginning with the first crotchet, and beating every note with the throat upon the vowel *o*, to the last breath. The gruppo (as described by Playford) appears to be no other than the shake now practised, and which consists in the alternate prolation of two tones in juxtaposition to each other, with a close on the note immediately beneath the lower of them. The trill (says Playford) being the most usual grace, is made in closes or cadences; and when on a long note, exclamation or passion is expressed there, the trill is made in the latter part of such note; but most usually upon binding notes, and such as precede the closing note. Notwithstanding this, Mr Hawkins is of opinion that the trill is rather a defect than an ornament in singing; as being nothing more than the intermitted prolation of a single tone.

TROPEOLUM, **INDIAN CRESS**; a genus of the monogynia order, belonging to the octandria class of plants. There are two species: 1. The minus, or small Indian cress, grows naturally in Peru. This was first brought to Europe in 1684, and was raised in the gardens of count Bevening in Holland. It has a trailing herbaceous stalk, garnished with leaves almost circular. The foot-stalk is inserted in the centre of the leaf, like a buckler, as in the navelwort; they are smooth, of a greyish colour; the flowers come out from the wings of the stalks, standing upon very long slender foot-stalks, of an admirable structure, composed of five acute-pointed petals; the two upper are large and rounded, the three under are narrow; their tails join together, and are lengthened into a tail two inches long. After the flower is past, the germen turns to a roundish fruit, which is furrowed, and divided into three lobes, each including one streaked seed. It flowers from Midsummer till the frost stops it in autumn. There are two varieties of this, one with a deep orange-coloured flower, inclining to red, and the

other with a pale yellow flower. 2. The majus, or greater Indian cress, grows naturally about Lima; this has larger stalks than the former. The leaves are also larger, and their borders are indented almost into lobes; the flowers are larger, and their petals are rounded at their points. There are two colours of this sort as in the former; and one with double flowers, which is propagated by cuttings, for it does not produce seeds.—The first sort is less common at present in the English gardens than the second, though it was formerly more so; the flowers of the latter being larger, make a finer appearance, for which it is preferred: they are both esteemed annual plants, though they may be continued through the winter if they are kept in pots, and sheltered in a good green-house, in like manner as that with double flowers is preferred; so may be propagated by cuttings as that is. But, as these ripen their seeds constantly every year, the plants are generally raised from them: these may be sown in April in the places where they are to remain, which should be where their stalks may have support; for they will climb six or eight feet high, when they are trained up, and then their flowers make a good appearance; but when they trail upon the ground, they will spread over the neighbouring plants and become unsightly.—The flowers of these plants are frequently eaten in salads; they have a warm taste like the garden cress, and are esteemed very wholesome; they are likewise used for garnishing dishes. The seeds are pickled, and by some are preferred to most kinds of pickles for sauce.

TRYING, in the sea-language. A ship is said to *try* or to *lie a-try*, when no sails are abroad but the main-fail or mizen-fail.

TUBIPORA, or **TUBULARIA**, a genus of submarine plants, belonging to the cryptogamia class, of the hardness of coral, and consisting of cylindric tubes rising from a thin crust of the same sort of matter with themselves. See Plate CCCXVII.

TYLES, (*Encycl.*) There are various kinds of tiles for the various occasions of building; as plain, thack, ridge, roof, crease, gutter, pan, crooked, or Flemish, corner, hip, dormar, scallop, astragal, traverse, paving, and Dutch tiles.

Plain or thack tiles, are those in ordinary use for covering of houses. They are squeezed flat, while yet soft, in a mould. They are of an oblong figure; and by 17 Edw. IV. c. 4. are to be $10\frac{1}{2}$ inches long, and $6\frac{1}{2}$ broad, and half an inch and half a quarter thick. But these dimensions are not over strictly kept to.—Ridge, roof, or crease tiles, are those used to cover the ridges of houses, being made circular breadthwise, like an half-cylinder; they are, by the aforesaid statute, to be 13 inches long, and of the same thickness with the plain tyles.—Hip or corner tiles, are those which lie on the hips or corners of roofs. As to form, they are first made flat like plain tiles, but of a quadrangular figure, whose two sides are right lines, and two ends edges of circles, one end being a little concave and the other convex. The convex end is to be about seven times as broad as the concave end, so that they would be triangular but that one corner is taken off; then, before they are burnt, they are bent on a mould breadthwise, like ridge tiles. They have an hole at their narrow end to nail them on by, and are laid.

Trying
||
Tyles.

Tyles,
Vayer.

laid with their narrow end upwards; by statute, they are to be 10½ inches long, and of a convenient breadth and thickness.—Gutter tiles, are those which lie in gutters or valleys in cross buildings. They are made like corner-tyles, only the corners of the broad end are turned back again with two wings. They have no holes in them, but are laid with the broad end upwards, without any nailing. They are made in the same mould as the corner-tyles, and have the same dimensions on the convex side. Their wings are each four inches broad and eight long. Pan, crooked, or Flemish tyles, are used in covering of sheds, lean-to's, and all kinds of flat-roof buildings. They are in form of an oblong parallelogram, as plain tyles; but are bent breadthwise forwards and backwards in form of an S, only one of the arches is at least three times as big as the other; which biggest arch is always laid uppermost, and the less arch of another tyle lies over the edge of the great arch of the former. They have no holes for pins, but hang on the laths by a knot of their own ear. They are usually 14½ inches long, and 10½ broad. By 12 Geo. I. c. 25. they are to be, when burnt, not less than 13½ inches long, and 9½ inches wide, and half an inch thick.—Dormar or dorman tyles consist of a plain tyle and a triangular piece of a plain one standing up at right angles to one side of the plain tyle, and swept with an arch of a circle from the other end, which end terminates in a point. Of these tyles there are two kinds, the triangular piece in some standing on the right, in others on the left side of the plain tyle. And of these again there are two kinds, some having a plain whole tyle, others but half a plain tyle. But in them all the plain tyle has two holes for the pins at that end where the broad end of the triangular piece stands. Their use is to be

Tyles,
Vespa.

laid in the gutters betwixt the roof and the cheeks or sides of the dormars, the plain part lying on the roof, and the triangular part standing perpendicularly by the cheek of the dormar; they are excellent to keep out the wet in those places, and yet they are hardly known any where but in Suffex. The dimensions of the plain tyle part are the same as those of a plain tyle; and the triangular part is of the same length, and its breadth at one end seven inches, and at the other nothing. Scallop or atragal tyles are in all respects like plain tyles, only their lower ends are in form of an atragal, viz. a semicircle with a square on each side. They are used in some places for weather-tyling.—Transverse tyles are a kind of irregular plain tyles, having the pin-holes broken out, or one of the lower corners broken off. These are laid with the broken end upwards, upon rafters where pinned tyles cannot hang.

Flemish or Dutch tyles are of two kinds, ancient and modern: the ancient were used for chimney foot-pieces; they were painted with antique figures, and frequently with postures of soldiers, some with compartments, and sometimes with morefque devices; but they come much short of the design and colours of the modern ones. The modern Flemish tyles are commonly used plastered up in the jaumbs of chimneys instead of chimney-corner stones. These are better glazed, and such as are painted (for some are only white) are done with more curious figures and more lively colours than the ancient ones. But both kinds seem to be made of the same whitish clay as our white glazed earthen ware; the modern ones are commonly painted with birds, flowers, &c. The ancient ones are only five inches and a quarter square, and about three quarters of an inch thick; the modern ones six inches and a half square, and three quarters of an inch thick.

U, V.

VAYER (Francis de la Mothe le), a Parisian counsellor of state, and preceptor to the duke of Anjou: only brother to Lewis XIV. was born at Paris in 1588. He was admitted into the French academy in 1639; but his style was less polite than that of his fellow-academicians. He was a man of a regular conduct, like that of the ancient sages; however, his austerity and wisdom did not prevent his being accused of having no religion. This was probably founded on certain Dialogues written by him, and published under the name of *Graſius Tubero*, and upon his showing throughout his works in general too great an inclination to scepticism. He was greatly affected at the loss of his only son; and his grief disordered him so much, that he married again, though he was above 75, and had no reason to lament his first wife. He died in 1672, aged 84.

VESPA, the wasp, in zoology, a genus of insects of the hymenoptera order; of which the following are the characters: The mouth is armed with jaws, but has no rostrum: the upper wings are folded in both sexes: the sting is sharp-pointed, and concealed within the abdomen: the eyes are lunular: the body is smooth, without hair: to which may be added, that the antennæ are broken, the first articulation being longer than the rest; the under wings shorter than the

upper; the abdomen joined to the thorax by a very short stalk; and the stemmata three in number.

1. The crabro, has the antennæ and head of a dun colour, somewhat brown. The upper lip is yellow, and the eyes are blackish. The middle of the thorax is black; brown on the fore-part, the sides, and behind. The legs are of the same brown colour, inclining to chefnut. The first segment of the abdomen is black mixed with brown, and slightly edged with lemon colour; the others are black on the upper side, a portion of which is again covered by the upper segment, and yellow underneath. Upon the yellow are seen two black spots on each of the rings; one on each side, connected with the black colour of the upper part. This large species of wasps makes its nest in the trunks of hollow trees, and in the timber-work of lofts. Its cakes or combs are composed of a substance resembling coarse paper or rusty parchment. It is very voracious, devouring other insects, and even bees. Of those insects, some live in society, others are solitary. A distinguishing character of this genus of flies is their bodies being smooth and apparently without hairs. Their upper wings, when at rest, are folded in two the whole length of them. At the rise of each of those wings is situate a scaly part, which performs the office of a spring to hinder the upper wing from rising

rising too high in the flapping of their wings; a caution very important to those carnivorous insects who pursue their prey on full stretch of wing.

2. The vulgaris, or common wasp. These raise subterraneous buildings, live in associations, feed on plunder, and commit great outrages on our wall-fruit. This numerous commonwealth is founded by a single female impregnated during the autumn, and that has weathered out the severity of the winter. It digs a hole in a dry soil, contrives itself a sinuous inlet, or else it takes up with the dwelling-place of a mole, where it hastily builds a few cells and deposits its eggs. Within the space of 20 days, they have gone through the different states of larvæ, chrysalids, and are turned to wasps. Nature, all-wise, provides for every thing. The male-wasps, or that are of no sex, are the only ones that labour at laying the foundation of the republic. The first eggs that are hatched prove to be neuter wasps. No sooner are they come into existence, but they fall to work, enlarge the hole, and go about upon wood, lattice-work, and window-sashes, in search of materials for building. With their teeth they cut, hack, and tear off small fibres of wood, which they moisten with a liquor they disgorge, and then convey them to the work-shop. Other labourers are in waiting for them, who with those materials set about the construction of the wasp-nest; an edifice outwardly composed of sheets of paper, which not being in contact with each other, dampness cannot penetrate to the inside. This latter part consists of 12 or 15 stories, and between each runs a colonnade formed by the fastenings which connect the cakes one to the other. Every story is as it were a market-place, where the citizens may take their walks. The cells are hexagonal. It is the cradle in which the mother continues to lay eggs of neuter-wasps to the number of 15000 or 16000; after which it deposits 300 eggs of females, and as many of males. The elder brothers, or first-hatched insects, take amazing care of those born after them, by proportioning their food to the delicacy of their stomach. First, it consists of the juice of fruits and meats, afterwards it is the carcases of insects. The caterers provide for the labourers. Each one takes his own portion; there is no dispute, no fighting. The republic grows daily more numerous, living in profound peace. Every individual, as soon as he has acquired sufficient strength, flies away to the fields. They then become a gang of banditti; they pillage our wall-trees, break into our fruit before its maturity, dart with the fierceness of hawks upon our bees, cut their throats to possess themselves of their honey, plunder and lay waste their commonwealth, riot on the fruits of their labour, and oblige them to remove. During the period of plenty, the wasps bring all the booty to the nest, and share it amongst them. There is nothing then goes forwards but feasting, rioting, and good-fellowship; but concord cannot be lasting among robbers. Towards the month of October provisions begin to run short; when this lively, this amicable young brood is fired with a kind of rage, and the nest is now nothing but a scene of horror. The neuters and males tear from their cradles the eggs, the larvæ, the chrysalids, and the new-born insects, without showing mercy to any. They next fight one against another, though their duels seldom proceed to death as those of the bees. The males alone are destitute of stings. The hopes of the state, the solicitude for posterity, the love of their native

place, no longer exist; and the whole commonwealth is overturned to the very foundation. Frosts and rains throw the citizens into a state of languor. They almost all perish, luckily for us and our bees. Some few females escape the disasters of intestine war and the severity of winter, which in the ensuing spring become founders of new republics. One robber is sometimes useful in bringing another to punishment. Some butchers hang up before their shop a calf's liver or any other tender meat. The wasps come in quest of this delicate food; and, fond of enjoying it to themselves, they pursue the blue-bottle flies, from whose eggs are produced the maggots that spoil meat: and this is the only advantage we can reap from wasps.

3. The aerial wasps are a very small species; nor is their society numerous. Their history, as well as their manners, are the same as those of the common wasp; but their buildings are on a different construction. Their nest is fastened to the branch of a tree with a kind of a band, and is in figure from the size of an orange down to that of an egg. Wood reduced to paper is the material part of it, which, if it were of a ruddy colour, might be taken for a large opening rofe. It is covered over with a varnish impenetrable by water. One of those nests was neither mollified nor impaired by that element.—There are 25 other species.

VIRGULA DIVINA, or *Baculus divinatorius*, &c. a forked branch, in the form of a Y, cut off an hazel-stick, by means whereof people have pretended to discover mines, springs, &c. under ground. The method of using it is thus: The person who bears it, walking very slowly over the places where he suspects mines or springs may be, the effluvia exhaling from the metals, or vapour from the water, impregnating the wood, makes it dip or incline, which is the sign of a discovery.

Some dispute the matter of fact, and deny it to be possible. Others, convinced by the great number of experiments alleged in its behalf, look out for the natural causes thereof: The corpulcels, say those authors, rising from the springs or minerals, entering the rod, determine it to bow down, in order to render it parallel to the vertical lines which the effluvia describe in their rise.

The famous Father Kircher, in his *Mundus Subterraneus*, in which many interesting particulars are found concerning mines, derides these practices, and denies, from his own experience, the truth of the assertions concerning them. He seems, however, to have some faith in sympathies, and proposes even new divining wands of his own invention; the effects of which, though more dependent on physical causes, are not, however, more certain. He believes, for instance, that a wand, one end of which should be made of sal gem, and the other of wood, being suspended and balanced above a mine of salt, would be inclined towards the ground; and he supports his opinion by an experiment. This experiment consists in evaporating over the fire a solution of sal gem below the wand, which is by this means really made to incline. We need not be deeply learned in chemistry to discover, that the wand would have inclined in the same manner if Father Kircher had evaporated pure water instead of a solution of sal gem; because the water would have equally well attached itself to the saline end of the wand; consequently this experiment proves nothing.

The same author proposes also to discover mines of

mercury by employing a wand, one end of which is made of gold, and the other of wood, in hopes that the emanations of the mercury would attach themselves to the gold rather than to the wood, and would make it incline downwards. But this effect certainly cannot be produced unless the mercury was evaporating; for which purpose two conditions are necessary: 1. The mercury must be in a native metallic state, and not mineralised, as it is in cinnabar; and, 2. it must also be exposed to the heat of some subterranean fire, by which it is volatilised and sublimed, the ordinary heat of the earth being far too little for this purpose. This second physical or chemical divining wand proposed by Father Kircher is therefore no better than the former; and probably the same judgment may be passed upon all other wands made upon the same principles and in imitation of these. Lastly, the same author positively affirms, that he hung and balanced a wand, one half of which was made of alder-tree, and the other half of some wood that has no sympathy with water, over a subterranean water, and that he observed the end of the wand incline towards the earth.

VITEX, the *AGNUS CASTUS*, or *Chaste Tree*; a genus of the angiospermia order, belonging to the dynamia class of plants. There are three species; of which the most remarkable is the *agnus castus*, or common chaste tree. This grows naturally in Sicily near Naples, by the sides of rivers, and in the Archipelago in moist places: it has a shrubby stalk 10 or 12 feet high, sending out branches opposite the whole length, which are angular, pliable, and have a greyish bark, garnished with leaves for the most part placed opposite, composed of five, six, or seven lobes, which unite at the footstalk, and spread out like the fingers of a hand, ending in blunt points, of a dark green on their upper side, but hoary on their under. The flowers are produced in spikes at the extremity of the branches, from seven to fifteen inches long, disposed in whorls round the stalks, with intervals between each whorl: they are of the lip-kind; the two lips are each cut into three segments, the middle being larger than the two sides; in some plants white, and in others blue; these are generally late before they appear; so that in bad seasons they do not open fair. The flowers have an agreeable odour, and make a good appearance in autumn, when the flowers of most other shrubs are gone; for, in warm mild seasons, these shrubs are in full flower in the middle of October.

This sort is pretty common in many English gardens, where it has been long an inhabitant, but was not much propagated till of late years. It is very hardy; and may be propagated by planting the cuttings early in the spring, before they shoot.

VITRIFICATION, the production of glass, one of the most curious and most important operations in chemistry. See *GLASS*, (*Encycl.*)

The hardness, beauty, and perfect transparency, of glass render it very extensively useful in ordinary life, in natural philosophy, in chemistry, and in many arts. Almost any form may be given to glass, and all kinds of vessels and utensils may be formed of it, which are capable of resisting the most powerful corrosives and solvents. Glass is capable of receiving and preserving the finest polish. Its properties of transmitting and refracting the rays of light, and of reflecting these rays when one of its surfaces is covered with a metallic coat, render it very useful for constructing mirrors, telescopes,

microscopes, and all kinds of optical glasses; for collecting, separating, and decomposing the rays of light; and for exhibiting many wonderful catoptrical and dioptrical appearances and experiments. If to these admirable properties we add that of imitating the many brilliant precious stones, opaque or transparent, we shall easily be convinced that perfect glass is one of the most beautiful and excellent productions of human industry.

Perfect glass, or the most beautiful facitious crystal, is perfectly similar in appearance to the whitest and most transparent natural vitrifiable stones. The only sensible difference between these natural and artificial productions is, that the latter are much less hard and more fusible than natural crystal or any other vitrifiable stone. In fact, pure glass or artificial crystal is essentially of the same nature as vitrifiable stones; or we may rather say, that it is vitrifiable earth itself rendered more fusible only by certain additions, as we shall soon show.

The most simple and elementary of all earths, called by chemists *vitrifiable earth*, forms the hardest and most transparent of all natural bodies when its ingredient parts are united together in a due state of aggregation: but the parts of vitrifiable earth cannot form this aggregation, unless they have been previously so much separated from each other that they possess a mobility, which enables them to unite together according to their natural tendency: the ingredient parts of elementary earth may acquire this mobility by two methods; namely, by the interposition of the parts of water or of those of fire.

Almost all the vitrifiable stones that we know, as diamonds, rock-crystal, and other hard transparent stones, appear to have been once dispersed in infinitely small molecules through much water, from which they have afterwards been deposited, and then have united together and formed the very hard transparent masses which we now see. Possibly some of these stones may have been formed by fire, and by a true fusion. Of these two ways, that of the division and elaboration by water cannot be practised by human art, on account of the many ages required for the operation.

By the second method, namely, fusion, the time required for which is better adapted to the shortness of our lives, we certainly might, with a sufficient degree of heat, melt vitrifiable earth, and all other kinds of earths; since these, when sufficiently purified, are reduced to the nature of vitrifiable earth; and we might convert these earths into masses of crystal, or of hard transparent stones, as perfect as the natural precious stones. In a word, nothing but a heat sufficiently intense is required to melt any earthy matter, and to convert it into a diamond as brilliant and as hard as the most perfect natural diamonds: but here a great, and hitherto unsurmountable, difficulty occurs, namely, to produce a heat sufficiently intense to melt the most pure and simple vitrifiable earth; for the most violent heat that art has ever produced is insufficient to melt even many of the common impure earths and stones; and is therefore much less capable of melting that earth, which, because it is the simplest and purest, is also the most infusible of all natural bodies.

Hence we conclude, that although we know by what means the parts of the purest earthy principle may be so united as to form bodies similar to the natural precious stones, yet we cannot possibly put these

means

means in execution: but if we cannot artificially produce solid masses of pure earth exactly similar in all their properties to the natural precious stones, we can however very well imitate these beautiful natural productions, not in their hardness and unfusibility, but in their transparency and lustre; that is, in their most obvious and striking qualities, by means of compositions of glass or factitious crystal. The solution of this problem is founded on the following principles.

First, pure and elementary earth, which makes the principal basis of all vitrifications, and therefore called *vitrifiable earth*, is indeed unfusible with regard to us: but we know, that certain very fusible substances are capable of uniting intimately with this earth, and of communicating to it some of their fusibility; so that by their means we may reduce it to a perfect fusion.

Secondly, the substances capable of acting upon the earthy principle are the inflammable principle or phlogiston, and several saline matters: but we may remark, that as these substances do only act as fluxes by uniting intimately with the vitrifiable earth, and while they themselves make part of the glass; and also, as the integrant parts of these fluxes are not capable of forming either with each other, or with the parts of vitrifiable earth, so strong an adhesion as that which can be formed between the parts of the pure vitrifiable earth; it follows, that all factitious crystal must be much less hard than natural crystals or other hard stones, since these contain only pure vitrifiable earth.

Thirdly, in consequence of the principle, that all compound bodies partake of the properties of their component parts, factitious crystals ought to partake so much more of the properties of inflammable and saline matters, and ought to be removed so much more from those of pure vitrifiable stones, as they contain a larger quantity of those matters. Accordingly we find, that the smaller quantity of flux that is contained in glass, the greater hardness, lustre, and resemblance to natural stones it has, provided the fusion has been complete. Thus glass is so much more perfect, as it possesses more of the properties of vitrifiable earth.

These principles, which are incontestable, being once understood, are easily applicable to the art of making glass; since, if we could produce a fire sufficiently intense, and had furnaces and vessels capable of sustaining it, we should make glass equal to the precious stones: it is therefore evident, that the most important object in vitrification, is to have furnaces capable of producing the greatest heat, and pots or crucibles capable of resisting, during a long time, this heat, and also the action of the vitrescent matter that they contain. These pots, as has been elsewhere observed, ought to be made entirely of the most refractory and purest clay, well washed and cleansed from all sandy, ferruginous, and pyritous matters, and mixed with a certain proportion of the same clay baked, and pounded not very finely. The quantity of baked clay that ought to be mixed with the crude clay, to prevent the pots from cracking, when dried or when exposed to violent heat, is not absolutely determined, but varies in different glass-houses, according as the crude clay employed be more or less fat, as it is called.

The ovens and furnaces are different, according to the quantity of materials to be vitrified. See the article *GLASS*, (*Encycl.*) In large works, wood or fossil coal are used; and the furnaces are so constructed that the flame of the fuel circulates and burns within very

intensely. As these furnaces vary much in different countries and glass-houses, and as a description would not be very intelligible without figures, we shall refer the reader to other works in which these several furnaces are described and represented; particularly to the French edition of *Neri's Art of making Glass*, with Notes by Merret and by Kunckel; and to an excellent Memoir by Dr D'Antic of Paris. We shall here say only in general, that these furnaces are placed under large and lofty buildings called *halls*; that they are covered with a vaulted roof; and that they have no chimney, but only lateral openings, through which the melted glass is drawn from the pots. Under these openings is built a kind of platform or banquette, on which the pots containing the glass stand, one of which is opposite to each opening. In the middle of the furnace, below the banquette, is a space, across which iron bars are laid. In this space, which communicates with a large cavity below called the *ash-hole*, the fuel is placed. In these furnaces, which have not any chimney, as we have said, the fire is nevertheless very intense. This intense heat is occasioned by the great capacity of the furnace, by means of which a strong draught of air passes continually from the ash-hole: besides, the flame being vividly agitated by air, and not being drawn out of the furnace by any chimney, circulates in every direction within the furnace, and produces a very violent heat. Most glass-house furnaces have also hollow towers that communicate with the cavity of the furnace, and which therefore increase the capacity of the whole. In these the heat is not nearly so intense as in the furnace. They are employed to contain the frit, or the pieces of manufactured glass that are to be annealed. Such is the general disposition of the furnaces of glass-houses.

Next to the good condition of the pots and furnaces, the most important and essential matter is the consideration of the kinds and proportion of the fluxes. Of these we may observe two kinds, namely, the inflammable and the saline. As we cannot obtain the pure inflammable principle, we must, when we intend that it should enter into the composition of glass, choose for this purpose some of the earthy substances with which it is found naturally combined; and these are particularly metallic earths, which are best adapted for conveying phlogiston into vitreous compositions: but all these earths are not equally fit for this purpose. All metals are composed of an earthy matter intimately combined with a sufficient quantity of the inflammable principle to be very fusible, and at the same time very opaque. Some of these metals, namely, those called *perfect*, are unalterable by fire, and cannot be entirely, or even partly, deprived of phlogiston: but as every metallic substance is incapable of uniting with earthy matters while it retains its metallic state, therefore no perfect metal can be vitrified. The case is different with those metallic substances, the phlogiston of which may be burnt, or otherwise destroyed. The earths or calxes of most, perhaps of all combustible metals, when not perfectly deprived of all their phlogiston, are capable of being reduced to a vitreous state, by means of their remaining inflammable principle. As they are not then in a metallic state, they can facilitate the fusion of vitrifiable earths, may contract with these an intimate union, and reduce them to a state of perfect vitrification: but these phlogisticated calxes of imperfect metals promote vitrification more or less, ac-

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cording to their particular natures. Some of these, as, for instance, tin, cannot be without great difficulty brought to that precise degree of calcination that is necessary to vitrification; because the heat required for this purpose deprives them of all their phlogiston, and renders them in a high degree refractory. Others, in whatever manner they be calcined, either retain too little phlogiston to be sufficiently fusible, although they still retain enough to give them colour; or if they be not calcined so much as to lose their fusibility, they cannot be melted but into opaque masses, so nearly in a metallic state that they cannot be united intimately with vitrifiable earths. Such, especially, are the earths of iron and of copper.

Of all metallic earths, that of lead is fittest for vitrification. This metal, which contains a large portion of phlogiston, is quickly deprived of so much of it, that it loses its metallic state, and is easily melted into a transparent vitreous mass; but it has, at the same time, this remarkable property, that when once it has lost as much phlogiston as is necessary to dispose it to vitrification, its calx strongly retains as much of it as is necessary to give to its greatest degree of vitrescibility; and that it may be sooner dissipated into vapours by the continued action of a very intense fire, than it can be changed into an earth totally dephlogisticated, and consequently refractory, like the calxes of tin and of regulus of antimony. Besides, the fusible earth of lead is one of these that retain the least colour. All these qualities render it preferable to any other metallic earth for the purposes of vitrification. The earth of bismuth, which in the above-mentioned properties resembles the earth of lead, may probably be employed with equal success; but as the calxes of lead are much more common than those of bismuth, the use of this semi-metal is not known to manufacturers of glass.

In whatever manner the calx of lead has been prepared, provided it be really in a calcined and not in a metallic state, it may be used in vitrification. Accordingly, the grey calx, or ashes of lead, massicot, red-lead, litharge, ceruss, and all the precipitates of lead, separated from acids by unmetallic intermediate substances, being mixed with sand or any other vitrifiable stone, and exposed to a sufficient degree of fire, do always promote the fusion of these matters, and form with them glasses more or less hard and transparent, according to the strength of the fire and the proportion of the ingredients.

The earth of lead constantly retains, as we have said, enough of the inflammable principle to preserve its fusibility. When it is exposed singly to the fire, it vitrifies with a very moderate heat. It has more phlogiston than is requisite for its vitrification. The fusibility, fluidity, and activity of this glass of lead, when pure, are so great, that it cannot be contained in any crucible, all which it easily pervades; therefore pure glass of lead is never made. But as the calx of lead has more phlogiston than is required for its own vitrification, it may divide this excess of inflammable principle with any unmetallic earths with which it is mixed, and thus may produce their fusion and perfect vitrification. The glasses formed by a mixture of calx of lead with unmetallic earths, have more consistence, hardness, and less fusibility, than pure glass of lead. The proportions of calx of lead and of sand employed in these kinds of glass are from one part to two

of calx of lead, to one of sand or of ground flints.

We may observe upon the subject of glasses that contain no other flux than phlogiston or metallic earths, of lead, or of any other metal, that none of them are perfectly white, but are all more or less coloured; because phlogiston is, as chemists know, the principle of colours. Secondly, these glasses have a greater density or specific gravity than any natural crystalline stone, all metallic earths being heavier than any that are not metallic.

Thirdly, metallic glasses are generally somewhat less brittle, are less liable to be broken by the alterations of heat and cold, and have more of a certain smoothness, or, as it were, unctuousity, not easily to be described, than glasses made altogether of unmetallic earths. These properties can only be attributed to the inflammable principle, a pretty considerable quantity of which is united with them. As these latter qualities of glass are valuable, a certain quantity of calx of lead generally enters into the composition of most fine glasses, which are distinguished from ordinary glass by the name *crystal-glass*.

From what we have said concerning the properties of metallic earths in vitrification, we may perceive, that the more calx of lead, or other metallic earth, enters into the composition of any glass, the more fusible, soft, coloured, and dense this glass is; and reciprocally. The colours given to glass by calxes of lead are shades of yellow.

Saline substances are the second kind of fluxes used in vitrification: but all these substances are not equally fit for this purpose; not that they are not all very fusible, but for several reasons hereafter to be mentioned.

First, neither the pure and disengaged acids, nor volatile alkalis, nor ammoniacal salts, can be employed as fluxes in vitrification; because none of these saline matters is sufficiently fixed. Their volatility is so great, that they may be totally dissipated by fire before they could act in any degree upon vitrifiable earth.

Secondly, none of the neutral salts with basis of fixed alkali, containing either vitriolic acid, or marine acid, can be employed as fluxes in vitrification. This proceeds, not from their want of fusibility, or of the necessary degree of fixity, but from the union of the acid and the alkali; which is so strong that they cannot act with sufficient force upon other substances, and particularly upon vitrifiable earth. The saline matters fit for vitrification are, fixed alkalis, vegetable and mineral; niter with basis of fixed alkali; sedative salt, and borax; fusible salt of urine, or rather phosphoric acid.

Of all saline matters, fixed alkalis, vegetable and mineral, are most frequently used in vitrification. These alkalis are fusible with a moderate heat; they are so fixed that they can resist during a sufficient time the heat of ordinary vitrifications; and they act powerfully upon flints, sands, and other vitrifiable stones. The proportion of alkali to sand, in order to make good glass, is, from one to two parts of the former ingredient, and two parts of the latter.

Nitre produces in vitrification nearly the same effects as fixed alkalis, although it be a neutral salt; the alkali and acid of which are united together nearly as they are in common salt, which however does not produce in vitrification similar effects. The remarkable difference in this respect betwixt these two salts, and

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betwixt the nitre and the vitriolic salts, must be attributed to the great affinity of nitrous acid to the inflammable principle; which affinity is so strong, that when nitre is exposed to fire in vessels not perfectly close, the acid quits its alkaline basis to unite with the phlogiston of combustible matters, even though these be not sensibly in contact with it. Hence nitre exposed during a certain time to the action of a strong fire, is gradually alkalinized, and then becomes capable of dissolving very effectually vitrifiable earth. This alkalinization is produced so much more easily in most vitrifications, that the ingredients employed generally contain some inflammable matter. Common salt cannot be alkalinized in this manner, because it cannot be decomposed by the contact of inflammable bodies, and therefore is not used in vitrifications: but as vitriolic acid has a strong affinity with phlogiston, we might be inclined to think, that vitriolic salts with basis of fixed alkali, which also are never used in vitrification, might perhaps be employed along with sand or other vitrifiable matters containing a larger proportion of phlogiston than the ingredients now commonly used do.

Fixed alkalis or nitre cannot be formed into transparent glass by being melted singly; because these salts contain too little of the earthy principle; for they form true glasses when they are mixed with a sufficient quantity of this principle, as with sands and other earthy matters: but borax, sedative salt, and the fusible salt of urine, may be melted without any earthy addition into transparent vitreous masses: and hence we may conclude, that these salts contain a larger portion of the earthy principle than nitre or fixed alkali. They nevertheless very powerfully promote the vitrification of other substances. These salts are not employed in the manufacture of large quantities of glass, because they are too dear. Borax is sometimes used for making small quantities of some particular kinds of fine glass.

Arsenic may be enumerated among vitrifying fluxes, as it is fusible and vitrescible singly, and is also capable of promoting the fusion of vitrifiable earths; for which purpose it is frequently employed as an ingredient in vitreous compositions. As arsenic partakes both of the metallic and saline properties, it probably acts in vitrification both as a salt and as a metallic earth. The quantity therefore of arsenic necessary to promote vitrification, is intermediate betwixt the quantities of calx of lead and of saline substances that are necessary for that purpose. But we must observe, that as arsenic is very volatile, a great part of it escapes in vapours upon the first application of heat, and that the quantity remaining is always uncertain. Arsenic cannot well be employed as the sole flux for vitrifiable earth. When we intend that a certain quantity of this matter should remain in the composition of a glass, one of the best methods that can be used for this purpose, is at the same time to add nitre to the ingredients of this glass; because the arsenic uniting with the alkaline basis of the nitre forms the neutral arsenical salt in which the arsenic is considerably fixed. But as this neutral arsenical salt is easily decomposed by contact of phlogiston, therefore no calx of lead or other substance containing the inflammable principle ought to be mixed with arsenic in the composition of glass. It has been found by experiment, that this neutral arsenical salt is very difficultly manageable in vitrifications, not only for the reason now given, but also from the property it has of powerfully corroding and pervading crucibles and pots.

In many mixtures, it quitted the vitrifiable earth with which it was mixed, and acted upon the crucible, which it penetrated and dissolved. These experiments seem to show, that arsenic has a greater affinity with clay than with vitrifiable earths.

From Mr Pott's experiments, chemists know, that vitrifiable, calcareous, and argillaceous earths, each of which are singly infusible, do reciprocally promote the fusion of each other, when mixed together nearly in equal proportions, and exposed to a very violent heat; and that from these mixtures matters perfectly vitrified are formed. But as we do not know the cause of this singular fusibility, we cannot determine whether it is produced by a phlogistic or by a saline substance, or perhaps by both.

Glasses that contain no other fluxing ingredient than phlogistic matters or metallic earths, partake of the properties of these metallic earths; and also glasses that contain only saline fluxes, partake of the properties of salts. The latter, or saline glasses, when pure and well proportioned, are less heavy, less dense, harder, whiter, more brilliant, more brittle, than the glasses containing calx of lead: and glasses containing both saline and metallic fluxes do also partake of the properties of both these substances. In general, glasses too saline are soft, and easily susceptible of alteration by the action of air and water; especially those in which alkalis prevail: which latter glasses are also liable to be attacked by acids, as we evidently see from the properties of the vitrified matter that is made with an excess of alkali, for the preparation of liquor of flints. Glasses containing too much borax and arsenic, although at first very beautiful, do quickly tarnish and become opaque when exposed to air.

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From what we have said concerning the properties of fluxes, phlogistic or saline, we may know how to adjust the proportions of these to the sand or powdered flints for the various kinds of glass. Thus, if we require a glass that is dense, fusible, and not saline, one part and a half of red-lead or litharge may be mixed with one part of sand, and fused together. If equal parts of sand and of calx of lead be employed, a glass somewhat less dense and harder will be produced.

If a glass be required of very little density, only saline fluxes must be employed. A glass of this kind may be composed of six parts of salt of tartar, or of potash, or of purified soda, mixed with eight parts of sand or of flints; or of four parts of any of the above-mentioned alkalis, mixed with two parts of nitre or of borax, and eight parts of vitrifiable earth. These glasses must be left long in the fire, for the reasons hereafter to be mentioned.

When a crystal-glass is required which shall be of an intermediate quality betwixt the metallic and saline glasses, it may be made from a mixture of one part of the above-mentioned salts, one part of calx of lead, and two parts of sand or other vitrifiable earth. By varying the proportions of these ingredients, many different kinds of glasses may be produced, each of which may be good, if the quantity of each of the fluxes employed be proportionable to its vitrifying power. Several good receipts for glass and factitious crystal may be found in Neri's Art of Making Glass, with Notes by Merret and Kunckel; to which work we refer for many interesting particulars. See also the article GLASS, (Encycl.) We shall however observe, that the proportions of the fluxes necessary to produce any required kind

kind of glass cannot be precisely ascertained, for the following reasons.

First, the sands, flints, and other stones commonly employed for making of glass, are not all equally fusible. Thus the quartzose sand obtained by washing an earth found near Nevers, known to manufacturers of glass and of pottery by the name of *sand of Nevers*, may be almost entirely melted when exposed to a good vitrifying heat; and by a moderate heat its grains may be considerably rounded. There are some other hard stones, which in a violent fire are still more fusible, and convertible into an almost transparent glass without addition. The fusibility of these vitrescible stones is caused by some unknown heterogeneous matter united with them. These fusible sands and stones require a much less quantity of flux to promote their vitrification than other sands or vitrifiable stones which are much purer, and therefore more refractory.

Secondly, although the phlogistic and saline matters employed as fluxes in vitrification are sufficiently fixed to support the degree of fire necessary for the fusion of glass, they are nevertheless far from being so fixed as vitrifiable earth. The fire necessary for the perfect fusion of glass, is even sufficient to evaporate them entirely. Accordingly, in glass-houses where the pots are uncovered, a vapour or smoke continually rises from their surface, which is nothing else than the saline and phlogistic fluxes in a state of continual exhalation. Hence the longer glass remains melted in the fire, the harder and more difficultly fusible it becomes, and the more it partakes of the properties of pure vitrifiable earth. Accordingly, even when a very hard glass is required, such a quantity of flux ought to be added as shall at first promote a perfect fusion; and this fusion ought to be continued a long time till a considerable quantity of the flux is gradually dissipated, and till the glass has acquired the requisite degree of hardness, provided that the fire be sufficiently strong to maintain the fusion notwithstanding the loss of flux. From these observations it appears, that we cannot precisely ascertain the proportion of flux to vitrifiable earth, unless we knew the fusibility of the sand to be employed, and the degree of heat which can be excited in the furnace.

The saline fluxes, and especially the fixed alkalis employed in vitrification, are generally rendered impure by a mixture of several heterogeneous matters, and especially by neutral salts not vitrifiable, and by a certain quantity of inflammable principle. In manufactories of bottles and other common glass, the alkalis employed are not previously purified, but are even mixed with the earth of the ashes of the burnt plants, which earth is also much disposed to vitrification. Accordingly, to make glass of this kind, sand is mixed with common wood ashes, sometimes even with those which have been lixiviated, together with some unpurified potash, soda, or kelp; and from this mixture a brown, dusky, not very transparent glass is produced, which is preferred in common sale for wine bottles to clearer and more transparent glass. But when a fine, white, and very transparent glass is required, the alkali must be perfectly purified from all heterogeneous matter, by lixiviation and calcination.

As a too large quantity of the inflammable principle is the chief cause of the colours and of the opacity of glass, when a perfectly colourless and transparent glass is required, not only the alkalis must be deprived of all their superabundant phlogiston, but also the sands

or flints employed must be purified from any of this principle which they may contain. The method used for this purpose is by mixing together the due proportions of sands and salts, by exposing this mixture during a considerable time to a red heat, not intense enough to melt it. By this calcination, the phlogiston of these matters is burnt and dissipated, all colour is destroyed, and the glass produced is also more clear and brilliant. This first mixture of materials of glass, when calcined, is called the *fritt*; and this fritt is used in large manufactories not only for the finer glass, but also for the common brown glass; not with an intention to render this latter kind of glass colourless, but because, during this calcination, the salts and earth begin to act upon each other, and to incorporate in a certain degree; by which a great part of the effervescence and swelling occasioned by the reaction of these matters, which happen when they are at once exposed to a melting heat, are avoided. Accordingly, when matters not previously fritted are employed in small experiments, the heat must be applied gradually; otherwise they so swell, that frequently the greatest part of the mixture runs over the crucible.

The due degree of heat is an essential point in making of glass; it ought not only to be very strong, but also maintained during a long time. In great manufactories, the glass is kept fused during ten or twelve hours before it is taken out of the pots. Accordingly their glass is always more perfect than that which is hastily made in small quantity in two or three hours. Good glass, although kept in fusion in a very great heat, is not perfectly liquid. It is always somewhat thick, and when taken from the crucible, it may be drawn out into fine wire or threads; which shows that it has a certain consistence and a very sensible tenacity when it is red-hot. It is not transparent while it remains red-hot, not even when it has become perfectly hard. Another remarkable circumstance is, that glass which is so brittle when it is cold and transparent, is very ductile when it is so heated as to be opaque. We might be induced to believe, that the disengaged fire with which the glass is filled when it is red-hot, produces upon it the same effect that phlogiston or combined fire produces upon metals. The ductility of red-hot glass is very useful; for by its means all imaginable shapes may be given to glass, and numberless vessels and utensils may be easily formed of it.

As soon as glass-vessels have received their intended form, they must be cooled very gradually, otherwise they would have no solidity, and would be of little use, as they would be liable to be broken by the smallest stroke, or by a slight change of heat and cold. This inconvenience is prevented in glass-houses by carrying the glass vessels as soon as they are formed, and while yet red-hot, into an oven too little heated to destroy their form. But in which they may be very gradually cooled. This is called *annealing the glass*.

Notwithstanding all the care taken in the manufactories of the finer kinds of glass, as crystal-glass and plate-glass, to make them perfectly good, they are nevertheless seldom found quite free from faults. The principal faults in glass are, colours, bubbles, and veins. The colours which generally hurt glass, especially that kind which contains saline fluxes, are shades of green, olive, and blue. These colours are destroyed by manganese; which being added in small quantities, clears the glass, and is therefore sometimes called by artists

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the soap of glass. This effect of manganese cannot easily be explained, for it has the property of tinging glasses with a purple colour. Mr Montamy, in his *Traité des Couleurs pour la Peinture en Email*, has a very fine and ingenious thought upon this subject; which is, that the manganese destroys the above-mentioned colours, by adding to these a purple tinge, and by the mixture producing a blackish brown colour; and that as blackness is caused merely by an absorption of the rays of light, therefore the blackish tinge given to the glass by the above mixture of colours, prevents the reflection of so many rays, and thus renders the glass less coloured than before. The causes of the bubbles and of the veins in all glass, even when most carefully prepared, and the methods of preventing these faults, are not sufficiently known.

We shall observe, in concluding this article, that several causes lessen or entirely prevent the transparency of glass, which is one of its most necessary qualities. As we cannot melt vitrifiable earth into transparent masses but by means of fluxes, and a sufficiently strong and long-continued heat, therefore when the vitreous mixture contains too little flux, or is exposed to too little heat, some parts of the vitrifiable earth cannot be entirely fused, and therefore injure more or less, according to their quantity, the transparency of the glass. The same fault may be perceived in glass, when it contains some earthy matter not susceptible of the action of fluxes, as vitrifiable earth is; such as, for instance, most metallic earths that are too much deplogified, particularly the earth of tin. Accordingly, these earths are employed to make opaque or semi-transparent glasses, as enamels, artificial opals, and other such stones. Another remark may be made concerning the transparency of some kinds of glass, that it is destructible by a too long exposure to violent heat. As all fluxes, phlogistic or saline, are much less fixed than vitrifiable earth, and as some fluxes are less fixed than others, or less capable of becoming fixed by being mixed with vitrifiable earth; the cause therefore of the loss of transparency which some glasses suffer by a too violent fire is, that a part of their flux is dissipated, so that these glasses are decomposed, and that they contain so much earth that the flux is incapable of keeping them completely fused. It has been observed that glasses formed by a mixture of argillaceous and gypseous or calcareous earths, are more liable than any others to this loss of transparency.

UNIVERSE, (Encycl.) As space is in its own nature every way infinite, it gives us an idea of the infinity of the universe, which can therefore be only in part comprehended by us: and that part of the universe which we can have any notion of, is that which is the subject of our senses; and of this the eye presents us with an idea of a vast extended prospect, and the appearance of various sorts of bodies disseminated through the same.

The infinite abyss of space, which the Greeks call *to pan*, the Latins *inane*, and we the *universe*, does undoubtedly comprehend an infinity of systems of moving bodies round one very large central one, which the Romans called *sol*, and we the *sun*. This collection of bodies is therefore properly called the *solar system*, and sometimes the *mundane system*, from the Latin word *mundus* the "world."

That the universe contains as many solar systems or worlds as there are what we call fixed stars, seems

reasonable to infer from hence, that our sun, removed to the distance of a star, would appear just as a star does, and all the bodies moving about it would disappear entirely. Now the reason why they disappear is, because they are opaque bodies, and too small to be seen at so great a distance, without an intense degree of light; whereas theirs is the weakest that can be, as being first borrowed, and then reflected to the eye.

But the sun, by reason of his immense bulk and innate light, which is the strongest possible, will be visible at an immense distance; but the greater the distance, the less bright it will appear, and of a lesser magnitude: and therefore every star of every magnitude may probably be a sun like our own, informing a system of planets or moving bodies; each of which may be inhabited, like our earth, with various kinds of animals, and stored with vegetable and other substances.

We can perceive, says Mr Maclaurin, no bounds of the vast expanse in which natural causes operate; nor can we fix any border or termination of the universe; and we are equally at a loss to trace things to their elements, and to discover the limits which enclose the subdivisions of matter. The objects which we commonly call great, vanish when we contemplate the vast body of the earth. The terraqueous globe itself is soon lost in the solar system; being in some parts seen as a planet or distant star, and in great part of the system unknown, or visible only at rare times to vigilant observers, assisted perhaps with instruments like our telescopes. The sun itself dwindles into a star: Saturn's vast orbit, and the orbits of all the comets, crowd into a point when viewed from numberless places between the earth and the nearest fixed stars. Other suns illuminate other systems where our sun's rays are unperceived: but all these are also swallowed up in the vast expanse of the universe. Even all the systems of the stars that sparkle in the clearest sky, must possess a small corner only of that space over which such systems are dispersed. And after we have risen so high, and left all definite measures so far behind us, we find ourselves no nearer to a term or limit; for all this is nothing to what may be displayed in the infinite expanse, beyond the remotest stars that ever have been discovered.

In this view of the universe, an august idea arises in the mind, worthy of the infinite and wise Author of nature, who can never be supposed to have created so many glorious orbs, to answer so trifling a purpose as the twinkling to mortals by night now and then; besides that the far greatest part of the stars are never seen by us at all.

USNEA, in botany, a genus of mosses, wholly destitute of leaves, and composed only of long slender filaments or stalks, which are usually solid, rigid, and of a cylindric figure. The extremities, or other parts of these, are at times furnished with a sort of orbicular bodies, dry and destitute of use, but seeming to supply the place of flowers. These are hollow, in form of cups, but have no rim. The whole plants are fixed in the manner of mistletoe to the barks of trees. Micheli has given accounts of flowers and seeds in these plants; but Dillenius suspects the accuracy of this observation, and adds, that if there are such, they are too minute to be of any service in the general distinctions of the plants. See Plate CCCXX.

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Wand,
Warburton.**WAND, DIVINING.** See *VIRGULA Divina* in this Appendix.

WARBURTON (William), bishop of Gloucester, a learned prelate, was born at Newark upon Trent, in the county of Nottingham, Dec. 24. 1698. His father was George Warburton, an attorney, and town-clerk of the place, in which this his eldest son received his birth and education. While at school, the bishop showed no indication of superior genius. His original designation was to the same profession as that of his father and grand-father; and he was accordingly placed clerk to an attorney, with whom he remained until he was qualified to engage in business upon his own account. He was then admitted to one of the courts at Westminster; and for some years continued the employment of an attorney and solicitor at the place of his birth. The success he met with as a man of business was probably not great. It was certainly insufficient to induce him to devote the rest of his life to it; and it is probable, that his want of encouragement might tempt him to turn his thoughts towards a profession in which his literary acquisitions would be more valuable, and in which he might more easily pursue the bent of his inclination. He appears to have brought from school more learning than was requisite for a practising lawyer. This might rather impede than forward his progress, as it has been generally observed, that an attention to literary concerns, and the bustle of an attorney's office, with only a moderate share of business, are wholly incompatible. It is therefore no wonder that he preferred retirement to noise, and relinquished what advantages he might expect from continuing to follow the law. It has been suggested by an ingenious writer, that he was for some time usher to a school. In the year 1724, his first work, consisting of translations from Cæsar, Pliny Claudian, and others, appeared under the title of "Miscellaneous Translations in Prose and Verse, from Roman Poets, Orators, and Historians," 12mo. It is dedicated to his early patron, Sir Robert Sutton, and seems to have laid the foundation of his first ecclesiastical preferment. At this period it is probable he had not abandoned his profession, though it is certain he did not attend to it much longer. About Christmas 1726 he came to London; and while there, was introduced to Theobald, Concanen, and others of Mr Pope's enemies, with whose conversation he was extremely pleased. In 1727, he published a work, entitled, "A Critical and Philosophical Enquiry into the Causes of Prodigious and Miracles, as related by Historians," &c. 12mo, and was also dedicated to Sir Robert Sutton. He was at this time in orders, and on the 25th of April 1728, had the honour to be in the king's list of Masters of Arts, created at Cambridge, on his majesty's visit to that university. In June, the same year, he was presented by Sir Robert Sutton to the rectory of Burnt Broughton, in the county of Lincoln; a living which he retained till his death, at which he spent a considerable part of his middle life in a studious retirement, devoted entirely to letters, and there planned, and in part executed, some of his most important works. Several years elapsed, after obtaining this preferment, before Mr Warburton appeared again in the world as

a writer. It was in this year 1736, that he may be said to have emerged from the obscurity of a private life into the notice of the world. The first publication which rendered him afterwards famous now appeared under the title of "The Alliance between Church and State; or, the Necessity and Equity of an Established Religion and a Test-law, demonstrated from the Essence and End of Civil Society, upon the fundamental Principles of the Law of Nature and Nations." At the end was announced the scheme of "The Divine Legation of Moses demonstrated on the Principles of a religious Deist, from the omission of the doctrine of a future state of rewards and punishments in the Jewish dispensation;" and met with a reception which neither the subject, nor the manner in which it was treated, seemed to authorize. It was, as the author afterwards observed, fallen upon in so outrageous and brutal a manner, as had been scarce pardonable, had it been "The Divine Legation of Mahomet."—It produced several answers, and so much abuse from the authors of "The Weekly Miscellany," that in less than two months he was constrained to defend himself, in "A Vindication of the Author of the Divine Legation of Moses, from the Aspersions of the Country Clergyman's Letter in the Weekly Miscellany of February 24, 1737-8," 8vo. Mr Warburton's extraordinary merit had now attracted the notice of the heir-apparent to the crown; in whose immediate service we find him in June 1738, when he published "Faith working by Charity to Christian Edification; a sermon preached at the last episcopal visitation for confirmation in the diocese of Lincoln; with a preface, showing the reasons of its publication, and a postscript, occasioned by some letters lately published in the Weekly Miscellany. By William Warburton, M. A. Chaplain to his Royal Highness the Prince of Wales." A second edition of "The Divine Legation" also appeared in November 1738. In March 1739, the world was in danger of being deprived of this extraordinary genius by an intermitting fever, which with some difficulty was relieved by a plentiful use of the bark. The "Essay on Man" had now been published some years; and it is universally supposed that the author had, in the composition of it, adopted the philosophy of Lord Bolingbroke, whom on this occasion he had followed as his guide, without understanding the tendency of his principles. In 1738, M. de Crousaz wrote some remarks on it, accusing the author of Spinozism and Naturalism; which falling into Mr Warburton's hands, he published a defence of the first epistle, and soon after of the remaining three, in seven letters, of which six were printed in 1739, and the seventh in June 1740, under the title of, "A Vindication of Mr Pope's Essay on Man, by the Author of the Divine Legation." The opinion which Mr Pope conceived of these defences, as well as of their author, will be best seen in his letters. In consequence, a firm friendship was established between them, which continued with undiminished fervour until the death of Mr Pope; who, during the remainder of his life, paid a deference and respect to his friend's judgment and abilities, which will be considered by many as almost bordering on servility. In 1741, the second volume of "The Divine

Legation" was published; as was also a second edition of the "Alliance between Church and State." Mr Pope's affection for Mr Warburton was of service to him in more respects than merely increasing his fame. He introduced and warmly recommended him to most of his friends, and amongst the rest to Ralph Allen, Esq. of Prior-Park, whose niece he some years afterwards married, and whose great fortune at length came to his only son. In 1742, Mr Warburton published "A Critical and Philosophical Commentary on Mr Pope's Essay on Man." In which is contained a Vindication of the said essay from the misrepresentations of M. de Resnel, the French translator, and of M. de Croufaz, professor of philosophy and mathematics in the Academy of Lausanne, the commentator. It was at this period when Mr Warburton had the entire confidence of Mr Pope, that he advised him to complete the Dunciad, by changing the hero, and adding to it a fourth book. This was accordingly executed in 1742, and published early in 1743, 4to, with notes by our author; who, in consequence of it, received his share of the satire which Mr Cibber liberally bestowed on both Mr Pope and his annotator. In the latter end of the same year, he published complete editions of "The Essay on Man," and "The Essay on Criticism;" and, from the specimen which he there exhibited of his abilities, it may be presumed Mr Pope determined to commit the publication of those works which he should leave, to Mr Warburton's care. The publication of "The Dunciad" was the last service which our author rendered Mr Pope in his life-time. "The Divine Legation of Moses" having now been published some time, and various answers and objections to it having started up from different quarters, Mr Warburton, in 1744, turned his attention to these attacks on his favourite work; and defended himself in a manner which, if it did not prove him to be possessed of much humility or diffidence, at least demonstrated, that he knew how to wield the weapons of controversy with the hand of a master. His answers are couched in those high terms of confident superiority, which marked almost every performance that fell from his pen during the remainder of his life. At this important crisis, 1745, Mr Warburton printed three very excellent and seasonable sermons, 1. "A faithful Portrait of Popery, by which it is seen to be the reverse of Christianity, as it is the Destruction of Morality, Piety, and Civil Liberty. A Sermon preached at St James's Church, Westminster, Oâ. 1745, 8vo." 2. "A Sermon occasioned by the present unnatural Rebellion, &c. preached in Mr Allen's Chapel at Prior-Park, near Bath, Nov. 1745. and published at his request," 8vo. 3. "The nature of National Offences truly stated. A Sermon preached on the General Fast-day, Dec. 18. 1745," 8vo, 1746. Notwithstanding his great connections, his acknowledged abilities, and his established reputation, yet we do not find that he received any addition to the preferment given him in 1728 by Sir Robert Sutton (except the chaplainship to the Prince of Wales), until April 1746, when he was unanimously called by the Society of Lincoln's-Inn to be their preacher. In 1747 appeared his edition of Shakespeare, and his Preface to Clarissa; and in the same year he published, 1. "A Letter from an Author to a Member of Parliament, concerning Literary Property," 8vo. 2. "Preface to Mrs Cockburn's Remarks upon the Principles and

Reasonings of Dr Rutherford's Essay on the Nature and Obligations of Virtue," &c. 8vo. 3. "Preface to a Critical Inquiry into the Opinions and Practice of the ancient Philosophers, concerning the Nature of a Future State, and their Method of teaching by double Doctrine," (by Mr Towne,) 8vo, 1747, 2d edition. In 1748, a third edition of "The Alliance between Church and State; corrected and enlarged." In 1749, a very extraordinary attack was made on the moral character of Mr Pope, from a quarter where it could be the least expected. His "Guide, Philosopher, and Friend," Lord Bolingbroke, published a book which he had formerly lent Mr Pope in MS. The preface to this work, written by Mr Mallet, contained an accusation of Mr Pope's having clandestinely printed an edition of his Lordship's performance without his leave or knowledge. A defence of the poet soon after made its appearance; which was universally ascribed to Mr Warburton, and was afterwards owned by him. It was called, "A Letter to the Editor of the Letters on the Spirit of Patriotism, the Idea of a Patriot King, and the State of Parties, &c. occasioned by the Editor's Advertisement," &c. which soon afterwards produced an abusive pamphlet, under the title of "A Familiar Epistle to the most impudent Man living," 8vo; a performance, as hath been truly observed, couched in language bad enough to disgrace even galls and garrets. About this time the publication of Dr Middleton's Enquiry concerning the Miraculous Powers gave rise to a controversy, which was managed with great warmth and acerbity on both sides, and not much to the credit of either party. On this occasion Mr Warburton published an excellent performance, written with a degree of candour and temper, which, it is to be lamented, he did not always exercise. The title of it was, "Julian; or a Discourse concerning the Earthquake and Fiery Eruption which defeated that Emperor's attempt to rebuild the Temple at Jerusalem," 8vo, 1750. In 1751, he gave the public his edition of Mr Pope's works, with notes, in nine volumes 8vo; and in the same year printed "An Answer to a Letter to Dr Middleton, inserted in a pamphlet intitled, The Argument of the Divine Legation fairly stated," &c. 8vo, and "An Account of the prophecies of Arise Evans, the Welch prophet, in the last century;" the latter of which pieces afterwards subjected him to much ridicule. In 1753, Mr Warburton published the first volume of a Course of Sermons preached at Lincoln's Inn, intitled, "The Principles of Natural and Revealed Religion occasionally opened and explained;" and this, in the subsequent year, was followed by a second. After the public had been some time promised the appearance of Lord Bolingbroke's works, they were about this time printed. Many answers were soon published, but none with more acuteness, solidity, and sprightliness, than "A View of Lord Bolingbroke's Philosophy, in two Letters to a Friend, 1754;" the Third and Fourth Letters were published in 1753, with another edition of the two former; and in the same year a smaller edition of the whole; which, tho' it came into the world without a name, was universally ascribed to Mr Warburton, and afterwards publicly owned by him. To some copies of this is prefixed an excellent complimentary epistle from the President Montesquieu, dated May 26. 1754. At this advanced period of his life, that preferment which his a-

bilities might have claimed, and which had hitherto been withheld, seemed to be approaching towards him. In September 1754, he was appointed one of his Majesty's chaplains in ordinary, and in the next year was presented to a prebend in the cathedral of Durham, on the death of Dr Mangey. About the same time the degree of Doctor of Divinity was conferred on him by Dr Herring, then archbishop of Canterbury. In 1757, a pamphlet was published, called "Remarks on Mr David Hume's Essay on the Natural History of Religion;" which is said to have been composed of marginal observations made by Dr Warburton, on reading Mr Hume's book; and which gave so much offence to the author as to advert upon, that he thought it of importance enough to deserve particular mention in the short account of his life. On the 11th of October, in this year, our author was advanced to the deanery of Bristol; and at the latter end of 1758, received the honour so justly due to his merit, of being dignified with the mitre, and promoted to the vacant see of Gloucester. In 1762, he published "The Doctrine of Grace; or, the Office and Operations of the Holy Spirit vindicated from the Insults of Infidelity and the Abuses of Fanaticism," 2 vols, 12mo; and in the succeeding year drew upon himself much illiberal abuse from some writers of the popular party, on occasion of his complaint in the House of Lords, on the 15th of November 1763, against Mr Wilkes, for putting his name to certain notes on the infamous "Essay on Woman." In making his complaint, the bishop, after solemnly disavowing both the Poem and the Notes, avowed, that the former was worthy of the Devil; then, after a short pause, added, "No, I beg the Devil's pardon, for he is incapable of writing it." The year 1777 produced a third volume of his Sermons, dedicated to Lady Mansfield: and with this, and a single "Sermon preached at St Lawrence Jewry, on Thursday April 30. 1767, before his Royal Highness Edward duke of York, President, and the Governors of the London Hospital, &c." 4to, he closed his literary labours. His faculties continued unimpaired for some time after this period; and in 1769 he gave considerable assistance to Mr Ruffhead in his life of Mr Pope. He also transferred 500 l. to Lord Mansfield, Judge Wilmot, and Mr Charles Yorke, upon trust, to found a Lecture in the form of a course of Sermons; to prove the truth of Revealed Religion in general, and of the Christian in particular, from the completion of the prophecies in the Old and New Testament, which relate to the Christian Church, especially to the apostasy of Papal Rome. To this foundation we owe the admirable Introductory Lectures of bishop Hurd, and the well-adapted continuation of bishop Halifax and dean Bagot. It is a melancholy reflection, that a life spent in the constant pursuit of knowledge frequently terminates in the loss of those powers, the cultivation and improvement of which are attended to with too strict and unabated a degree of ardour. This was in some degree the misfortune of Dr Warburton. Like Swift, and the great duke of Marlborough, he gradually sunk into a situation in which it was a fatigue to him to enter into general conversation. There were, however, a few old and valuable friends in whose company, even to the last, his mental faculties were exerted in their wonted force; and at such times he would appear cheerful for several hours, and on the departure of his friends retreat as it were within himself. This me-

lancholy habit was aggravated by the loss of his only son, a very promising young gentleman, who died of a consumption but a short time before the bishop himself resigned to fate, in the 81st year of his age.

WATER-HEMLOCK, Common. This plant is very common in England. It is a well known fact in Sweden, that horses will eat it, and that it frequently proves fatal to them by inducing a palsy: this effect, nevertheless, is judged to be owing to an insect which inhabits in great plenty the stalks of this herb, and from this singular effect is called by Linnæus *curculio paraplecticus*, when in its perfect state, as the larva only exists in this vegetable. The same caterpillar is found in the water-parsnip also in England.

WATER Hemlock, Long leaved. Happily this plant is not very common in England: the roots are the most virulent vegetable poison that is indigenous here. Linnæus, in the *Flora Lapponica*, n° 103. gives a dreadful account of the havoc it made among the horned cattle in Lapland, where it is common in the meadows near the sea, and where these cattle will frequently eat it, upon being first turned to grass in the spring, though they afterwards refuse it: yet they will eat the roots at all times, which are the most virulent parts of the plant. Bishop Gunner and Gmelin both confirm these bad effects. It is yet doubtful whether horses are hurt by it; and certain that goats are delighted with it, and eat it without any subsequent ill effect: and the roots are collected by the Norwegian peasants as fodder for those animals.

WATSON (Robert), an elegant historian, was born at St Andrews, in Scotland, about the year 1730. He was the son of an apothecary of that place, who was also a brewer. Having gone through the usual course of languages and philosophy at the school and university of his native place, and also entered on the study of divinity, a desire of being acquainted with a larger circle of literature, and of improving himself in every branch of knowledge, carried him, first to the university of Glasgow, and afterwards to that of Edinburgh. The period of theological studies at the universities of Scotland is no less than six years: but during that period, young men of ingenious minds find sufficient leisure to carry on and advance the pursuits of general knowledge. Mr Watson pursued his studies with ardour. Few men ever studied more constantly. It was a rule with him to study eight hours every day; and this law he observed during the whole course of his life. An acquaintance with the polite writers of England, after the union of the two kingdoms, became general in Scotland; and in Watson's younger years, an emulation began to prevail of writing pure and elegant English. Mr Watson applied himself with great industry to the principles of philosophical or universal grammar; and by a combination of these, with the authority of the best English writers, formed a course of lectures on style or language. He proceeded to the study of rhetoric or eloquence; the principles of which he endeavoured to trace to the nature of the human mind. He delivered a course of lectures in Edinburgh on these subjects; and met with the countenance, approbation, and friendship of lord Kaimes, Mr Hume, with other men of genius and learning.

At this time he had become a preacher; and a vacancy having happened in one of the churches of St Andrews, he offered himself a candidate for that living, but was disappointed. Mr Henry Rymer, who

then

then taught logic in St Salvador's College, was in a very infirm state of health, and entertained thoughts of retiring from the cares and emoluments of his office, to live upon his small salary or stipend. Mr Watson understanding this, purchased, for not a great sum of money, what, in familiar phraseology, may be called the good-will of Mr Rymer's place; and, with the consent of the other masters of St Salvador's, was appointed professor of logic. He obtained also a patent from the crown, constituting him professor of rhetoric and belles lettres. The study of logic, in St Andrews, as in most other places, was at this time confined to syllogisms, modes, and figures. Mr Watson, whose mind had been opened by conversation, and by reading the writings of the wits that had begun to flourish in the Scotch capital, prepared and read to his students a course of metaphysics and logics on the most enlarged and enlightened plan; in which he analyzed the powers of the mind, and entered deeply into the nature of the different species of evidence of truth or knowledge. By his history of Philip II. Dr Watson attained in his lifetime a considerable degree of celebrity; and his history of Philip III. published after his death, has added to his fame. Of this last performance, however, he has only completed the four first books; the two last were written by the editor of his manuscript, at the desire of the guardians of his children.

On the death of principal Tulideph, Dr Watson, through the earl of Kinnoull, was appointed his successor; in which station he lived only a few years. He married a lady of singular beauty and virtue, daughter to Mr Shaw, professor of divinity in St Mary's college, St Andrews. By this lady he had five daughters, who have lately obtained a small pension from government, through the active humanity of Mr Dundas then Lord Advocate for Scotland.

WEATHER, (*Encycl.*) Many have laboured with extreme diligence to explore the secret causes of the various changes of weather, and to foretell these alterations with certainty, but hitherto with no great success. Indeed, in this country at least, the alterations of the weather are so many, and frequently so sudden, that we can scarce suppose them to depend on any constant and regular cause. In the warm climates the weather is much more constant and uniform than with us; and even on the Continent in equal latitudes, it is less variable than here. Between the tropics, and probably for a considerable space northward and southward, the sun appears to be the principal agent in determining the weather. At one season of the year immense quantities of vapour are raised into the atmosphere, which, when the solar influence becomes less, are condensed into violent rains, and thus distinguish the year into the dry and rainy seasons. In those climates also the general course of the wind is evidently influenced by the sun, as Dr Halley has observed, (*See WIND, Encycl.*) Indeed at some times violent storms of wind, called *hurricanes*, whirlwinds, and storms of thunder and lightning, will occur: but of these the sun can only be accounted the remote cause; the immediate one being most probably the highly electrified state of the atmosphere. The inhabitants of those climates, especially the savages, who are continually exposed to the atmosphere, are able to foretell these tempests some time before. The signs which they observe, however, are in fact only the tempest beginning its operations in the atmosphere; and no

person whatever is able to foretell an hurricane or a storm of thunder a month, or even a week, before it comes. The reason of this is, that the sources of atmospheric electricity are not only invisible to us, but so variable in themselves, that though we knew them at one time, we have not the least security they that would continue the same even for a day. In various parts of this work it has been shown, that the sun communicates the electric fluid to the earth, and that this fluid must escape somewhere from the earth into the atmosphere in the very same quantity in which it is communicated. As the electric fluid, however, cannot easily diffuse itself in the atmosphere, an accumulation of it over any particular spot must soon take place; in which case that spot will cease to emit any more electric fluid. If then a new vent is opened, a current of electric matter may perhaps be directed from that place which emitted it before; and then the atmosphere, instead of receiving electricity from the earth, will communicate its superfluous quantity to it. In such a situation of the atmosphere, storms of thunder may readily take place; but where there is nearly an equal degree of electricity in the earth and atmosphere, an earthquake is most likely to ensue. (*See EARTHQUAKE, n° 39. art. 10. Encycl.*) Besides the mere accumulation of electricity in the atmosphere, there are other causes, such as severe frosts, which may detain the fluid in various parts of the earth at particular times; and thus be indirectly the cause of thunder, earthquakes, &c. in other places. This will easily show the difficulty, nay the impossibility, of predicting these storms; as the causes of them may be very remote from the place where they happen. An hurricane in Jamaica, for instance, may be occasioned by something in New Britain, or an earthquake in Portugal by something in Sweden or Norway.

In our own climate, nothing can be more variable and uncertain than the weather. Some have attempted to deduce its changes from the influence of the moon; but, though it cannot be doubted that the moon as well as the sun has some influence on our atmosphere, the changes in it are by far too many to be occasioned by any regular and permanent cause.—The wind has likewise been thought considerably to influence the weather: but excepting with regard to heat or cold, we cannot find that this is to be depended upon; not to mention that the wind itself makes part of the weather, and ought to have its cause explained as much as the rest. That alterations of the weather, however, do not depend immediately either on the sun, moon, or wind, appears from a circumstance mentioned by Mr Derham, viz. that “moles dig *before a thaw*.” This he ascribes to *warm vapours* which they feel in the earth; but whatever it is, we from thence learn, that the cause of this alteration lies not in the atmosphere, but in the earth itself, from whence it would seem to be communicated to the atmosphere.

But though it is probable that the action of the electric fluid in the earth is the cause of those sudden changes which are met with in almost all countries; yet the general determination of the weather, or what is called the *climate*, evidently depends on some settled and permanent cause. The cold of winter and heat of summer are plainly occasioned by the greater or less obliquity of the sun's rays at those seasons. To the sun also are we to ascribe those regular winds which, though most remarkable within the tropics, are yet in some degree to be met with even in our own country.

Thus, notwithstanding the excessive variableness of our climate, we may determine the general outline of the weather from evident causes. Thus in the months of January and February we may reasonably expect frost and snow, from the condensed and cold air in the northern regions pressing southward to those parts rarefied by the sun. In March we very often meet with the same, by reason of the weak influence of the sun at that time; but more frequently there are at that time storms of wind from various quarters, but frequently from the west or north. The reason of this is, that the air over the land begins to be rarefied; in consequence of which the denser air rushes in from that quarter where the passage is most free.—In April, the rarefaction of the air being greater, and considerable quantities of electric matter thus passing from the earth into it, the winds cease, or become more gentle, and rains commence. In the beginning of May the wind often blows very cold from the north, though the weather is more settled. Why this wind did not take place in April, seems not so easily accounted for; but most probably the difference of density between the northern and southern air was not then sufficient to allow of a strong current from any quarter. During the latter part of May and the whole of June, the weather is usually settled and clear; the sun gradually exerting his greatest influence. In July we have thunder and rain, for the reasons already given. The latter part of August and the whole of September are usually dry, with westerly winds, in consequence of the latter having prevailed in the conflict with the east wind. The

whole month of October, and great part of November, is usually rainy, on account of the interference of the west and north winds; and in the end of November, and throughout the month of December, frost and snow come on, though not with such certainty as in January.

This, in general, is the weather we may expect throughout the year; but by many accidental causes, not easily discoverable, it may be very much altered. Some of these causes we have endeavoured to point out; but, besides the reasons already given, it is not impossible that an alteration may take place in our atmosphere from causes entirely beyond it, and which exist only in the immense mass of ethereal fluid with which the universe is filled. Such causes, however, as they must be totally without the reach of our investigations, can never be assigned as the reason of any kind of weather; yet in some seasons there is such a general cold over a great part of the earth, that we must certainly imagine the cause to have been very high in the atmosphere. Of this the year 1782 furnishes us with a notable example. During the whole of that summer the sun appeared almost totally to have lost his influence. No vegetable, not even grass, came to perfection; and the harvest was scarce finished in the month of December. This was the case in Scotland, and it seems to have been similar all over Europe. The cause of this extraordinary cold, we cannot discover; but its effects were very obvious and dreadful. The electric fluid being confined over so large a space, broke out in the southern parts with fury; and Sicily and Calabria were almost entirely ruined by earthquakes. The earth now poured out such immense quantities of electric matter, that the atmosphere seemed scarce able to contain it. It therefore diffused itself along the lower regions all over Europe. Heat and almost perpetual thunder were the consequence: vegetation was excessively luxuriant; but the immoderate quantity of electricity having occasioned continual fogs which obscured the sun, fruits had not their proper flavour; nor was the crop altogether what might have been expected. The electric fluid, in the mean time, having fully saturated the lower part of the atmosphere, gradually ascended higher; but as the earthquakes ceased to supply new quantities of it, the southern parts of the atmosphere became negatively electrified with respect to the northern parts. To restore the equilibrium, a vast quantity rushed from the north to the south, visible from the north of Scotland to Paris and farther, in the meteor which appeared on the 18th of August 1783. The immediate consequence of this was, that the atmospheric vapours being left without a proper quantity of electric matter to support them, violent rains took place and continued for some time; a very severe winter succeeded an hot summer, and no remarkable alteration in the weather took place till May.

In most parts of the world, the general state of the weather is determined by their situation with regard to the sea, mountains, &c. In general, mountainous countries are subjected to violent rains, storms of wind, very often thunder and lightning. In some places, particularly the southern part of the continent of America, the weather is almost a continual tempest. The Cape of Good Hope is also remarkable for storms, but chiefly of wind; while Terra del Fuego and the opposite point of the continent is deluged with perpetual rains. The Isthmus of Darien is also remarkable for rainy weather, while in the whole empire of Peru

it scarce ever rains. Persia, Egypt, and some other countries, are likewise destitute of rain, without having the inconvenience of earthquakes to which Peru is subject. The reason of these variations cannot be assigned without a more particular knowledge of the situation of those countries than we can boast of. In general, however, it is known, that high mountains have the property of collecting clouds in their neighbourhood, and consequently of producing rains, thunder, and storms of wind. Where a country is nearly surrounded by a vast extent of sea, it is commonly subject to great rains. Hence the climate of islands is more rainy than of continents; and hence probably the reason of the rains in South America and the Isthmus of Darien, which approach to an insular situation. The great drifels of the air in Peru may be occasioned by the violent determination of the vapours to these parts, which deprive that country of its due proportion: but this can only be hinted as a conjecture, and we have not sufficient data to establish any thing certain.

To conclude this article, we ought now to give an account of those alterations in the air which predict a change of weather, or rather inform us that the weather actually is changing. These, however, are but few, and not always certain. The brute creation are much more sensible of them than we; and give information by various means, according to their peculiar instincts. Those who are much in the open air also will be much better able to perceive these alterations, than such as are not. The barometer is the most certain index we have, and will frequently inform us of a change before the least sign of it can be otherwise perceived. But though we are thus informed that some change is about to take place, we are at a loss to know what it is, and can only guess from the season of the year what kind of weather we may reasonably expect. Thus, in the summer-months, if the wind is easterly, the barometer falls, and the clouds in the west seem stationary, or move a little to the eastward, we may certainly expect thunder at no great distance. If the wind is brisk, and the clouds move before it heavily and sluggishly, we are also to expect thunder, but at a distance. Indeed, we may judge of the approach of thunder-clouds by the time of the day in which they appear. When the sun has reached the meridian, his power of rarefying the air above any particular spot is then greatest. Hence, as this luminary is continually moving to the westward, the increase of the rarefaction towards that quarter must prevent any current of air from blowing from the west, and at the same time solicit a current from the east: but if by some other cause a westerly wind shall prevail, and drive the clouds directly against the easterly one, it is then plain that nothing further can stop their progress; they will be violently electrified, and discharge their contents directly over our heads. Hence the vulgar observation in this country, that if thunder begins at eleven in the forenoon, we will probably have but little; but a great deal, and very near, if it begins at twelve, or between twelve and one.

Another pretty certain indication of an approaching change of weather is a great clearness and transparency in the atmosphere. This is commonly taken notice of when the moon is newly changed. If at that time we see distinctly the part of the moon which is not en-

lightened by the sun's rays, we are pretty certain that rough stormy weather is soon to ensue. In warm climates this transparency is not confined to the atmosphere, but extends even to the waters of the ocean: and when the bottom is visible at a great depth, it is a certain prognostic of an hurricane. This transparency denotes some internal agitation of the electric fluid; for by a certain motion of it even the most solid bodies may be made transparent as glass, (see *ELECTRICITY, Encycl.* n^o 4.); and the agitation becoming more and more violent, at last produces the most terrible commotions in the atmosphere. Something similar may be observed with regard to the transmission of sound; for in such states of the atmosphere sounds are heard much more difficultly and at a greater distance than others; but a sufficient number of observations have not yet been made to determine this matter with any accuracy.

It would be tedious to enter into a detail of all the prognostics which are drawn from the various appearances of the clouds, of halos, parhelia, aurora borealis, &c. Every person expects rain when the sky begins to grow hazy and dull; and halos and parhelia only appear in such cases. As for the aurora borealis, it is often seen for many nights together without any remarkable change in the state of the atmosphere. It is the natural effect of a constant and regular cause, and is probably too high in the atmosphere to produce any remarkable effect; though it has been thought in some cases to be productive of a current of wind from the south-west, for which a probable reason is assigned under the article *AURORA BOREALIS*, n^o ult.

WHEAT-EAR, (*MOTACILLA Oenanthe*), in ornithology, a species omitted to be described under *MOTACILLA*. It is a bird of passage, and begins to visit us about the middle of March, and continues coming till the beginning of May: it has been observed that the females arrive about a fortnight before the males. They frequent warrens, downs, and the edges of hills, especially those that are fenced with stone-walls. They breed in the latter, in old rabbit-burrows, cliffs, and frequently under old timber: their nest is large, made of dried grass, rabbit's down, a few feathers, and horse-hair: and they lay from six to eight eggs, of a light-blue colour.

They grow very fat in autumn, and are esteemed a delicacy. About Eastbourn in Suffex they are taken by the shepherds in great numbers, in snares made of horse hair, placed under a long turf: being very timid birds, the motion of a cloud, or the appearance of a hawk, will drive them for shelter into those traps, and so they are taken. The numbers annually ensnared in that district alone, amount to about 1850 dozen, which sell usually at six-pence per dozen; and what appears very extraordinary, the numbers that return the following year do not appear to be lessened. The reason that such a quantity are taken in the neighbourhood of Eastbourn is, that it abounds with a certain fly which frequents the adjacent hills, for the sake of the wild thyme they are covered with; which is not only a favourite food of that insect, but the plant on which it deposits its eggs.

Wheat-ears are much fatter in a rainy season than in a dry one; for they not only feed on insects but on earth-worms, which come out of the ground in greater numbers in wet weather than in dry.

The head and back of the male are of a light grey, tinged

tinged with red: over each eye is a white line; beneath that is a broad black stroke, passing across each eye to the hind part of the head: the rump and lower half of the tail are white; the upper half black: the under side of the body is white, tinged with yellow; on the neck it inclines to red: the quill-feathers are black, edged with reddish brown. The colours of the female are more dull: it wants that black stroke across the eyes, and the bar of white on the tail is narrower. These birds disappear in September, at least from the northern parts of this kingdom; but in Hampshire many of them continue the whole winter.

WHITE-THROAT, (*MOTACILLA Sylva*), in ornithology, a species omitted under the article **MOTACILLA**. It frequents our gardens in the summer-time; in the winter it leaves us. It builds in low bushes near the ground, making its nest externally of the tender stalks of herbs and dry straw; the middle part of fine bents and soft grass, the inside of hair. It lays five eggs of a whitish green colour, sprinkled with black spots. Its note is continually repeated, and often attended with odd ejaculations of the wings: is harsh and displeasing: is a shy and wild bird, avoiding the haunt of man; seems of a pugnacious disposition, singing with an erected crest, and in attitudes of defiance.

The head of this bird is of a brownish ash-colour, the throat white: the breast and belly white, tinged with red (in the female wholly white): the back inclines to red: the lesser coverts of the wings are of a pale brown; the greater dusky, edged with tawny brown; the quill-feathers dusky, edged with reddish brown; the tail the same, except the upper part of the interior side and whole exterior side of the outmost feather, which are white; the legs are of a yellowish brown.

WHYTE (Dr Robert), an eminent physician, born at Edinburgh on the 6th September 1714, was the son of Robert Whyte, Esq; of Kennoway, advocate. This gentleman died six months before the birth of our author, who had also the misfortune to be deprived of his mother before he had attained the seventh year of his age. After receiving the first rudiments of school-education, he was sent to the university of St Andrews; and after the usual course of instruction there, in classical, philosophical, and mathematical learning, he came to Edinburgh, where he entered upon the study of medicine, under those eminent medical teachers, Munro, Rutherford, Sinclair, Plummer, Allron, and Innes. After learning what was to be acquired at this university, in the prosecution of his studies he visited foreign countries; and after attending the most eminent teachers at London, Paris, and Leyden, he had the degree of Doctor of Medicine conferred upon him by the university of Rheims in 1736, being then in the 22d year of his age.

Upon his return to his native country, he had the same honour also conferred upon him by the university of St Andrews; where he had before obtained, with applause, the degree of Master of Arts.

Not long afterwards, in the year 1737, he was admitted a Licentiate of Medicine by the Royal College of Physicians of Edinburgh; and the year following he was raised to the rank of a Fellow of the College. From the time of his admission as a licentiate, he entered upon the practice of medicine at Edinburgh; and the reputation which he acquired for medical learn-

ing, pointed him out as a fit successor for the first vacant chair in the university. Accordingly, when Dr St-Clair, whose eminent medical abilities, and persuasive powers of oratory, had contributed not a little to the rapid advancement of the medical school of Edinburgh, found that those conspicuous talents which he possessed could no longer be exerted in the manner which they once had been when he enjoyed bodily vigour unimpaired by age, and powers of mind unclouded by disease, he resigned his academical appointments in favour of Dr Whyte.

This admission into the college took place on the 20th of June 1746; and he began his first course of the institutions of medicine at the commencement of the next winter-session. The abilities which he displayed from his academical chair, in no particular disappointed the expectations which had been formed of his lectures. The Latin tongue was the language of the university of Edinburgh; and he both spoke and wrote in Latin with singular propriety, elegance, and perspicuity. At that time the fystem and sentiments of Dr Boerhaave, which, notwithstanding their errors, much challenge the admiration of later ages, were very generally received by the most intelligent physicians in Britain. Dr Whyte had no such idle ardour for novelties as to throw them entirely aside because he could not follow them in every particular. The institutions of Dr Boerhaave, therefore, furnished him with a text for his lectures; and he was no less successful in explaining, illustrating, and establishing the sentiments of the author, when he could freely adopt them, than in refuting them by clear, connected, and decisive arguments, when he had occasion to differ from him. The opinions which he himself proposed, were delivered and enforced with such acuteness of invention, such display of facts and force of argument, as could rarely fail to gain universal assent from his numerous auditors; but free from that self-sufficiency which is ever the offspring of ignorance and conceit, he delivered his conclusions with becoming modesty and diffidence.

From the time that he first entered upon an academical appointment, till the year 1756, his prælections were confined to the institutions of medicine alone. But at that period his learned colleague Dr Rutherford, who then filled the practical chair, who had already taught medicine at Edinburgh with universal applause for more than thirty years, and who had been the first to begin the institution of clinical lectures at the Royal Infirmary, found it necessary to retire from the fatiguing duties of an office to which the progress of age rendered him unequal. On this crisis Dr Whyte, Dr Munro, sen. and Dr Cullen, each agreed to take a share in an appointment in which their united exertions promised the highest advantages to the university. By this arrangement, students who had an opportunity of daily witnessing the practice of three such teachers, and of hearing the grounds of that practice explained, could not fail to derive the most solid advantages.

In these two departments, the institutions of medicine in the university, and the clinical lectures in the Royal Infirmary, Dr Whyte's academical labours were attended with the most beneficial consequences both to the students and to the university. But not long after the period we have last mentioned, his lectures on the former of these subjects underwent a very considerable change. About this time the illustrious Gaubius, who had succeeded to the chair of Boerhaave, favoured the

the world with his *Institutiones Pathologiæ*. This branch of medicine had indeed a place in the text which Dr Whyte formerly followed; but, without detracting from the character of Dr Boerhaave, it may justly be said, that the attention he had bestowed upon it was not equal to its importance. Dr Whyte was sensible of the improved state in which pathology now appeared in the writings of Boerhaave's successor; and he made no delay in availing himself of the advantages which were then afforded.

In the year 1762, his pathological lectures were entirely new modelled. Following the publication of Gaubius as a text, he delivered a comment, which was read by every intelligent student with the most unfeigned satisfaction. In these lectures he collected and condensed the fruits of accurate observation and long experience. Enriched by all the opportunities of information which he had enjoyed, and by all the discernment which he was capable of exerting, they were justly considered as his most finished production.

For a period of more than twenty years, during which he was justly held in the highest esteem as a lecturer at Edinburgh, it may readily be supposed that the extent of his practice corresponded to his reputation. In fact, he received both the first emoluments, and the highest honours, which could here be obtained. With extensive practice in Edinburgh, he had numerous consultations from other places. His opinion on medical subjects was daily requested by his most eminent contemporaries in every part of Britain. Foreigners of the first distinction, and celebrated physicians in the most remote parts of the British empire, courted an intercourse with him by letter. Besides private testimonies of esteem, many public marks of honour were conferred upon him both at home and abroad. In 1752, he was elected a fellow of the Royal Society of London; in 1761, he was appointed first physician to the king in Scotland; and in 1764, he was chosen president of the Royal College of Physicians at Edinburgh.

But the fame which Dr Whyte acquired as a practitioner and teacher of medicine, were not a little increased by the information which he communicated to the medical world in different publications. His celebrity as an author was still more extensive than his reputation as a professor.

His first publication, an *Essay on the Vital and other Involuntary Motions of Animals*, although it had been begun soon after he had finished his academical course of medical education, did not come from the press till 1751; a period of fifteen years from the time that he had finished his academical course, and obtained a degree in medicine; but the delay of this publication was fully compensated by the matter which it contained, and the improved form under which it appeared.

The next subject which employed the pen of Dr Whyte was one of a nature more immediately practical. His *Essay on the Virtues of Lime-water and Soap in the Cure of the Stone*, first made its appearance in a separate volume in 1752. Part of this second work had appeared several years before in the *Edinburgh Medical Essays*: but it was now presented to the world as a distinct publication, with many improvements and additions.

His third work, intitled *Physiological Essays*, was

first published in the year 1755. This treatise consisted of two parts; 1st, An Inquiry into the Causes which promote the Circulation of the Fluids in the very small Vessels of Animals; and 2dly, Observations on the sensibility and irritability of the Parts of Men and other Animals, occasioned by Dr Haller's treatise on that subject. The former of these may be considered as an extension and farther illustration of the sentiments which he had already delivered in his *Essay on the Vital Motions*, while the latter was on a subject of a controversial nature. In both he displayed that acuteness of genius, and strength of judgment, which acquired in his former writings.

From the time at which his *Physiological Essays* were published, several years were probably employed by our author in preparing for the press a larger and perhaps a more important work than any yet mentioned, his *Observations on the Nature, Causes, and Cure of those Disorders which are commonly called nervous, hypochondriac, and hysterical*. This elaborate and useful work was published in the year 1764.

The last of Dr Whyte's writings is intitled, *Observations on the Dropsy in the Brain*. This treatise did not appear till two years after his death; when all his other works were collected and published in one quarto volume, under the direction of his son and of his intimate friend the late Sir John Pringle.

Besides these five works, he wrote many other papers, which appeared in different periodical publications; particularly in the *Philosophical Transactions*, the *Medical Essays*, the *Medical Observations*, and the *Philosophical and Literary Essays*.

At an early period of life, soon after he had settled as a medical practitioner in Edinburgh, he entered into the married state. His first wife was Miss Robertson, sister to General Robertson late governor of New York. By her he had two children; both of whom died in early infancy, and their mother did not long survive them. A few years after the death of his first wife, he married as a second wife Miss Balfour, sister to the present James Balfour, Esq; of Pilrig. By her he had fourteen children: but in these also he was in some respects unfortunate; for six of them only survived him, three sons and three daughters, and of the former two are since dead. Although the feeling heart of Dr Whyte, amidst the distresses of his family, must have often suffered that uneasiness and anxiety which in such circumstances is the unavoidable consequence of parental affection and conjugal love; yet he enjoyed a large share of matrimonial felicity. But his course of happiness was terminated by the death of his wife, which happened in the year 1764: and it is not improbable that this event had some share in hastening his own death; for in the beginning of the year 1765 his health was so far impaired, that he became incapable of his former exertions. A tedious complication of chronic ailments, which chiefly appeared under the form of diabetes, was not to be resisted by all the medical skill which Edinburgh could afford; and at length terminated in death, on the 15th of April 1766, in the 52d year of his age.

WILDERNESS, (*Encycl.*) Wilderesses, says Mr Miller, should always be proportioned to the extent of the gardens in which they are made; for it is very ridiculous to see a large wilderness planted with tall trees in a small

Whyte,
Wilderness.

Wilderness. small spot of ground; and, on the other hand, nothing can be more absurd than to see little paucity squares, or quarters of wilderness-work, in a magnificent large garden. As to the situation of wildernesses, they should never be placed too near the habitation, nor so as to obstruct any distant prospect of the country, there being nothing so agreeable as an unconfined prospect: but where, from the situation of the place, the sight is confined within the limits of the garden, nothing can be so agreeably terminate the prospect as a beautiful scene of the various kinds of trees judiciously planted; and if it is so contrived that the termination is planted circularly, with the concave towards the sight, it will have a much better effect than if it end in straight lines or angles. The plants should always be adapted to the size of the plantation; for it is very absurd for tall trees to be planted in the small squares of a little garden; and in large designs small shrubs will have a mean appearance. It should also be observed never to plant evergreens amongst deciduous trees; but always to place the evergreens in a wilderness in a separate part by themselves, and that chiefly in sight.

As to the walks, those that have the appearance of meanders, where the eye cannot discover more than twenty or thirty yards in length, are generally preferable to all others, and these should now and then lead into an open circular piece of grass; in the centre of which may be placed either an obelisk, statue, or fountain; and if in the middle of the wilderness there be contrived a large opening, in the centre of which may be erected a dome or banqueting-house, surrounded with a green plot of grass, it will be a considerable addition to the beauty of the whole. From the sides of the walks and openings, the trees should rise gradually one above another to the middle of the quarters, where should always be planted the largest growing trees, so that the heads of all the trees may appear to view, while their stems will be hid from the sight. Thus, in those parts which are planted with deciduous trees, roses, honeysuckles, spiræa frutex, and other kinds of low-flowering shrubs, may be planted next the walks and openings; and at their feet, near the sides of the walks, may be planted primroses, violets, daffodils, &c. not in a straight line, but so as to appear accidental, as in a natural wood. Behind the first row of shrubs should be planted syringas, althæa frutex, mezerions, and other flowering-shrubs of a middle growth; and these may be backed with many other sorts of trees, rising gradually to the middle of the quarters.

The part planted with evergreens may be disposed in the following manner, viz. in the first line next the great walks may be placed the laurus tinus, boxes, spurge-laurel, juniper, savin, and other dwarf evergreens. Behind these may be placed laurels, hollies, arbutuses, and other evergreens of a larger growth. Next to these may be planted alaternuses, phyllireas, yews, cypresses, Virginian cedars, and other trees of the same growth; behind these may be planted Norway and silver firs, the true pine, and other sorts of the fir-growth; and in the middle should be planted Scotch pines, pinalars, and other of the larger growing evergreens; which will afford a most delightful prospect if the different shades of the greens are curiously intermixed.

But beside the grand walks and openings (which should always be laid with turf, and kept well mowed), there should be some smaller serpentine walks

through the middle of the quarters, where persons may retire for privacy; and by the sides of these private walks may also be scattered some wood-flowers and plants; which, if artfully planted, will have a very good effect.

In the general design for these wildernesses, there should not be a studied and stiff correspondency between the several parts; for the greater diversity there is in the distribution of these, the more pleasure they will afford.

WINTER'S BARK. See the two following articles.

WINTERANIA, in botany, a genus of the monogynia order, belonging to the dodecandria class of plants; for the characters of which, see the *BOTANY Table*. There is but one species, the canella; see Plate CCLXXXVI. It grows usually about 20 feet high, and eight or ten inches in thickness, in the thick woods of most of the Bahama islands. The leaves are narrow at the stalk, growing wider at their ends, which are broad and rounding, having a middle rib only; they are very smooth, and of a light shining green. In May and June the flowers, which are pentapetalous, come forth in clusters at the ends of the branches: they are red, and very fragrant, and are succeeded by round berries, of the size of large peas, green, and when ripe (which is in February) purple, containing three shining black seeds, flat on one side, otherwise not unlike in shape to a kidney-bean: these seeds in the berry are enveloped in a slimy mucilage. The whole plant is very aromatic, the bark particularly, being more used in distilling, and in greater esteem, in the more northern parts of the world than in England. This bark is that which is commonly known in the shops by the name of *Winter's bark*; tho' truly not the right, as Sir Hans Sloane has judiciously informed us. See the following article.

WINTERANIA Aromatica, the tree which produces the *Winter's bark*. Formerly this tree was utterly unknown to the Europeans till the return of Captain John Winter, who, in the year 1577, sailed with Sir Francis Drake, as commander of a ship called the *Elizabeth*, destined for the South Seas; but immediately after they had gone through the Straights of Magellan, Captain Winter, on the 8th of October 1578, was obliged by stress of weather to part company, and to go back again into the Straights, from whence he returned into England in June 1579, and brought with him several pieces of this aromatic bark; which Clusius, in his *Exot.* p. 75. calls after him *Cortex Winteranus*, or *Winter's bark*.

Several authors have mentioned it since in their botanical works; but all they have said has been copied from Clusius, *e. g.* Dalechamp hist. p. 1818. Parkinson Theat. p. 1652. *Baubin Pin.* 461. *Jonglson Dendr.* p. 232.

No more was heard of this bark till the Dutch fleet under admiral Van Nort returned from the Straights of Magellan in the year 1600. The author of their voyage calls this tree "Lauro similis arbor licet prociore, cortice piperis modo acri et mordenti." *De Bry. Ind. Occid.* vol. 9. p. 18.

Afterwards all the navigators who passed through the Straights of Magellan took notice of the tree on account of the usefulness of its bark; but none furnished any description that could make it botanically known, before Mr George Handasyd came from the Straights

Streights of Magellan, 1691, and brought with him some dried specimens, which he gave to Sir Hans Sloane, and are now preserved in the British Museum, Hort. Sicc. 8. fo. 100. 130. 148. 332. fo. 46. From these specimens, and the account Mr Handasyd gave of this tree, Sir Hans Sloane drew up a history, and gave a figure in the Philosophical Transactions, 1693. n^o 204. p. 922. t. 1. "Periclymenum rectum, foliis laurinis, cortice acri aromatico."

Still the systematical botanists could not give it a place in their catalogues, being unacquainted with its flowers and fruit.

Pomet, in his Mat. Med. p. 130. imagined our Winter's bark to be the same with the canella cinnamomea, Brown Hist. Jam. p. 275, fo. 3. Catesby Carol. vol. 2. p. 50. which grows in the West Indies, between the tropics, and is called by the drug-gifts *canella alba*. This error has been followed by most of the modern writers, and the two trees proposed under the same name, viz. *Winterania Canella*, Lin. Sp. Pl. 638.

At length Dr Fothergill procured figures to be taken from the specimens brought by Captain Wallis from the Streights of Magellan, and prevailed with Dr Solander to give such a history and description of the tree as might enable botanists to place it in its proper rank. These were communicated to the London Medical Society, and published in the fifth volume of their *Observations and Inquiries*.

From the observations made by Sir Joseph Banks and Dr Solander during their stay in Terra del Fuego, it seems as if the trees in the Streights of Magellan, near the sea coast, are stunted, perhaps from the high winds, and have smaller leaves than those upon Terra del Fuego, where again the flowers were not so much expanded as in the Streights of Magellan. This last difference may be occasioned by the season, as the flowers on Terra del Fuego were seen in the month of January, and in the Streights of Magellan in the month of March.

The Winter's-bark tree, *Winterania aromatica*, is one of the largest forest-trees upon Terra del Fuego; it often rises to the height of 50 feet. Its outward bark is on the trunk grey and very little wrinkled, on the branches quite smooth and green.

The branches do not spread horizontally, but are bent upwards, and form an elegant head of an oval shape.

The leaves come out, without order, of an oval elliptic shape, quite entire, obtuse, flat, smooth, shining, of a thick leathery substance, evergreen, on the upper side of a lively deep green colour, and of a pale bluish colour underneath, without any nerves, and their veins scarcely visible; they are somewhat narrower near the footstalks, and there their margins are bent downwards.

In general, the leaves are from three to four inches long, and between one and two broad; they have very short footstalks, seldom half an inch long, which are smooth, concave on the upper side, and convex underneath. From the scars of the old footstalks the branches are often tuberculated.

The peduncles, or footstalks for the flowers, come out of the *axillæ foliorum*, near the extremity of the branches; they are flat, of a pale colour, twice or three times shorter than the leaves; now and then they

support only one flower, but are oftener near the top divided into three short branches, each with one flower.

The bractææ are oblong, pointed, concave, entire, thick, whitish, and situated one at the basis of each peduncle.

Calix, or flower-cup, it has none; but in its place the flower is surrounded with a spathaceous gem, of a thick leathery substance, green, but reddish on the side which has faced the sun: before this gem bursts, it is of a round form, and its size is that of a small pea. It bursts commonly so, that one side is higher than the other, and the segments are pointed.

The corolla consists always of seven petals, which are oval, obtuse, concave, erect, white, have small veins, and are of an unequal size, the largest scarcely four lines long; they very soon fade, and drop off almost as soon as the gem bursts.

The filaments are from 15 to 30, and are placed on the flat end side of the receptacle; they are much shorter than the petals, and gradually decrease in length towards the sides.

The antheræ are large, oval, longitudinally divided into two, or as if each was made up of two oblong antheras.

The germina are from three to six, placed above the receptacle, turbinate, or of the shape of an inverted fig, flat on the inside, and somewhat higher than the stamina; they have no styles, but terminate in a stigma, which is divided into two or three small lobes.

Dr Solander never saw the fruit in its perfect ripe state; but could conclude from the unripe ones which he saw in abundance, that each germen becomes a separate seed-vessel, of a thick fleshy substance, and unilocular; and in each the rudiments of three, four, or five seeds were plainly discernible. See Plate CCCXXIII. where n^o 1. represents the spathaceous gem, after it is burst open. 2. The same. 3. The same (*a*) with the corolla (*b*) remaining within it. 4. One of the petals spread out. 5. The stamina (*a*) and the pistilla (*b*) after the gem and the corolla are taken away. 6. The outside of an anthera (*a*) with its filament (*b*). 7. The inside of the same. 8. The germina (*a*) situated on the centre of the receptacle, after the stamina have been removed; the lobed stigma (*b*). 9. The convex or outermost side of a germen (*a*) with its stigma (*b*). 10. The inside of the same. 11. A germen cut open longitudinally, so as to show the rudiments of the seeds. 12. A germen cut through transversely.

The weather is much more severe in the climate where these trees are natives, than in Britain; where, therefore, it is thought they would thrive very well.

The bark of the *Winterania*, or Winter's cinnamon, brought over by the Dolphin, in respect to figure, exactly resembles that which was delineated by Clusius. The pieces are about three or four inches square, of different degrees of thickness, from a quarter to three quarters of an inch. It is of a dark brown cinnamon colour; an aromatic smell, if rubbed; and of a pungent, hot, spicy taste, which is lasting on the palate, though imparted slowly. It has the name of Winter's *Cinnamon*, from a faint resemblance in colour and flavour to that grateful aromatic, though differing from it greatly in every other respect. This bark is only brought to us from the Streights of Magellan, and is the produce of the tree above described; much celebrated as an anti-

scorbutic by the first discoverers, but unknown in the practice of physic, no quantity, except as a curiosity, having been brought to Europe till the return of the ships sent out on the expeditions to the South Seas.

The bark which was substituted in the room of this is the canella alba of the shops, the bark of a very different tree, and brought from a different part of the world, disagreeing with the former in almost every particular. It is of a light ash or grey colour; in thickness it seldom exceeds two-eighths of an inch. The pieces are of different lengths and irregular shapes, and for the most part are taken from trees of small size: its taste is aromatic, and has more of the clove than the cinnamon. It yields an essential oil by distillation, and is brought to us chiefly from Jamaica, though it is found in some other of the West-India islands. There are a few plants of it in the stoves of some curious botanists in England, particularly in that belonging to John Blackburne, Esq; at Oxford, Lanshire.

Sir Hans Sloane gives a figure of it in his History of Jamaica; from which it evidently appears to be a different genus from the Winterania aromatica.

For want of the knowledge of these circumstances, and an opportunity of comparing the genuine Winter's bark with the canella alba, some of the most respectable writers on the materia medica have scarcely been able to avoid confusion in treating this subject; which it is hoped for the future will be avoided, and the distinction between them sufficiently established.

From several experiments made by Dr Morris, the cortex magellanica appears to be an astringent of a particular kind, and therefore likely to be of use in several manufactures. Water is the proper solvent of this bark; though the saline, gummy, and resinous parts are so blended in it, as in saffron and some other vegetables, that it parts with them readily in proof and rectified spirits of wine, though not in so great a quantity.

The infusion and decoction of this bark were of so grateful an aromatic bitter taste, that it seems likely to be a pleasant vehicle for some of the nauseous drugs. With this view, on substituting the powder of this bark for the cardamom seeds in making the infusion of fenna, as directed in the London Dispensatory, the nauseous smell and taste of that excellent purgative was so effectually covered, as to be scarcely distinguished by the nicest palate. Tincture of rhubarb also prepared with this bark instead of cardamoms seemed far less disagreeable.

It must not be concealed, that the canella alba from Jamaica, which is generally sold for the Winter's bark in the shops, was found to have the last mentioned property, though not in so high a degree.

WOOD, (*Encycl.*) The art of moulding wood is mentioned by Mr Boyle as a desideratum in the art of carving. He says, he had been credibly informed of its having been practised at the Hague; and suspects that it might have been performed by some menstruum that softens the wood, and afterwards allows it to harden again, in the manner that tortoise-shell is moulded; or, perhaps, by reducing the wood into a powder, and then uniting it into a mass with strong but thin glue. And he adds, that having mixed saw-dust with a fine glue made of isinglass, slightly straining out

what was superfluous through a piece of linen, the remainder, formed into a ball and dried, became so hard as to rebound when thrown against the floor.

The people who work much in wood, and that about small works, find a very surprising difference in it, according to the different seasons at which the tree was cut down; and that not regularly the same in regard to all species, but different in regard to each. The button-mould makers find that the wood of the pear-tree cut in summer works toughest; holly, on the contrary, works toughest when cut in winter; box is mellowest when it has been cut in summer, but hardest when cut about Easter; hawthorn works mellow when cut about October; and the service is always tough if cut in summer.

Woods are distinguished into divers kinds, with regard to their nature, properties, virtues, and uses. Of wood, considered according to its qualities, whether useful, curious, medicinal, &c. the principal is called *timber*, used in building houses, laying floors, roofs, machines, &c.

Woods valued on account of their curiosity, are cedar, ebony, box, calambo, &c. which by reason of their extraordinary hardness, agreeable smell, or beautiful polish, are made into tables, combs, beads, &c.

The medicinal woods are guaiacum, aloes, sassafras, nephriticum, fantal, saraparilla, apalanthum, &c.

Woods used in dyeing are brazil-wood, Campechy-wood, &c.

Fossile Wood. Fossile wood, or whole trees, or parts of them, are very frequently found buried in the earth, and that in different strata; sometimes in stone, but more usually in earth; and sometimes in small pieces loose among gravel. These, according to the time they have lain in the earth, or the matter they have lain among and in the way of, are found differently altered from their original state; some of them having suffered very little change; and others being so highly impregnated with crystalline, sparry, pyritical, or other extraneous matter, as to appear mere masses of stone, or lumps of the common matter of the pyrites, &c. of the dimensions, and, more or less, of the internal figure of the vegetable bodies into the pores of which they have made their way.

The fossile wood which we find at this day, are, according to these differences, arranged by Dr Hill into three kinds; 1. The less altered: 2. The pyritical: and, 3. The petrified.

Of the trees, or parts of them, less altered from their original state, the greatest store is found in digging to small depths in bogs, and among what is called *peat* or *turf earth*, a substance used in many parts of the kingdom for fuel. In digging among this, usually very near the surface, they find immense quantities of vegetable matter buried, and that of various kinds: in some places there are whole trees scarce altered, except in colour; the oaks in particular being usually turned to a jetty black; the pines and firs, which are also very frequent, are less altered, and are as inflammable as ever, and often contain between the bark and wood a black resin. Large parts of trees have also been not unfrequently met with unaltered in beds of another kind, and at much greater depths, as in the strata of clay and loam, among gravel, and sometimes even in solid stone.

Besides

Fig. 1.
Incision.



Fig. 2.
THEA Viridis.



Fig. 4.
PANAX Quinquifolium.



Root.

Fig. 5.
Libellula
half the natural size.



Fig. 3.
THEA Bohra.



Fig. 7.
Orellus.



A. Bell, sculp^t







Beside these harder parts of trees, there are frequently found also in the peat-earth vast quantities of the leaves and fruit and catkins of the hazel and the like trees: these are usually intermixed among the sedge and roots of grass, and are scarce at all altered from their usual texture. The most common of these are hazel nuts; but there are frequently found also the twigs and leaves of the white poplar; and a little deeper usually there lies a cracked and shattered wood, the crevices of which are full of a bituminous black matter; and among these the stones of plums and other stone-fruits are sometimes found, but that more rarely.

It is idle to imagine, that these have been thus buried either at the creation, or, as many are fond of believing, at the universal deluge. At the first of these times the strata must have been formed before the trees were yet in being; and the peat-wood is so far from being of antediluvian date, that much of it is well known to have been growing within these 300 years in the very places where it is now found buried.

In this state that is little altered from their original condition, it is that the fruits and larger parts of trees are usually found: what we find of them more altered, are sometimes large and long, sometimes smaller and shorter branches of trees, sometimes small fragments of branches, and more frequently small shapeless pieces of wood. The larger and longer branches are usually found bedded in the strata of stone, and are more or less altered into the nature of the stratum they lie in. The shorter and smaller branches are found in vast variety in the strata of blue clay used for making tiles in the neighbourhood of London. These are prodigiously plentiful in all the clay-pits of this kind, and usually carry the whole external resemblance of what they once were, but nothing of the inner structure; their pores being wholly filled, and undistinguishably closed, by the matter of the common vitriolic pyrites, so as to appear mere simple masses of that matter. These fall to pieces on being long exposed to moisture; and are so pregnant in vitriol that they are what is principally used for making the green vitriol or copperas at Deptford and other places.

The irregular masses or fragments of wood are prin-

cipally of oak, and are most usually found among gravel; though sometimes in other strata. These are variously altered by the insinuation of crystalline and stony particles; and make a very beautiful figure when cut and polished, as they usually keep the regular grain of the wood, and show exactly the several circles which mark the different years growth. These, according to the different matter which has filled their pores, assume various colours, and the appearance of the various fossils that have impregnated them; some are perfectly white, and but moderately hard; others of a brownish black, or perfectly black, and much harder; others of a reddish black, others yellowish, and others greyish, and some of a ferruginous colour. They are of different weights also and hardesses, according to the nature and quantity of the stony particles they contain: of these some pieces have been found with every pore filled with pure pellucid crystal; and others in large masses, part of which is wholly petrified and seems mere stone, while the rest is crumbly and is unaltered wood. That this alteration is made in wood, even at this time, is also abundantly proved by the instances of wood being put into the hollows of mines, as props and supports to the roofs, which is found after a number of years as truly petrified as that which is dug up from the natural strata of the earth. In the pieces of petrified wood found in Germany, there are frequently veins of spar or of pure crystal, sometimes of earthy substances, and often of the matter of the common pebbles: these fragments of wood sometimes have the appearance of parts of the branches of trees in their natural state, but more frequently they resemble pieces of broken boards; these are usually capable of a high and elegant polish.

Many substances, it is certain, have been preserved in the cabinets of collectors, under the title of *petrified wood*, which have very little right to that name. But where the whole outer figure of the wood, the exact lineaments of the bark, or the fibrous and fistular texture of the stræ, and the vestiges of the utriculi and tracheæ or air-vessels, are yet remaining, and the several circles yet visible which denoted the several years growth of the tree, none can deny these substances to be real fossil wood.

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